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Comparative EU statistics on Income and Living Conditions: Issues and Challenges

Proceedings of the EU-SILC conference (Helsinki, 6-8 November 2006)

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FOREWORD

Since 2005, the new EU Statistics on Income and Living Conditions (EU-SILC) covers 25 European Union (EU) countries as well as several non EU countries. EU-SILC, which replaces the EU-15 European Community Household Panel (ECHP), has now become the EU reference source for comparative statistics on income, poverty and social exclusion, particularly in the context of the Open Methods of Coordination on pensions and on social inclusion. On the one hand, EU-SILC raises some new issues regarding the EU common indicators already in use - especially with regard to the income concept(s) to be used for calculating the income-based indicators (as it follows closely -though not strictly- the recommendations of the Canberra Group and therefore provides detailed information on income components, in both gross and net). On the other hand, EU-SILC should allow to (better) address some policy areas that have not been (satisfactorily) covered to date.

From 6 to 8 November 2006, a conference entitled “Comparative EU-Statistics on Income and Living Conditions: Issues and Challenges” was held in Helsinki. This meeting, which was followed by a methodological workshop, was jointly organised by Eurostat and Statistics Finland. It brought together about 120 participants, producers as well as institutional and academic users of the SILC instrument. The conference can be seen as a follow-up of the EU Luxembourg Presidency Conference on “Taking forward the EU Social Inclusion Process” (Luxembourg, 13-14 June 2005) recommendation for in-depth methodological studies around EU-SILC[1].

The Conference and the Methodological Workshop were a joint event by Eurostat and Statistics Finland. Statistics Finland hosted the Conference and the Workshop, and was responsible for the local organisation.

This event was prepared together with a *Scientific Committee* which consisted of Tony Atkinson (Oxford University, UK), Michel Glaude (EUROSTAT, European Commission), Markus Jäntti (Åbo Akademi University, Turku, Finland) and Eric Marlier (CEPS/INSTEAD Research Institute, Luxembourg) and of a *Programming Committee* composed of Anne Clémenceau (EUROSTAT, European Commission), Martin Bauer (Statistics Austria), Jean-Marc Museux (EUROSTAT, European Commission), Hannele Sauli (Statistics Finland) and Paloma Seoane (Statistics Spain).

Academic experts in the field of income measurement, social exclusion and living conditions analysis made substantive contribution on the basis of their analysis of the EU-SILC micro database. Papers and presentations of the conference and workshop are available on www.stat.fi/eusilc/ . The Conference sessions covered the following topics:

1. General presentation of EU-SILC, giving a general overview of the state of the art of the EU-SILC project.

2. Income measurement in EU-SILC

[1] See http://www.ceps.lu/eu2005_lu/default.cfm for more information on this Conference (programme, interventions, conclusions and list of participants) and on the book *The EU and Social Inclusion: Facing the Challenges* [Marlier, Atkinson, Cantillon and Nolan, Bristol (2006), The Policy Press] that was subsequently published.

This session put the focus on conceptual papers discussing pros and cons of the EU-SILC approach in various dimensions of income measurement in the framework of policy assessment (Open Method of Coordination...) and academic research.

3. Non-income dimensions in EU-SILC

Non-income dimensions of EU-SILC were reviewed in assessing their ability to fulfil the EU and country needs in terms of other EU indicators for social inclusion. This session was oriented towards the recommendation of new/ revised EU indicator(s) for social inclusion and the possible need to adjust the variables to be collected/ produced under EU-SILC... building on the existing EU work.

4. Data quality and comparability in EU-SILC

This session concentrated on the several dimensions of quality, accuracy, coherence and comparability (main focus of the session); both comparability between countries (trade-off between comparability and best national practice) and comparability over time (transition from ECHP to EU-SILC) were considered.

5. EU-SILC to be used for national and comparative EU monitoring of some key aspects of social protection and social inclusion

The purpose of this session was to identify the needs of institutional and academic users for monitoring and modelling purposes (esp. in the context of the *EU Social Protection and Social Inclusion Process*), and to "benchmark" these needs against the data currently available in EU-SILC. An outcome of this session was a set of concrete recommendations to suggest ways of improving the EU-SILC instrument. Panellists reacted to the recommendations made in the previous sessions and addressed the issue of the use of EU-SILC as an aid to making social protection and social inclusion policy.

The conference has proved to be of great value for discussing stakeholders' needs and for providing directions for improving the relevance of the instrument. Eurostat drafted an action plan for the next few years summarizing the main recommendations of this Conference in order to be able to produce data of better quality, mainly in terms of comparability, and to better fulfill the needs of the different users, i.e. Commission DGs, the scientific community and other international organizations. This event has been a success thanks to the active contribution of all actors, speakers, discussants, chairs of the different sessions, panelists and all participants.

General presentation of EU-SILC

EU-SILC (community statistics on income and living conditions: general presentation of the instrument)

Anne CLEMENCEAU and Jean-Marc MUSEUX

chapter 1

EU-SILC (COMMUNITY STATISTICS ON INCOME AND INSTRUMENT)

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1. Introduction

Over the last years, Eurostat and the EU-SILC Working Group have invested a lot of efforts for developing the EU-SILC project, which has been implemented on a step by step basis. At the end of 2006, for the first time, comparable cross-sectional information relating to the 2005 collection has become available for the 25 Member States of the EU and for Norway and Iceland. It is the appropriate time to take stock of the achievements of almost 5 years of intense activity, to draw a first evaluation of the project and to issue recommendations for future improvement. These are the objectives of the Conference on “Comparative EU Statistics on income and living conditions: issues and challenges”.

As an introduction to the conference, the two first papers aim to review the project as it stands, from its launching up to now and from a European Commission and national perspective. The first paper is structured into two parts:

- The first part gives an overview of the EU background of the project, covering successively the policy context, the legal basis, the scope and geographical coverage, the main characteristics, the sampling issues, implementing and tracing rules, the content, the income concept, and finally the data access policy.
- The second part of the document provides an insight on the actual implementation of EU-SILC.

2. EU Background of the project

2.1. Policy context

The Lisbon European Council of March 2000 sets Member States and the European Commission the goal of making a decisive impact on the eradication of poverty by 2010. Building a more inclusive European Union is an essential element in achieving the Union’s ten year strategic goal of sustained economic growth, more and better jobs and greater social cohesion.

Member States co-ordinate their policies for combating poverty and social exclusion on the basis of a process of policy exchanges and mutual learning known as the ‘Open Method of Coordination’ (OMC). From 2006, three policy areas provide the framework for this process:

- Eradicating poverty and social exclusion
- Ensuring adequate and sustainable pensions
- Providing accessible, high quality and sustainable health and long-term care

The Open Method of Coordination comprises five main elements:

- Agreeing common objectives for the Union
- Translating the EU objectives into national/regional policies on the basis of National Reports on Strategies for Social Protection and Social Inclusion
- Establishing common indicators as a means of comparing best practice and measuring progress
- Publishing reports analysing and assessing the National Reports
- Establishing a Community Action Programme to promote policy cooperation and transnational exchange of learning and good practice.

The initial set of outcome indicators adopted formally by the European Council at Laeken in December 2001, as improved by subsequent developments since that date, plays a central role in monitoring the performance of Member States in promoting social inclusion. The purpose of these indicators is to allow the Member States and the European Commission to monitor national and EU progress towards key EU objectives in the area of social inclusion and of social protection, and to support mutual learning and identification of good (and bad) practices in terms of policies and institutional processes. This represents a major step forward in the development of EU cooperation in social policy, and has the potential to transform the framework within which Member States develop their national (and sub-national) policies to tackle poverty and social exclusion.

The development of indicators, under the responsibility of the SPC (Social Protection Committee) Indicators Sub-Group since February 2001, is a dynamic process. The work of the national delegations of experts, who make up the Group, and the secretariat provided by the European Commission Directorate-General on “Employment, Social Affairs and Equal Opportunities” (in close cooperation with Eurostat), has allowed the set of indicators (and breakdowns of these) to be considerably enriched. The following table (table 1) provides the current list of streamlined indicators in the strand relating to social inclusion as well as the list of overarching indicators for the three strands (social inclusion; pensions and health and long term care).

Table 1. List of overarching indicators and of indicators of the ‘social inclusion’ strand

Overarching indicators	
1	Risk of poverty
1a	Intensity of poverty risk
2	Income inequalities
3	Health outcome, inequality in health
4	Educational outcome and human capital formation
5	Access to labour market
6	Financial Sustainability of social protection systems
7	Pensions adequacy

Indicators for the strand ‘social inclusion’	
1	EU: At-risk-of poverty rate + illustrative threshold values
2	EU: Persistent at-risk of poverty rate
3	EU: Relative median poverty risk gap
4	EU: Long term unemployment rate
5	EU: Population living in jobless households
6	EU: Early school leavers not in education or training
7	NAT: Employment gap of immigrants
8	EU: Material deprivation

Overarching indicators	
8	Inequalities in access to health care
9	Improved standards
10	Employment of older workers
11	In-work poverty
12	Participation in labour market
13	Regional dimension
14	Improved standards

Indicators for the strand 'social inclusion'	
9	EU: Housing
10	EU: Self reported unmet need for medical examination
11	*Child well-being*

EU: commonly agreed EU indicator
NAT: commonly agreed national indicators

2.2. EU-SILC: the successor of the ECHP (European Community Household Panel) project

Reliable and timely indicators, reflecting the multi-dimensionality of poverty and social exclusion, are necessary. This means that having the required statistical infrastructure and capacity in place at the national and EU levels is a necessary condition for the Social Inclusion Process to achieve its aims, and commitment by the Member States and the Commission of the resources required to build that capacity is indispensable.

Over an eight year period (from 1994 to 2001), the ECHP (European Community Household Panel), ran in 14 of the then 15 Member States (with the exception of Sweden), and served as the source for many of the commonly agreed social inclusion indicators for this period. The role of the ECHP has therefore been crucial for the first two rounds of EU-15 National Action Plans on inclusion (2001 and 2003).

The ECHP was an input harmonised survey conducted in eleven Member States, based on common requirements defined at EU level. Concepts, definitions, classifications, procedures such as weighting, imputation, data editing and a 'blue print' questionnaire to be used by all the involved Member States were defined by Eurostat jointly with the ECHP Working Group and applied nationally.

In the other three Member States (DE, LU, UK), the ECHP data were produced from existing national panel survey information which were subsequently converted into the ECHP format. Consequently, full comparability of the data for these countries was not achieved as these national surveys were sometimes diverging to the ECHP requirements.

From the beginning, the ECHP project suffered from some quality problems, mainly, incomplete geographical coverage, reliability, timeliness:

- As already said, only fourteen Member States were covered by the ECHP project.
- The reliability of the ECHP data for a number of countries has occasionally been questioned. The initial response rate of the project, around 70% for the EU as a whole, varied considerably between countries (from 90% in EL and IT) to only 38-40% in LU and DE.
- The ECHP was conceived as a long term panel and suffered from a relatively steady attrition rate: between the first and second year, attrition was around 10% and stands at around 5% in the following years affecting significantly cross sectional representativity along the years.
- The ECHP results have been available only after a substantial lag and have therefore been criticised as being

out of date. It took around three years for the results of this project to be available in the first years, and around two years at the end;
- In some countries it was not satisfactorily integrated into the national statistical systems.

In parallel, international recommendations on income (Expert Group on Household Income Statistics (The Canberra Group), 2001) were developed, and collection of gross income at component level (and not net income as implemented in the ECHP) appeared to be preferable for income distribution analysis.

It is with the aims of solving the ECHP technical problems, of conforming to the internationally agreed definition of income and of extending the data collection to the enlarged EU (and beyond) that the decision was taken to stop the ECHP and launch EU-SILC.

2.3. Legal basis of the EU-SILC project

After a start on the basis of a Gentlemen's agreement in 2003 in seven countries, the SILC project has been implemented through a legal basis with effect from the 2004/2005 exercises. The legal basis is composed of three main components:

- Council and European Parliament (EP) regulation N° 1177/2003 defines the scope, definitions, time reference, characteristics of the data, data required, sampling, sample sizes, transmission of data, publication, access for scientific purposes, financing, reports and studies for the SILC project. The Framework Regulation was signed by the Council and EP on 16 June 2003 and published in the Official Journal (OJ) of the European Union on 3 July 2003. Regulation N° 1177/2003 is modified by regulation N°1553/2005 published on 7 September 2005 to extend the SILC project to the Member States to joined the EU on 1st May 2004;
- In parallel, Eurostat and the MS developed the technical aspects of the instrument. More concretely, five Commission Regulations (CR) on 'Sampling and tracing rules', on 'Definitions', on the 'list of primary (annual) target variables', on 'Fieldwork aspects and imputation procedures' and on 'Quality reports', implementing the Framework Regulation, were elaborated. The first four Commission Regulations were approved by the Statistical Programme Committee (SPC) in August 2003 and published in the OJ on 17 November 2003. The CR on quality reports was published in the OJ on 9 January 2004.
- In addition, every year, a Commission Regulation on the list of secondary target variables, i.e. modules introduced in EU-SILC with a possibility of repetition of a topic every four years or less frequently, is published.

2.4. Scope and geographical coverage of the EU-SILC instrument

EU-SILC is expected to become the EU reference source for comparative statistics on income distribution and social exclusion at European level, particularly in the context of the OMCs on pensions and on social inclusion and for producing structural indicators of social cohesion for the annual Spring Report to the European Council.

As for the ECHP and in fact for most household surveys, it covers only people living in *private households*, which needs to be kept in mind when carrying out statistical analyses and when interpreting indicators within a given country as well as between countries. Persons living in collective households and in institutions are generally excluded from the target population. For instance, the impact of the exclusion from the samples of old people living in institutions, of people with disabilities and of other vulnerable groups including the homeless may be very different from one country to the next. Some vulnerable groups living in private households may also be underrepresented because they are not easy to reach.

Small parts of the national territory amounting to no more than 2% of the national population and the national territories listed below may be excluded from EU-SILC. National territories that may be excluded include the French Overseas Departments and territories, the Dutch West Frisian Islands with the exception of Texel, the all Irish offshore islands with the exception of Achill, Bull, Cruit, Gorumna, Inishnee, Lettermore, Lettermullan and Valentia, and finally the Scotland north of the Caledonian Canal, the Scilly Islands.

2.5. Main characteristics of EU-SILC

A common framework aimed at anchoring the instrument nationally

EU-SILC is organised under a framework Regulation and is thus compulsory for all EU Member States. EU-SILC is based on the idea of a *common "framework"* and no longer a *common "survey"* as was the case for the ECHP. The common framework is defined by harmonised lists of target primary (annual) and secondary (every four years or less frequently) variables, by a recommended design for implementing EU-SILC, by common requirements (for imputation, weighting, sampling errors calculation), common concepts (household and income) and classifications (ISCO, NACE, ISCED) aiming at maximising comparability of the information produced.

The common framework is defined in the legislative background of the project, the Council and European Parliament framework Regulation, and the implementing Commission Regulations.

A cross-sectional and a longitudinal component for EU-SILC

SILC will provide two types of annual data:

- Cross-sectional data pertaining to a given time or a certain time period with variables on income, poverty, social exclusion and other living conditions, and
- Longitudinal data pertaining to individual-level changes over time, observed periodically over a four year period.

The first priority is to be given to the delivery of comparable, timely and high quality cross-sectional data. Longitudinal data will be limited to income information and a reduced set of critical qualitative, non-monetary variables of deprivation, aimed at identifying the incidence and dynamic processes of persistence of poverty and social exclusion among subgroups in the population. The longitudinal component is more limited in sample size compared to the primary, cross-sectional component. Furthermore, for any given set of individuals, micro-level changes are followed up only for a limited duration, such as a period of four years.

For both the cross-sectional and longitudinal components, all household and personal data are linkable.

Flexibility of implementation at national level

To anchor EU-SILC in the National Statistical System, survey design is flexible. In this way, the cross-sectional and longitudinal data can come from separate sources, i.e. the longitudinal dataset does not need to be "linkable" with the cross-sectional dataset at the micro-level. Of course, such linkage was not precluded, and is actually frequently met because the two types of data come from the same source. Depending on the country, micro-data could come from:

- two or more national sources (surveys and/or registers).
- one or more existing national sources combined or not with a new survey.

- A new harmonised survey to meet all EU-SILC requirements.

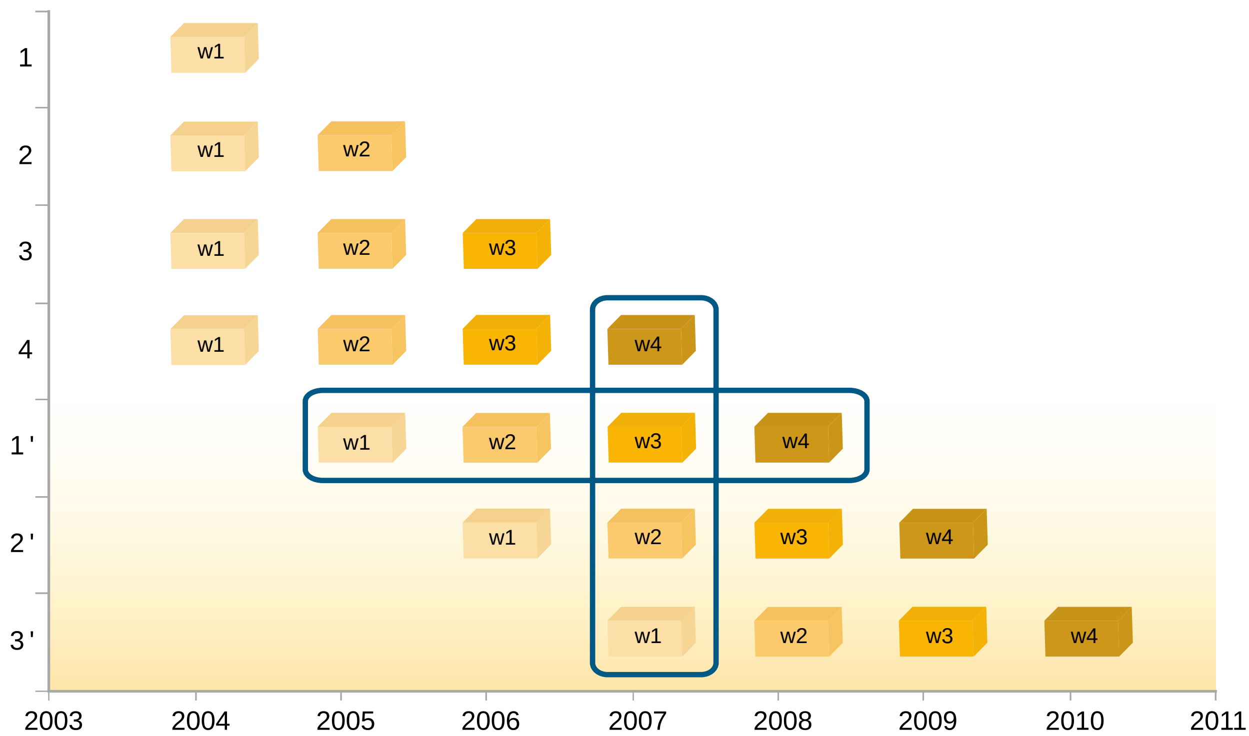
An integrated design ('the rotational design') for those countries that launched a new survey was proposed by Eurostat and implemented by countries.

Rotational design refers to the sample selection based on a number of sub-samples or replications, each of them similar in size and design and representative of the whole population. From one year to the next, some replications are retained, while others are dropped and replaced by new replications.

The fundamental characteristic of the integrated design is that the cross-sectional and longitudinal statistics are produced from essentially the same set of sample observations, thus avoiding unnecessary duplications which entirely separate cross-sectional and longitudinal surveys will involve.

As the most important objective of the longitudinal component of EU-SILC is to allow the calculation of the *Laeken Indicator on "at persistent-risk-of poverty rate"*, computed as the percentage of the population living in households where the equivalised disposable income was below the 60% threshold for the current year and at least two out of the preceding three years, the population selected in the first year needs to be followed-up for at least 4 years, i.e. the panel duration should be of at least 4 years. For this reason, Eurostat has recommended a rotational design with 4 sub-samples or replications.

Figure 1 below illustrates the type of structure which has been recommended by Eurostat. This structure will be suitable for meeting the combined cross-sectional and longitudinal requirements.



Timeliness: a core concern of the project

One reason for the move from the ECHP to the EU-SILC project is the need to significantly improve the timeliness of the data released. The EU-SILC Regulation of the EP and Council gives the target dates by which cross-sectional and longitudinal data are to be delivered to Eurostat.

Compared to the three years initially required (subsequently reducing to two years) to issue the ECHP information at EU level, the EU-SILC cross-sectional data are available in the form of tables 12 months after the end of the data collection period while the longitudinal aggregated data will become available 18 months after end of data collection. The cross-sectional Laeken indicators based on EU-SILC 2004 for 12 "old" Member States, for Estonia as well as for Norway and Iceland, were released at the end of 2005/beginning of 2006 for inclusion in the Joint Social Inclusion and Social Protection Report of the Commission and publicly through the Eurostat free dissemination data base. For the first time, all 25 Member States of the current EU, Norway and Iceland have carried out SILC in 2005 and cross-sectional data were available for most countries at the end of 2006 and have been disseminated by Eurostat in January 2007.

In addition, anonymised EU cross-sectional micro-data files to be used for research purposes, are to be available 15 months after the end of the data collection (data of year N are available from March N+2). A delay of 20 months is planned for the longitudinal component (data collected before N are available in August N+2).

Micro data files from 14 countries were prepared by April 2006 and have been released for specific research projects under contract from June 2006. These data were made available under research contract to the contributors of the Conference.

Data comparability: a priority to be thoroughly evaluated

With such a flexible format, it is not difficult to see potential problems relating to harmonisation and non-comparability arising. Apart from the development of common guidelines and procedures aimed at maximising comparability on which Eurostat and Member States are working together on, quality of the SILC data is ensured in different ways:

- Member States provides annually intermediate and final quality reports on the basis of which Eurostat is drafting an EU synthesis.
- Methodological studies have been launched covering key issues for comparability at both EU level and national level (impact of household definition, comparability of administrative and survey data, the impact of the mode of data collection, the impact of different treatment of negative income, the impact of sampling issues, …)
- A methodological Task Force has been set up which discussed issues such as imputation techniques, the treatment of lump sum, the imputed rent, the status of private pensions plans in income.
- Eurostat is systematically computing standard errors for the income-based indicators the first year these data are available.

2.6. Sampling/design

Probability samples

According to the Commission Regulation on sampling and tracing rules, for all components of EU-SILC (whether survey or register based), the cross-sectional and longitudinal (initial sample) data are to be based on a nationally representative probability sample of the population residing in private households within the country, irrespective of language, nationality or legal residence status. All private households and all persons aged 16 and over within the household are eligible for the operation. Representative probability samples shall be achieved both for households and for individual persons in the target population. The sampling frame and methods of sample selection should ensure that every individual and household in the target population is assigned a known and non-zero probability of selection. Germany has a transition period till 2008 where fully representative probability sampling is to be achieved.

Sample sizes

Regulation N° 1177/2003 defines the minimum effective sample sizes to be achieved. The reference is to the effective sample size, which is the size required if the survey were based on simple random sampling (design effect in relation to the 'risk of poverty rate' variable = 1.0). The actual sample sizes will have to be larger to the extent that the design effects exceed 1.0 and to compensate for all kinds of non-response. Furthermore, the sample size refers to the number of valid households which are households for which, and for the majority of members of which, all or nearly all the required information has been obtained.

For the cross-sectional component, the plans are to achieve the minimum effective sample size of around 121.000 households or 250.000 individuals aged 16 and over in the EU as a whole (127.000, respectively 260.000 including Iceland and Norway). The allocation of the EU sample among countries represents a compromise between two objectives: the production of results at the level of individual countries, and production for the EU as a whole.

Sample size for the longitudinal component refers, for any pair of consecutive years, to the number of individuals successfully interviewed in both the years.

Requirements for the longitudinal data will be less important. For this component, an effective sample size of around 187.000 individuals (195.000 including Iceland and Norway) is planned.

The following tables give for each EU Member State (plus Norway and Iceland) the minimum effective sample sizes and the corresponding actual minimum sample required taking into account design effect estimated for 2004 (when available) for the cross-sectional component (table 2) and the minimum effective sample size for the longitudinal part (table 3). Globally, the actual minimum EU sample size is about 150.000 households. Given national over sampling in order to meet specific reporting needs, the achieved global sample size is about 200.000 households.

Table 2. Cross-sectional component: minimum effective sample and actual sample required

	Households		Persons aged 16 and over	
	Minimum effective sample size	Actual sample size required	Minimum effective sample size	Actual sample size required
Belgium	4750	4940	8750	9100
Czech Republic	4750		10000	
Denmark	4250	3570	7250	6090
Germany	8250		14500	
Estonia	3500	3850	7750	8525
Greece	4750	5452	10000	11477
Spain	6500	9295	16000	22880
France	7250	8193	13500	15255
Ireland	3750	4875	8000	10400
Italy	7250	10223	15500	21855
Cyprus	3250		7500	
Latvia	3750		7650	
Lithuania	4000		9000	
Luxembourg	3250		6500	
Hungary	4750		10250	
Malta	3000		7000	
Netherlands	5000		8750	
Austria	4500	4500	8750	8750
Poland	6000		15000	
Portugal	4500	5490	10500	12810
Slovenia	3750		9000	
Slovakia	4250		11000	
Finland	4000	5614	6750	9473
Sweden	4500	4320	7500	7200
United Kingdom	7500		13750	
Iceland	2250		3750	
Norway	3750	3750	6250	6250
Total (including Iceland and Norway)	127000		260150	

Table 3. Longitudinal component – Minimum effective sample size

	Households	Persons aged 16 and over
Belgium	3500	6500
Czech Republic	3500	7500
Denmark	3250	5500
Germany	6000	10500
Estonia	2750	5750
Greece	3500	7250
Spain	5000	12250
France	5500	10250
Ireland	2750	6000
Italy	5500	11750
Cyprus	2500	5500
Latvia	2750	5600
Lithuania	3000	6750
Luxembourg	2500	5000
Hungary	3500	7750
Malta	2250	5250
Netherlands	3750	6500
Austria	3250	6250
Poland	4500	11250
Portugal	3250	7500
Slovenia	2750	6750
Slovakia	3250	8250
Finland	3000	5000
Sweden	3500	5750
United Kingdom	5750	10500
Iceland	1700	2800
Norway	2750	4650
Total including Iceland and Norway	**95200**	**194300**

2.7. Implementation and tracing rules

Implementation rules

For ensuring the best quality output of the project, minimum requirements for the implementation have been defined at EU level and are part of the Commission regulation N° 1981/2003 on the fieldwork aspects and imputation procedures. These rules for example:

- Limits the use of proxy rate;
- Limits the use of controlled substitutions to cases where the response rate is below 60%;
- Defines the maximal interval between the end of the income reference period and the time of the interview for the respondent concerned;
- Defines the maximum total fieldwork duration for one shot surveys;
- Defines intervals between successive waves in the longitudinal component;
- Defines precise follow up rules of households in case of refusals, non contact…

Tracing rules

The longitudinal component of EU-SILC will comprise one or more panels. For each panel, the initial sample representing the target population at the time of its selection is followed-up over a minimum of duration of 4 years according to specific tracing rules. The duration may be longer or indefinite depending upon the design adopted in the country. The objective of the tracing rules is to reflect in the initial sample any changes in the target population and to follow-up individuals over time.

To study changes over time at individual level, all sample persons (members of the initial sample) should be followed-up over time, despite the fact that they may move to a new location during the life of the panel. However, in the implementation of EU-SILC some restrictions are applied for cost and other practical reasons. It has been decided that only persons remaining or moving within private households in the national territory are followed up. Sample persons moving to a collective household or to an institution, moving to national territories not covered in the survey, or moving abroad (to a private household, collective household or institution, within or outside the EU), would normally not be traced. The only exception would be the continued tracing of those moving temporarily (for actual or intended duration of less than 6 months) to a collective household or institution within the national territory covered, who are still considered a member of the household.

2.8. Content

EU-SILC is a multi-dimensional instrument focused on income but covering at the same time housing, labour, health, demography, education so as to allow studying the multidimensional approach of social exclusion.

It is composed of primary (annual) and secondary (module) target variables. The target variables are the variables transmitted to Eurostat. Given the principle of flexibility of the implementation of the SILC project at national level, the corresponding sequence of questions needed to construct one target variable may vary from one country to another.

The primary target variables are either household or individual (for persons aged 16 and more) information and are regrouped into domains:

- At household level, five domains are covered ((1) basic/core data, (2) income, (3) housing, (4) social exclusion, (5) labour information.
- The personal level is regrouped into six domains ((1) basic/demographic data, (2) income, (3) education, (5) labour information and (6) health).

Tables 4 and 5 below gives of an overview of the sub-domains included in EU-SILC and of the component (cross-sectional and/longitudinal) in which each sub-domain is included. For countries using the integrated design, all variables will be in both cross-sectional and longitudinal components.

Table 4. Primary annual component: domains covered at household level

Domains	Areas	Cross-sectional (X) and/or longitudinal (L)
Basic data		
	Basic household data including degree of urbanisation	X, L
Income		
	Total household income (gross and disposable)	X, L
	Gross income components at household level	X, L
Social exclusion		
	Housing and non-housing related arrears	X, L
	Non-monetary household deprivation indicators, including problems in making ends meet, extend of debt and enforced lack of basic necessities	X, L
	Physical and social environment	X
Labour information		
	Child care	X
Housing		
	Dwelling type, tenure status and housing conditions	X, L
	Amenities in the dwelling	X
	Housing costs	X

Table 5. Primary annual component: domains covered at personal level

Domains	Areas	Cross-sectional (X) and/or longitudinal (L)
Basic data		
	Basic personal data	X, L
	Demographic data	X, L
Income		
	Gross personal income, total and components at personal level	X, L
Education		
	Education, including highest ISCED level attained	X, L
Labour information		
	Basic labour information on current activity status and on main job, including information on last main job for unemployed	X, L
	Basic information on activity status during income reference period	X
	Total number of hours worked on current second/third…jobs	X
	Detailed labour information	X, L
	Activity history	L
	Calendar of activities	L
Health		
	Health, including health status and chronic health or condition	X, L
	Access to health care	X

The secondary target variables are introduced every four years or less frequently. One module per year is included from 2005 only in the cross-sectional component. The first EU-SILC modules are relating to:

2005: Inter-generational transmission of poverty
2006: Social participation
2007: Housing conditions
2008: Over-indebtedness/Financial exclusion
2009: Deprivation

2.9. Income concept

As already said, income is the core of the EU-SILC; consequently, the Commission regulation on definitions is mainly focussed on the detailed definition of income. An important objective for EU-SILC is adherence as closely as possible to the recommendations of the international Canberra Group on the definition of household income (Expert Group on Household Income Statistics, 2001). This has led to significant changes compared with the income concept used in the ECHP.

Four main aggregates are computed from EU-SILC: total disposable household income, total disposable household income before transfers (with and without old-age and survivors' benefits) and total gross income.

The income concept (following the Canberra recommendations) will only be fully implemented from 2007. In this perspective, 2004-2006 can be seen as a transitional period as some countries (Greece, Spain, France, Italy, Portugal, Latvia and Poland) are allowed to only deliver net income components and for all countries, a limited number of components is not compulsory during this period.

Gross income data collection leads to practical difficulties[1]. Strategies have thus to be developed depending on the national context. In particular, some countries have to design models for gross/net conversion in order to obtain with a reasonable degree of accuracy, the required data on the basis of net collected data. Eurostat developed a generic model for net-gross conversion to meet the EU-SILC requirements for the construction of the standardised income target variables from input data collected in various forms. A system, named the Siena Micro-Simulation Model (SM2), has been developed as a flexible tool for this.

Gross income components

Gross income components covered in EU-SILC are employee income, self-employment income, imputed rent, property income, current transfers received, other income received, interests paid on mortgage, current transfers paid.

Employee income

In EU-SILC, employee income covers gross cash or near-cash employee income, gross non-cash employee income and employers' social insurance contributions.

[1] For example, computation of the structural indicator "at-risk-of-poverty rate before social transfers" requires deducting social transfer income from total income. If social transfer income details are only collected on a gross basis, some method has to be found to adjust these to net.

For non-cash employee income, only company cars are to be recorded till 2006. From 2007 onwards, the variable will in addition include free or subsidised meals, luncheon vouchers; reimbursement or payment of housing-related expenses (e.g. gas, electricity, water, telephone or mobile telephone bills); other goods and services provided free or at reduced price by the employer to their employees, when they are a significant component of the income at national level or they constitute a significant component of the income of particular groups of households.

For employers' social insurance contributions, the compulsory component will be introduced from 2007 given the positive results of the feasibility studies. The voluntary component is only to be included if it represents more than 10% of the total (compulsory plus voluntary part).

Self-employment income

Self-employment income is in SILC broken down into gross cash profits or losses from self-employment (including royalties) and the value of goods produced for own consumption. Various alternative approaches to the measurement of income from self-employment are allowed:

- The 'entrepreneurial income' that corresponds to the concept of profit/loss normally used in business accounting;
- The 'net operating benefits/losses' shown on the annual tax accounts;
- The money (goods) drawn out of the business for personal use.

The value of goods produced for own consumption will be included from 2007 when they are a significant component of the income at national level or they constitute a significant component of the income of particular groups of households. This is particularly likely for certain of the Member States that joined the EU in May 2004 and the current Candidate Countries.

Imputed rent

The imputed rent is to be added from 2007 for all households that do not report paying full rent, either because they are owner-occupiers or because they live in accommodation rented at a lower price than the market price, or because the accommodation is provided rent-free. The impact of its inclusion is important on all inclusion indicators generating unbalanced flows into and out of poverty. In addition, concerns have been raised about the existence of a comparable methodology for computation of imputed rent. These aspects will require specific attention and monitoring.

Property income

Property income is included and broken down into 'Interest, dividends, profits from capital investment in an unincorporated business' and 'Income from rental of a property or land'.

Current transfers received

Current transfers received include social benefits and regular inter-household cash transfers received.

Social benefits are broken down into family/children-related allowances, housing allowances, unemployment benefits, old-age benefits, survivors' benefits, sickness benefits, disability benefits, education-related allowances and social exclusion not elsewhere classified.

Other income received

This covers income received by people aged under 16.

Interest paid on mortgage

From 2007 onwards, the interests paid on mortgage should be taken into account together with imputed rent when computing total household disposable income.

Current transfers paid

Finally, current transfers paid are broken down into tax on income and social insurance contributions, regular taxes on wealth, employers' social insurance contributions, regular inter-household cash transfers paid.

The inclusion of employers' social insurance contributions is crucial for comparability of gross income levels and income structures in the EU and it is likely to have an impact on the spread of the employee income distribution and thus on inequality measures based on gross data. However, inclusion of employers' social contribution will have no impact on total disposable income and on derived indicators.

2.10. Data access

The EU-SILC data are cleaned and imputed by the MS and then individual records are transmitted to Eurostat without any direct identifiers (e.g. name, address, official identifiers). EU-SILC individual records are likely to be considered as confidential data in the sense of Article n° 13 of Council Regulation 322/97 (Statistical Law) because they allow indirect identification of statistical units (individuals and households). In this respect they should only be used for statistical purposes or for scientific research.

Commission Regulation 831/2002 granted the Commission to release anonymised micro data for instance via CD-ROM to researchers. Anonymised micro data are defined as individual statistical records which have been modified in order to control, in accordance with best practices, the risk of identification of the statistical units to which they relate.

EU-SILC framework Regulation n°1177/2003 makes provision for the release of anonymised micro data to researchers (encrypted CD-ROM with documentation).

At European level, only variable suppression and global recoding have been envisaged as they can be applied uniformly to all countries without case by case tuning.

Other methods like local suppression or data perturbation, needing case by case tuning can be envisaged at national level if countries feel it necessary.

At this stage, 3 types of release are envisaged:

- A cross sectional UDB with the most recent wave of EU-SILC. A revision of the UDB is planned after one year;
- A longitudinal UDB containing all the trajectories ending with the most recent wave of EU-SILC; or

- A longitudinal UDB containing all 4 years trajectories available at the time of the release, possibly complemented by a historic files of 4 years trajectories

The full UDB containing 2005 EU-SILC data will be available end of March 2007. Price policy has been adjusted to avoid obstacle to access the data base. The cross sectional and longitudinal files are sold separately at the price 500€ for the first purchase and 250€ for subsequent waves.

Details on the EU-SILC micro-data files to researchers in relation to (1) variable suppression and global recoding applied can be found at: *http://forum.europa.eu.int/Public/irc/dsis/eusilc/library.*

3. Insight of the EU-SILC current implementation and achievements

3.1. Introduction

The quality reports provided to Eurostat by MS under regulation requirement provide a good insight on the national implementations and substantive elements to draw preliminary conclusions regarding the quality of the instrument. These elements are complemented by the information collected through the frequent contacts between Eurostat and MS during data checking operation and grant agreements negotiations for the funding of the launching and anchoring of EU-SILC in national systems.

On this basis, the second part of this paper aims to give an insight of the actual implementation of EU-SILC. Many of the features encountered in national implementation are the results of framework requirements which have been described in the first part of this paper. The review of procedures used by countries allows drawing preliminary conclusions regarding the quality of the instrument as a whole. So called good practices are indeed known to enable the production of higher quality data. Their identification in national processes is a first step in the quality assessment of the instrument. On the other hand, the identification at this early stage of practices that are likely to produce poorer quality results, would allow drawing recommendations for continuous improvement of the instrument.

3.2. Different starting dates

EU-SILC was launched in 2003 on a gentlemen's agreement basis in six Member States (Belgium, Denmark, Greece, Ireland, Luxembourg and Austria) as well as in Norway. Eurostat, in close cooperation with Member State national statistical institutes, used these data to evaluate the process of data collection and the computation of cross-sectional indicators. They have carried out methodological investigations focusing on survey quality, data cleaning and on the impact of the changes of source and (mainly income) definitions on the cross-sectional income-based Laeken indicators.

In 2004, under Regulation N° 1177/2003 of the EP and Council, EU-SILC was implemented in twelve EU-15 countries (Germany, The Netherlands and United Kingdom delayed the launching for one year) as well as in Estonia, Iceland and Norway.

In 2005, EU-SILC was operating in all EU-25 countries as well as Iceland and Norway. Bulgaria, Turkey and Romania have launched EU-SILC in 2006, Switzerland is expected for in 2007 and later on most probably in the Former Yugoslav Republic of Macedonia and in Croatia.

Given the different starting dates of SILC depending on the country, longitudinal data required for the at-persistent-risk-of-poverty indicator will only be available for all countries by the beginning of 2010, although temporary variations of that indicator will be available during the interim.

The significant data gap at EU level between former ECHP and the new EU-SILC has required collecting indicators from national sources not always comparable.

3.3. Different designs

Almost all countries have used the integrated design proposed by Eurostat. Modified designs have been used only in few countries, primary for the purpose of integrating EU-SILC with an existing survey (i.e. Sweden, Finland, Germany), and/or incorporating into EU-SILC an existing sample (i.e. Norway). France and Norway have adopted the same structure as the standard integrated design, except that panel duration of 9 years and 8 years respectively. Luxembourg is the only country having implemented a pure panel complemented with annual sample to compensate attrition and high turnover of the Luxembourgish resident population. All designs encountered ensure strict cross sectional representativeness and allow for following a significant number of individuals over at least 4 years.

3.4. Various samples

The EU-SILC instrument has been thought to collect information on representative samples of the target population.

Following Commission regulation requirements, all samples[2] are actually probabilistic. In all countries updated sampling frame and stochastic algorithm to select statistical units are used. Fully enumerated list of dwelling is used in CY, FR, HU, MT. Population registers are used in AT, BE, DK, EE, FI, IS, LT, LU, LV, NL, NO, PT, SE, SI, SK. Post enumeration of randomly selected primary sampling unit is used in EL, IE, IT, ES, PL. In all cases, unbiased estimates can be produced on firm theoretical grounds. The coverage bias is controlled by the appropriate frequency of updating of this frame in almost all countries.

The EU-SILC sample at EU level can be seen as the accumulation of sample drawn at national level. The achieved sample size in 2004 was 113.501 households and 200.145 in 2005. For the cross sectional component, the minimum effective sample size requirements have been met by all countries except Portugal and Czech Republic which launched a reduced version of SILC in 2005.. The allocation of the sample among MS is directed by the EU Regulation. It was set up by Eurostat taking into account the size of the country in order to meet precision requirement for estimation at national level and to be efficient when producing EU-estimation.

MS have designed their sample in order to find a good trade-off between reporting needs at sub national level and cost effectiveness of the data collection. Significant increase of the sample size, driven by sub national reporting requirements, was recorded in Spain and Italy.

Stratification according to geographical and possibly demographic characteristics is common to all designs except for very small countries/populations. Within strata, the type of design differs widely: simple or systematic random sample is sometimes preferred in small countries (AT, CY, MT, IS, LU); common two/three stage designs (BE, LV, LT, SK, SI, FR, HU, PL, IT, SP) are found whenever country have to cope with large geographical areas and/or when central register are

[2] With the exception of Germany, for which an existing quota sample has been used at the launching of EU-SILC. This nonprobabilistic sample will be phase out progressively.

not available (IT, SP, PL); two phase sample is used in countries where EU-SILC is integrated or is coupled to existing instrument (NL, DE) or is using a master sample (PT). Direct probability proportional to size sample of household is found only in EE. SRS (simple random sampling) approximation is eventually proposed where SILC is using existing self weighting sample (NO).

Globally, sample designs are found adapted to the national specificities. Except for DK and SE, sample designs are slightly less efficient than SRS because of the dispersion of sample weights due to non response and the unbalanced clustering and stratification effects of the selection of the sample. Weighting schemes are derived accordingly enabling unbiased design based inference. In one instance, in Luxembourg, advanced weighting scheme (weight sharing method) had to be set up in order to cope with the existence of multiple frames. The most critical assumptions regarding weighting schemes are probably found when SRS approximation is used for existing sample.

Table 6. Achieved sample size and design effects for the 2004 EU-SILC operation[3]

	Achieved hh ss	Deff
AT	4521	1.00
BE	5275	1.04
DK	6866	0.84
EE	3993	1.10
ES	15355	1.43
FI	11200	1.40
FR	10273	1.15
EL	6252	1.15
IE	5477	1.30
IT	24204	1.41
LU	3572	NA
NO	6046	1.00
PT	4989	1.28
SE	5478	0.96
Total	**113501**	

3.5. Data source

EU-SILC framework fosters the use of existing sources and/or administrative data. However, in practice not all EU-SILC variables can be obtained from register and administrative data. Hence, two groups of countries can be done on the basis of the data source used in EU-SILC: in the so called register countries (DK, FI, IS, NL, NO, SE, SI) most income components and some demographic information are obtained through administrative registers. Other personal variables are obtained through interview. In all other countries except Ireland, the full information is obtained through survey

[3] Deff are not yet available for 2005 surveys

among household and interview with household members. In Ireland, upon the explicit agreement of the household collected, the information is obtained from administrative information.

3.6. Data collection

Type of collection

In EU-SILC two types of collection of household and individual variables have been allowed. In most countries (the non-register countries), all members aged 16 or more of selected households received and have been asked to fill in a personal questionnaire. In the register countries (DK, FI, IS, NL, NO, SE, SI), only a selected household respondent receives a personal questionnaire and household and income variables are collected either through register or through the selected respondent. The different types have different impact on the tracing of individuals through time (longitudinal dimensions). In the first type, all household members are panel persons and followed over time. In the second type, only selected respondents are interviewed over time but household information and income data for all members are collected through register. The selected respondent model needs some adaptation in order to avoid bias in the follow up of children. The different types lead to different weighting schemes. In particular when the selected respondent type is used, the individual and household weights are obviously different.

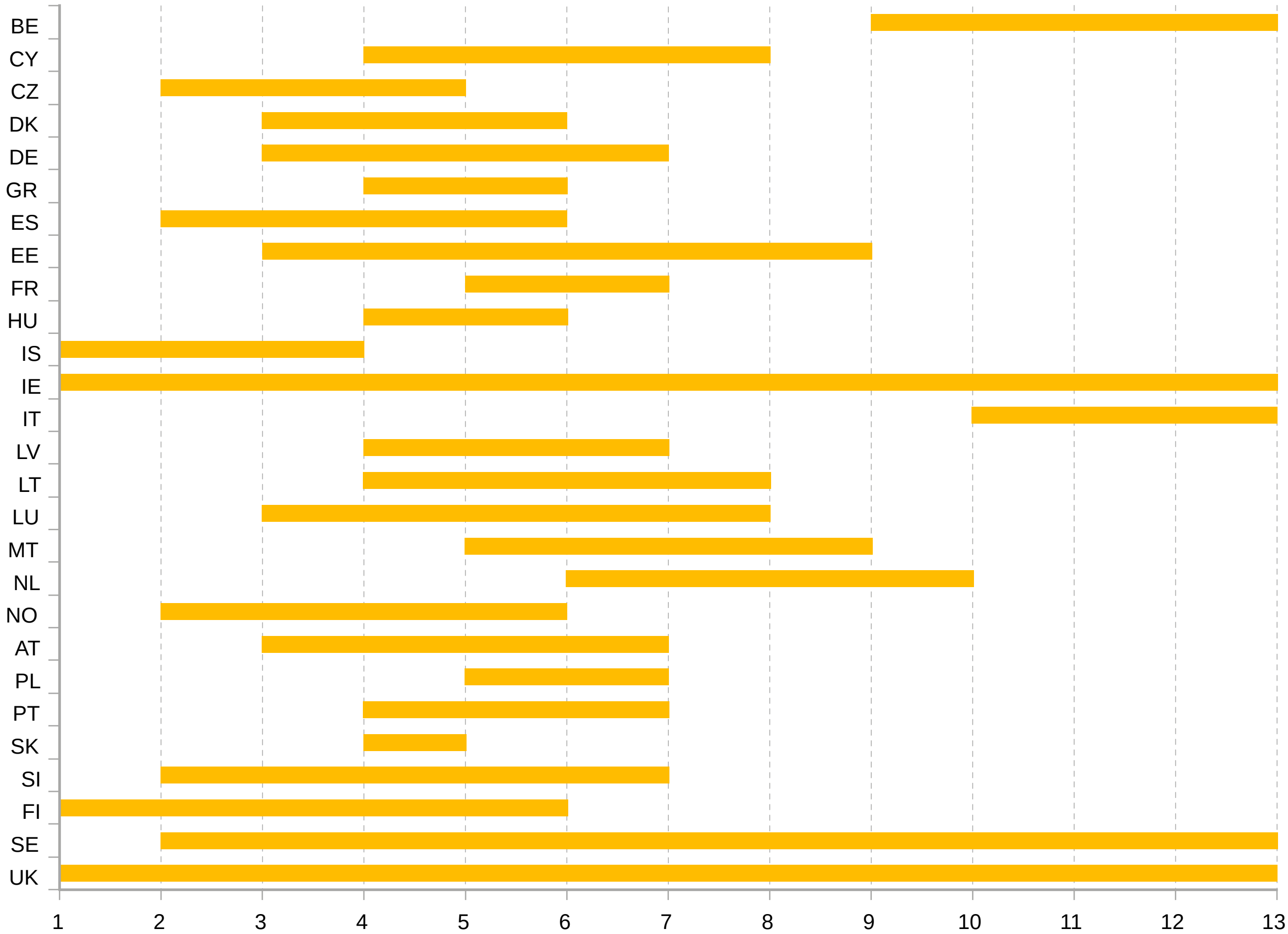
Mode of data collection

The specific mode of collecting information also varies from country to country. PAPI is still the main collection mode (CZ, EE, HU, IT, LT, LU, MT, PL, SE for cross sectional, SK). CAPI is implemented in 9 countries (AT, BE, CY, EL, FR, IE, IS, LV, PT, SI, SP, UK). CATI mode is often associated with selected respondent model (DK, FI, NL, NO, SI for re-interview, SE for panel). Germany is the only country where questionnaires are sent by post. The editing facility provided by computer assisted mode as implemented in about half of the countries has a positive impact on the quality of the micro-data collected and reduces costs of data collection and edition.

Fieldwork periods

National surveys also differ through the period during which the fieldwork is carried out. Regulation recommends that the one shot survey fieldwork is extending over less than 4 consecutive months and the lag between income reference period and fieldwork is limited to 8 months. When continuous surveys are used, the sample allocation over time should be controlled and weighting adapted to produce unbiased estimates of the annual average. Table 7 shows that most countries used one shot survey with fieldwork concentrated over a few months mainly in the first half of the year with two noticeable exceptions for IT and BE where the fieldwork is carried out in the second half of the year. Continuous survey over the whole year is run in Ireland and United Kingdom. The impact of varying fieldwork period over time might be noticeable when comparing indicators with steady and seasonal pattern overtime but is likely to be negligible for permanent income distributive analysis. One shot surveys always use the previous calendar year as income reference period while it is sliding for continuous survey. The higher degree of inconsistency between stock (income) and flow (socio economic status) when fieldwork period are distant from income reference period can be spotted as a weakness of some EU-SILC implementation.

Table 7. Fieldwork period for the 2005 EU-SILC operation



3.7. Deviation to common definitions and variation in implementation

The comparability in EU-SILC instrument is ensured by the conceptual harmonisation of target variables obtained through their detailed definition (income components …) as provided in EU-SILC regulations and through the active role of Eurostat coordinating and supporting implementation. EU-SILC pertains to the so called ex ante output harmonisation model. Explicit deviation from these commonly agreed standards was allowed to a limited extend but are monitored through quality report that are transmitted to Eurostat.

For the 2004 operation, no significant deviation was recorded in the concepts implemented by MS.

The framework allows however explicitly for some additional flexibility, namely on the data source (administrative or interview). It also allows for different concepts for self-employment income. These are among the most important issues that will require continuous monitoring of comparability and possibly improvement actions. These aspects are reviewed in detail in V. Verma's conference paper.

In addition, for some issues, details of implementation might lead to non comparability, for instance, the precise household definition, the precise phrasing and routing of questions, the treatment of negative income, the conversion between net and gross income depending on the type of data collected, the treatment of outliers and lump sums in some income components, the type of imputation, in particular the imputed rent. All these aspects are currently under review by a methodological Task Force bringing together methodologists from Eurostat and MS. Recommendations from this long run TF validated by the EU-SILC working group are expected to lead to continuous improvement of the instrument.

3.8. Data processing

EU-SILC is anchored in national statistical system. It benefits from the existing infrastructure of National Statistical Institutes and its horizontal and specialised processes. In particular, the existence of experienced interviewers pools and efficient procedure for their training are positive elements. Centralised and streamlined processing for data entry and editing are sometimes available. Procedures to minimise and to trace processing errors, specific process for the coding of classification like NACE, ISCO are also in some instances available. All these aspects, which participate to the excellence of the ESS, are beneficial for quality of EU-SILC.

For income components, EU-SILC framework requires full imputation. The level of imputation of income components is reported in micro data through a set of flag. This requirement participates to the homogeneity and the completeness of information delivered by the instrument.

In parallel Eurostat has developed an independent process for the micro data validation. Eurostat checking rules ensured that the final datasets have minimum consistency standard and meet basic quality requirements. The checks proposed by Eurostat have inevitably enriched the set of checks implemented by MS where they are most efficient, i.e. during or close after fieldwork. Eventually, Eurostat process generates a set of meta-information obtained through the frequent contact with MS at that stage and participates to the certification of the quality of NSI processes.

3.9. Non-sampling errors

The quality of the output can be characterised by a series of indicators which allow to control quality of the data collection and the risk of so called non sampling errors. The most important, such as the length of interview, the total non response rate and the item non response rate are reported annually in the quality reports.

EU-SILC was designed to keep respondent burden controlled so to avoid to high non response rate and to ensure good quality of the information collected. Despite the detailed collection of income components can be cumbersome, the target was to report limit the total length of interviewing household in average below 60 minutes. The average among MS carrying out full surveys was about 55 minutes. Significant decrease of interview times is observed for the register countries where the length of interview can be as low as 18 minutes on average.

Total non response of selected household/individuals was required to be below 40% which was thought be challenging for non mandatory surveys. When this target was difficult to achieved, substitution mechanisms were allowed. Substitution only occurs in Austria, Spain and Ireland. The average non response for household interview for 2004 was about 30%. The highest non response rates are recorded for BE and LU with slightly more than 50% of non response and lowest levels for FI, PT and EL with about 10-15 % of non response only. Within household individual non response was found almost negligible with level always below 2 % except in Spain (16% in 2004) and Estonia (5% in 2004) and UK (30% in 2005) for which correction measures have already taken place.

Item non response for non income variable is always limited to 5 percents except in very rare situations where questionnaire routing had defects and for which correcting measures were easily implemented. Income components recorded in micro data file are frequently already the aggregation of different sub components which are either directly collected from the respondent or can be derived using a model taking into account the situation of the household/individuals (such as child allowance, …). When non response affects a subcomponent collected through interview, statistical imputation or modelling is required. In many occasions, gross components are obtained from the net components collected by applying a taxation model. All these aspects are controlled in the datasets through imputation flags which represent the proportion of collected over recorded amounts. This imputation flags allow controlling the performance of the data collection and the relative importance of modelling in recording income. At the moment the imputation does not allow for distinguishing statistical imputation from model valuation.

The following table shows the imputation/modelling rate of the key EU-SILC income components for 2004 operation, namely, total disposable income, capital, employment income and self employment income. The rate is defined as the total amount imputed/modelled divided by the total amount recorded. Despite, imputation/modelling can affect a significant number of records in some subgroups (self employed, capital owners), it appears that the relative importance of the missing income is relatively low.

Table 8. For main income components, the rate of amount imputed and the percentage of records with some imputation for some countries, EU-SILC operation 2005

	Total disposable income		Employee income		Capital income		Self employment income	
	imputation rate	rec imputed	imputation rate	rec imputed	imputation rate	rec imputed	imputation rate	rec imputed
AT	1.1%	49%	2.0%	28%	0.4%	70%	6.9%	73%
BE	1.1%	72%	1.1%	26%	2.1%	74%	2.6%	62%
DK	0%		0%		0%		0%	
EE	0.1%	46%	0.2%	35%	0.0%	38%	0.4%	90%
ES	0.6%	39%	0.0%	8%	0.0%	55%	2.1%	68%
FI	0%	7%	0.0%		0.6%		0%	
GR	0%		0%		0%		0%	
IE	0.7%	31%	0.6%	13%	0.3%	0%	5.3%	60%
IS	0%		0%		0%		0%	
IT	1.7%	43%	0.0%	10%	0.0%	29%	8.5%	21%
LU	2.3%	100%	2.5%	28%	1.5%	30%	1.6%	46%
NO	0%		0%		0%		0%	
SE	0%		0%		0%		0%	

Register countries are remarkable for their thorough collection of income components. Partial imputation/modelling is predominant in survey countries for components like self employment and total income but its impact on the total amount recorded remains extremely limited and thus does not call for more harmonisation of procedure developed in MS.

3.10. Sampling errors

Standard errors of key indicators are commonly used as a measure of the reliability of data collected through sample survey. EU-SILC was designed to provide measure of at risk of income poverty rate with an absolute precision of about one point, i.e. the half length of the (95% confidence level) confidence interval (δ) to be of the order of 1%. Sample size requirements have been set up in accordance with this goal. The following table gives for some Laeken indicators and for the 2004 operation:

1) the average coefficients of variation (CV = standard error divided by estimated value of the indicator) computed over the 2004 countries[4].
2) the median of the half lengths of the confidence interval (δ) for the indicator in the 2004 countries
3) the minimum δ among the 2004 countries
4) the maximum δ among the 2004 countries

Table 9. Summary measure of precision for EU-SILC 2004 operation for some Laeken indicators

Indicator	Average CV	median δ	min δ	max δ
At-risk-of-poverty rate after social transfers - total	2.9	0.8	0.1	1.3
At-risk-of-poverty rate after social transfers - men total	3.4	0.9	0.1	1.4
At-risk-of-poverty rate after social transfers - women total	3.2	1.1	0.1	1.6
At-risk-of-poverty rate after social transfers - unemployed	6.2	3.9	1.7	6.4
At-risk-of-poverty rate after social transfers - men, unemployed	7.4	5.4	2.5	8.9
At-risk-of-poverty rate after social transfers - women, unemployed	10.1	5.1	2.3	8.7
At-risk-of-poverty threshold - single	0.8	-	-	-
Inequality of income distribution S80/S20 income quintile share ratio	2.4	0.2	0.1	0.5
Relative median at-risk-of-poverty gap - total	4.7	1.7	1.3	2.8
Gini coefficient	1.6	0.9	0.4	2.0
Mean equivalised disposable income	0.9	-	-	-

This table shows that the target for precision at the level of at risk poverty rate is globally met. The total "at risk of poverty rate" is estimated with an absolute precision of about one point. For small domains (e.g. unemployed by gender), the performance of sample surveys is limited (the precision is of about 5 points) and specific estimation strategies might be required.

[4] Except LU for which standard errors are not available yet.

3.11. Coherence

The sets of weights available in EU-SILC datasets have been obtained using calibration techniques which ensure basic coherence of estimates obtained from EU-SILC micro datasets and demographic counts. Further coherence analysis with other survey like LFS or HBS or other statistics like NA and social protection accounts can be found in national quality reports. A thorough assessment of this dimension will have to be further developed in the future.

3.12. Timeliness

Timeliness was at the core of the need for change from ECHP to EU-SILC. The latter has been designed to deliver timely data on income poverty and social exclusion. At the launching of EU-SILC, timeliness has thus received much attention. Despite the difficulties to streamline processes from the inception of the instrument, the timeliness challenge of EU-SILC has been met. Cross sectional estimates of poverty referring to 2005 population and covering 27 countries (2004 income reference period) were produced according to the plans in December 2006 and release soon afterwards. In comparison with its predecessor, EU-SILC is definitely a success. However, the need for further synchronisation with other Commission reporting processes has already arisen. After a time for adaptation, there might be a need to design different estimation strategies and to further streamline national processes.

Conclusion

This paper has described the substantive investment done both at EU and at national levels to develop and implement the SILC instrument which is about to be the EU reference source for income distribution, social exclusion and pension analysis at EU level. It has become the second pillar of household social survey statistics at EU level, complementing the EU Labour Force Survey focussed on labour market information.

The instrument is not yet stabilised. Although the cross-sectional component has been implemented in all countries last year and results are becoming available at EU level, the longitudinal component will only become fully operational in 2010.

Countries face important difficulties in the process of integration of SILC in their National Statistical System and some of them already made important adjustments in the model used between 2004 and 2006. For implementation in the medium to longer term, and with a view to limit the interview duration and consequently to improve data quality, more countries are envisaging to use register information for the income component of SILC.

Technical, methodological and implementing improvements will take place in the future to produce data of better quality mainly in terms of comparability and to better fulfil the needs of the different users i.e. Commission DGs, the scientific community and other international organisations. The aim of this Conference is to get first ideas about necessary future adaptations to this instrument.

EU-SILC (community statistics on income and living conditions: challenges for member states)

Martin BAUER

chapter 2

eurostat

EU-SILC (COMMUNITY STATISTICS ON INCOME AND LIVING CONDITIONS: CHALLENGES FOR MEMBER STATES)

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This part deals with EU-SILC from the perspective of member states. The implementation of EU-SILC has posed several challenges for the member states.

Challenge 1: Launching of EU-SILC survey in good time

Originally it was planned that EU-SILC would start in all countries in 2003. The background was that the European Community Household Panel (ECHP) had ended in 2001 and that there should be as soon as possible a new common data source for the EU indicators on poverty and social inclusion.

However, in the legislative process it became evident that this would not be possible and the start was postponed to 2004, while 3 countries (out of EU-15; Germany, The Netherlands, and United Kingdom) needed a derogation to start only in 2005. Also all new member states had to start in 2005.

So, in 2003 only those countries started with EU-SILC which had no other data source to provide the common EU indicators on poverty and social inclusion. This was the case for Austria, Belgium, Denmark, Greece, Ireland, Luxembourg and Norway. In 2004 6 more member states, Estonia and Island launched the EU-SILC survey. Finally, in 2005 EU-SILC was carried out in all 25 member states plus Norway and Iceland.

Of course the launching of EU-SILC was a big challenge for the new member states. None of them had participated in the ECHP. However, most of the new member states had been prepared by carrying out pilot surveys with support of the PHARE programmes.

Challenge 2: To provide cross-sectional and longitudinal data

According to the framework regulation the longitudinal micro-data do not need to be linkable with cross-sectional micro-data. This helps countries which can integrate EU-SILC in existing surveys. But it was practically impossible for member states to start two new independent surveys as this would have been much too expensive. So, these countries had to launch an integrated survey on the basis of a rotational sample. This was also the model recommended by Eurostat. However, this model has a few drawbacks:

- The fieldwork gets much more complicated and costly.
- About three quarters of the cross-sectional data come from the longitudinal part, which increases the methodological challenge to deliver cross-sectional data in time.
- The longitudinal part will only cover a maximum time span of four years for less than a quarter of the sample. But it will be possible to cumulate over time.

So, I hope that the use of the longitudinal data can prove that the additional work and the extra costs are justified.

Challenge 3: Very demanding methodological standards – main responsibilities lie with the Member States

While for the ECHP the weighting and imputation was the responsibility of Eurostat, it is now the responsibility of the member states: According to the Article 16 (1) of the EU-SILC framework regulation "Member States shall transmit to the Commission (Eurostat) in the form of micro-data files weighted cross sectional and longitudinal data which has been fully checked, edited an imputed in relation to income.

- Weighting is rather complex, especially because of the different sub-samples (rotational design).
- Imputation: One needs much more questions than the target variables in order to cover all relevant income components. This makes imputation a demanding exercise.
- Variance estimation is new, and especially for the median and the indicators based on the median the calculation is not an easy task.

There is not yet a unitary solution for the problem of *Individual total non-response*. The impact seems to be small; nevertheless a common solution would be good. Member states face the individual challenge of e.g. introducing new variables and concepts to be able to fulfil the high methodological demands. This implies to take decisions between methodology, costs and respondent burden.

Challenge 4: Income concept – Canberra recommendations and its implementation

The income concept follows the Canberra recommendations. The implementation is not easy. The EU-SILC regulations take that into account by giving some flexibility for the implementation of certain components, namely: Imputed rent, Gross income components and Employer's social insurance contributions, which only have to be fully implemented by 2007.

Here is not the place to discuss the relevance of the concept. However, I would like to say a few words: First of all, let me mention the difficulty to collect self-employment income. This component is absolutely necessary and it is also not new (compared with ECHP). The practical experience has shown that the collection of self-employment income is an ongoing challenge with need for improvement.

And now to the "postponed" components, which are newly introduced in comparison with the ECHP. Imputed rents will have an influence on net-income and therefore on the reporting on poverty and social exclusion. There is no common method foreseen, what might hamper comparability.

Gross income components and Employer's social insurance contributions will be introduced for better comparability concerning income statistics. I hope that research will show that this extension is really worthwhile.

Challenge 5: Timely production of indicators

Data and indicators have to be provided very quickly. This is a key target for EU-SILC.

However, most of the data analysis can be done only afterwards, if then data problems are detected indicators currently cannot be changed anymore. Therefore it seems to be important to think of setting up a revision policy.

Tertiary Laeken indicators: While it would be very important to develop specific national indicators, there are in some member states not enough resources to deliver the primary and secondary Laeken indicators with high quality and to develop specific national indicators at the same time.

Challenge 6: Yearly changing module

The EU-SILC regulations foresee a yearly changing module. The preparation time is short and needs quite some resources at Eurostat and at national level. It is not easy to integrate the module into the questionnaire, e.g. the module 2007 on housing which has to be integrated in the household questionnaire and requires therefore some changes of routing and checks for one year. The scope of the modules is limited. It might be worth to evaluate the usefulness of the modules.

Challenge 7: Financing of the EU-SILC survey after the end of the EU-contributions

The Commission (Eurostat) covers a big proportion of the costs for the first four year of data collection. In 2007 this period ends for all countries which started in 2004 (or 2003 – The 2003 EU-SILC survey was financed on bilateral contracts between Eurostat and the member states concerned.). EU-SILC is very costly, so this is quite a challenge for the member states concerned.

Summary and way forward

EU-SILC has posed several challenges for the member states. Member states have met these challenges quite well so far. But there is a lot of work ahead. The work of the methodological task force is very important.

I am confident that we will find solutions for all problems if the committed work at Eurostat and in member states goes on and if the good cooperation between Eurostat and member states continues.

EU-SILC and recommendations of the "Expert Group on Household Income Statistics"

II

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The Income Concept in EU-SILC: Relevance, Feasibility, Challenges

Paul VAN DER LAAN

chapter 1

THE INCOME CONCEPT IN EU-SILC: RELEVANCE, FEASIBILITY, CHALLENGES

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Abstract

The present paper discusses the income concept in EU-SILC in view of the recommendations of the International Expert Group on Household Income Statistics ('Canberra Group') and its appropriateness for policy-making and policy analysis. The present situation and requirements are assessed as well as the challenges we are facing to make EU-SILC the basic European reference source for data on income, poverty and social exclusion within the European Statistical System. The paper discusses the priorities concerning the measurement of various income components in EU-SILC considering the exhaustiveness as suggested by the Canberra Group, as well as feasibility, current practice and current policy assessments and the need for different income concepts. The paper ends by making recommendations on improving EU-SILC as a relevant source of income data in the EU.

1. Introduction

Producing household income data is one of the main objectives of the European Community Statistics on Income and Living Conditions (EU-SILC). In order to produce data that are comparable across countries and regions, among different population groups and over time, we need a standard concept of income. This standard concept should reflect household economic well-being and has to be relevant in view of social policy, *i.e.* it must be suitable for welfare assessment and appraisal, policy-making and policy evaluation. Or more generally, it must contribute to monitoring the social situation in the EU in terms of inputs, outputs and outcome of the European Social Model. Particularly, income data from EU-SILC must be suitable to use in the process of the 'Open Method of Co-ordination' within the EU on social protection and social inclusion.

The *International Expert Group on Household Income Statistics* ('Canberra Group') developed from 1996 to 2001 a guide to compilers on how to prepare harmonised and comparable statistics on income distribution (International Expert Group on Household Income Statistics 2001). This guide is a synthesis of prevailing ideas and best practices which try to reconcile the dual concerns to be faithful to the conceptual nature of income and its theoretical definition, whilst taking into account the practical difficulties of data collection and compilation including the costs involved to the agencies producing the statistics and the burden on households and institutions providing the raw material.

The Canberra Group guidelines reflect how economic societies are organised and people conduct their lives. Over the passage of time, with social and political transformation, changes in the role of government, globalisation and so on, policy issues and priorities will change. It is thus essential to retain a certain degree of flexibility in developing general standards for statistics on this topic. Thus, acknowledging that there is no single concept or set of concepts that fit all circumstances, the guidelines did not attempt to propose a definitive set of standards for the compilation of income distribution statistics. Rather the aim was to give a systematic presentation of all the issues, both conceptual and practical, which should be considered by producers and users of income distribution statistics. Where sufficient consensus existed about best practice, recommendations were made, in the hope that this would contribute in due course to the availability of more accurate, complete and internationally comparable income statistics compiled to common standards. This should in turn lead to greater transparency in their presentation and better informed use of what are inevitably some of the most complex statistics produced by national and international statistical offices and organisations.

The present paper discusses the proposed income concept in EU-SILC in view of the recommendations of the Canberra Group, its appropriateness for policy-making and social policy analysis and its feasibility and challenges. The next section summarises the European policy needs. Section 3 focuses on the requirements of policy-relevant income statistics. In section 4 the measurement of income in EU-SILC is discussed in view of the policy needs. Section 5 describes the present situation concerning the concept and measurement of income in EU-SILC. The challenges we are facing to improve EU-SILC as the basic European reference source for data on income, poverty and social exclusion are discussed in section 6. Finally, section 7 presents conclusions and recommendations on the priorities concerning improving the measurement of income in EU-SILC.

2. Policy objectives and policy needs

The purpose of EU-SILC is to serve as the basic European reference source for data on income, poverty and social exclusion (European Parliament and Council of the European Union 2003, Article 1). More generally, EU-SILC must contribute to monitoring the social situation in the EU Member States in terms of the European Social Agenda (European

Commission, Directorate-General for Employment, Social Affairs and Equal Opportunities 2005). Particularly, income data from EU-SILC must be suitable to use in the process of the 'Open Method of Co-ordination' (OMC) within the EU on social protection and social inclusion.

The current Common Objectives with regard to social protection and inclusion policies in the EU were endorsed by the March 2006 Employment, Social Policy, Health and Consumer Affairs Council (Council of the European Union 2006). The OMC process has also been streamlined in respect of the revised Lisbon process of growth and jobs and in respect of the mutual co-ordination of social policies. In its Communication *Working Together, Working Better: Proposals for a New Framework for the Open Co-ordination of Social Protection and Inclusion Policies* of December 2005 the European Commission has set forward proposals for the streamlining of the OMC in the field of social protection and inclusion (European Commission 2005).

In the face of the emerging challenges, according to the Council, modernising social protection systems remains essential in order to implement social justice for women and men and promote the active participation of all in society. In particular, the EU needs to respond to the challenges of globalisation and demographic change, including through addressing the related challenges in the fields of pensions, health and long-term care and pursuing a better balance between work and family life. Strengthening social cohesion is a fundamental objective of the EU and growth and employment are a means towards the end of more social cohesion. Making a decisive impact on the eradication of poverty, including child poverty, and social exclusion by the year 2010 remains a central priority of the Lisbon strategy.

The current *Common Objectives* with regard to social protection and inclusion policies in the EU consist of overarching objectives and objectives that apply to the different strands of work: (i) making a decisive impact on the eradication of poverty and social exclusion; (ii) providing adequate and sustainable pensions; and (iii) providing accessible, high-quality and sustainable health care and long-term care (European Commission, Directorate-General for Employment, Social Affairs and Equal Opportunities 2006).

As for monitoring of these Common Objectives, the EU Social Protection Committee has recently proposed a new *monitoring framework* consisting of a portfolio of overarching indicators and three strand indicators portfolios (Social Protection Committee of the European Union 2006). All four portfolios consist of primary indicators, secondary indicators and context indicators. Indicators can be commonly agreed EU indicators or commonly agreed national indicators. Although the latter are based on commonly agreed definitions and assumptions, they do not allow for a direct cross-country comparison and do not necessarily have a clear normative interpretation. EU-SILC data will be used to construct most of the indicators which monitor progress on the various objectives[1].

3. Policy-relevant income statistics

Users of income statistics need data which are *relevant* and *authoritative*. Income statistics which do not measure the most relevant aspects of the issue users are interested in have little to offer. The same holds for income statistics which are questionable as to reliability, bias and comparability. The relevance of statistical information reflects the degree to which it meets the real needs of users. The most relevant income statistics are those which are recurrently available for monitoring the long-run problems on the social policy agenda. Often the findings of those income statistics assist in setting the agenda.

[1] Currently, EU-SILC is the data source for 11 out of the 21 commonly agreed indicators of social exclusion and poverty (European Commission, Directorate-General for Employment, Social Affairs and Equal Opportunities 2006, Annex I.A)

Impartiality, integrity and professionalism are the qualities producers of income statistics have to emanate in order to produce authoritative statistics. Producers of income statistics have to try to:

- avoid the publication of statistical data that contradict each other, or which seem to contradict each other because of confusing differences between concepts or an unclear revision policy
- publish consistent time series
- publish statistics of which validity is enhanced by means of reconciliation and integration of all available sources
- timely publish preliminary results (in order to prevent the publication of 'quick and dirty' contradictory data)
- follow international standards

The authority and, by implication, the relevance of income statistics will be increased, if they can be fitted into broader statistical systems such as the National Accounts and if they can be used in connection to the most widely used demographic and economic time series.

Producing comparable household income distribution data is one of the main objectives of EU-SILC. Analysts and policy makers identify three main purposes for compiling information on income distribution. The first one is driven by a desire to understand how the pattern of income distribution can be related to patterns of economic activity and the returns to labour, capital and land and to the way in which societies are organised – *i.e.* to theoretical and institutional considerations. The second one reflects the concern of policy makers to determine the need for both universal and socially targeted actions on different socio-economic groups and to assess their impact. The third one is an interest in how different patterns of income distribution influence household economic well-being and people's ability to acquire the goods and services they need to satisfy their needs.

Producers of income distribution statistics, therefore, have to address such questions as:

- How many 'poor' people are there in a given country? How does this compare with earlier years, or with other European countries?
- Who are the 'poor'? Has this changed over time?
- How unequal is the distribution of income in a given country? How does this compare with earlier years, or with other European countries?
- Have the rich become richer? The poor become poorer?

The audience for income distribution statistics is usually less conscious of the ambiguities surrounding concepts such as 'income,' 'poor' and 'rich' than are the producers of the statistics. 'Income' may often be thought of by the user in terms of cash income; the 'poor' are those whose lack of income means they are restricted to a low standard of living – *i.e.* there is an implicit assumption that 'income' constraints are binding on poor people's consumption - and the 'rich' are those who can afford a luxurious lifestyle. Typically, the main focus of interest is on changes over time, with differences between countries coming a close second. Statisticians' statements about incomes are interpreted as statements about the living standards experienced by different sections of the population; those with the lowest incomes are assumed to have the lowest living standards. Thus interest in income distribution may be justified either per se as a way to see how the benefits of national product are distributed across people, or indirectly as the best proxy for the distribution of economic well-being.

4. The measurement of income in EU-SILC

A household's economic well-being can be expressed in terms of its access to goods and services. The more that can be consumed, the higher the level of economic well-being, though the relationship between the two is not a linear one. Measuring consumption might therefore be a way of measuring economic well-being. However, a household may be able to choose not to consume the maximum amount it could in any given period but to save at least some of the resources it has available. By saving, households can accumulate wealth through the purchase of assets which will both generate income at a later date and serve as a 'nest-egg' for spending at a later time when income levels may be lower, or needs higher, than now. In addition to potentially earning a return for the household, ownership of wealth also affects their broader economic power. For example, wealthy households may find it easier to gain credit to finance their consumption. Thus to capture the full extent of a household's economic well-being it is desirable to look at a number of different aspects of their economic situation including not only income but also levels of wealth (the level of net worth – assets minus liabilities) and changes in the value of that wealth. Analysis of economic well-being is usually primarily concerned with the comparison of the actual or potential living standards of different groups in society and across societies, at a point in time and also over a period of time. Policies to address social cohesion generally focus on income in some form or other. In other words, income is normally the most objective proxy for economic well-being for policy purposes.

The Canberra Group's basic principle is to include in the definition of income all components that in one way or another contribute to the maximum amount that a household, or other unit, can afford to consume during a certain period (usually a year) without having to finance its consumption by reducing its cash, by disposing of other financial or non-financial assets or by increasing its liabilities[2]. In broad terms, income refers to regular receipts such as wages and salaries, income from self employment, interest and dividends from invested funds, pensions or other benefits from social insurance and other current transfers receivable. Large and irregular receipts from inheritances and the like are considered to be capital transfers, because it is unlikely that they will be spent immediately on receipt and are 'one off' in nature.

Income thus defined presents a partial view of economic well-being and represents the regular or recurring receipts of households (*i.e.* current economic well-being). It provides a measure of resources available to the household for consumption and saving. Consumption expenditure of households represents the day-to-day purchases that may be financed not only by regular or recurring income but also by savings from previous years or by incurring debt. For some households, such as retired households, the running down of capital for consumption may represent a deliberate attempt on their part to even out consumption over a life time. Other groups in the population, such as farmers, may also average out their consumption over a number of years while their incomes may show quite wide fluctuations over the same period. In such cases, consumption expenditure may represent a better estimate of the household's sustainable standard of living.

Having chosen current economic well-being as the organising principle, there were three other dimensions along which further choices of income components had to be made. These were cash (*i.e.* monetary) versus non-cash income, regular versus irregular income and maintenance of the value of net worth. Decisions on what to include and exclude along these dimensions were governed by the extent to which the component in question may be 'spent today'.

2 This definition is based on the Hicksian notion of income: "a person's income is what he can consume during the week and still expects to be as well of at the end of the week as he was at the beginning" (International Expert Group on Household Income Statistics 2001, pp. 11-12).

Measurement constraints

Besides theoretical requirements, the income concept must be measurable, either from surveys and/or from administrative data sources. Most income distribution statistics rely on data collected in household surveys, although in some countries administrative sources are used, for example tax and/or social benefit records or personal income registers. However, it is highly unlikely that either type of source can provide the level of detail of data which the desired income concept demands. Household surveys are constrained by the information it is feasible to expect people to be able to provide with reasonable accuracy during the course of an interview. Recourse to administrative records might appear to circumvent most of the problems associated with primary data collection. Income tax records are the most important of such sources and have historically provided long-run time series of continuous data. However, they also have their drawbacks. For this reason, tax records are typically used in conjunction with other sources, for example social security information for non-taxpayers. Appropriate use of these files almost always involves direct matching of individual records by a personal identifier and, hence, runs up against privacy and confidentiality concerns.

Income measurement must also be able to meet the requirements of different quality criteria, such as timeliness, accuracy and coherence. Consequently, we need to find a proper balance between policy and analytical requirements on the one hand and measurement constraints, in terms of data collection design, response burden and cost effectiveness on the other. All these considerations have eventually led to the following income definitions in EU-SILC (European Parliament and Council of the European Union 2003, Article 2 and further specified in European Commission 2003, Annex I):

a) *Gross household income*: the total monetary and non-monetary income received by the household over a specified ‘income reference period’, before deduction of income tax, regular taxes on wealth, employees’, self-employed and unemployed (if applicable) persons’ compulsory social insurance contributions and employers’ social insurance contributions, but after including inter-household transfers received.

b) *Disposable household income*: gross household income less income tax, regular taxes on wealth, employees’, self-employed and unemployed (if applicable) persons’ compulsory social insurance contributions, employers’ social insurance contributions and inter-household transfers paid.

5. Where do we stand?

The Canberra Group has made a number of general recommendations in its report (summarised in International Expert Group on Household Income Statistics 2001, pp. xiii-xvi). These general recommendations have been followed in the design of EU-SILC, although it was acknowledged that not all recommendations could fully be implemented from the start of the project. Concerning the income definitions in the 2003 Framework Regulation of EU-SILC, therefore, EU Member States were allowed some years to adapt their data collection to EU-SILC standards (European Parliament and Council of the European Union 2003, Article 15). This consideration especially referred to the collection or calculation of income components, which are difficult to observe (see also the above contribution by Clémenceau *et al.* in the present publication for a review of the EU-SILC project).

New income components that have to be included in the income data collection in EU-SILC as from 2007 are:

- Non-cash employee income
- Employers’ social insurance contributions

– Imputed rent[3]
– Interest paid on mortgages
– Value of goods produced for own consumption

Besides, all income components will have to be measured *gross*, *i.e.* including any taxes and social insurance contributions.

Consequently, as from 2007 the income concepts in EU-SILC will be in line with the recommendations made by the Canberra Group. With regard to cross-sectional information EU-SILC will then have accomplished its goal in terms of relevance and comparability. However, three important limitations will remain. First, household disposable income in EU-SILC does not include so-called *social transfers in kind*. These transfers reflect the value of individual services of government to households, such as publicly financed education and health care, food, housing and transport subsidies and in-kind social assistance. Second, EU-SILC does not measure (realised) *capital gains*, *i.e.* proceeds from selling off by household's assets that have risen in value. Third, EU-SILC will be restricted to the population living in *private households*, as is typical of all household surveys. This means that homeless persons and other difficult-to-reach persons as well as people living in institutions such as homes for the elderly, nursing homes, psychiatric hospitals and prisons are not included in the results.

Besides the inevitable sampling errors, the limitations in the EU-SILC data mentioned above will of course hamper the analysis of income inequality and poverty. Consequently, collecting information on these phenomena remains an important challenge. However, EU-SILC is not the proper instrument to meet these challenges. As we consider these phenomena to be beyond the scope of EU-SILC, we will not make any specific recommendations in this paper on how to overcome these shortcomings. However, demographic data sources may be available to offer information on the size and composition of the population not covered by EU-SILC.

The first *longitudinal information* from EU-SILC will become available as from 2009. At that moment it will also be possible to produce information on income dynamics. However, longitudinal data from EU-SILC will be based on periods of 4 years, which is the minimum required panel duration for EU-SILC. Although some countries run longer term panels, at a European level EU-SILC will not provide data to analyse long-term income dynamics, which may be seen as another shortcoming. Since we still have to wait for some years before we will be able to assess the longitudinal data from EU-SILC, it is not very fruitful to make recommendations at this stage.

Looking at the short term we see the remaining challenges concerning EU-SILC in the area of feasibility of the instrument. This means a focus on process quality, in particular the survey process, measurement errors in income components, non-response and timeliness. All efforts towards improving the data quality, however, will have to consider the burden that can be put on respondents and the resources that are available to the data producers.

6. Remaining challenges

Although many satisfactory results have been achieved since the launch of the EU-SILC project, a lot of challenges still remain. From a conceptual point of view the main challenges are:

[3] The money that a household saves on full (market) rent by living in their own accommodation or in accommodation rented at a price that is lower than the market rent.

- Measurement or imputation of gross income components
- Full coverage of the income concepts total household gross income and disposable income
- Treatment of negative or strongly fluctuating income from self-employment
- Enhancing the coherence by making comparisons and reconciliations with other data sources

Some of the challenges are hard to overcome in terms of the desired accuracy of income data. Therefore, it is useful to look at the remaining challenges in view of the impact they will have on indicators used in the framework of policy assessment of the European social protection and social inclusion policies, both at EU level and at national level. The amount of resources it will take to overcome the remaining challenges is of course also an important issue to consider.

The inclusion of gross income components and employers' social insurance contributions in EU-SILC have no impact on the indicators that are used at present in the OMC on social protection and social inclusion policies. The inclusion of non-cash income components like the rental value of owner-occupied dwellings and the value of goods produced for own consumption, however, may have an impact on the indicators used, notably on the at-risk-of-poverty indicators[4]. However, it should be recognised in this regard that the choice of a specific equivalence scale to adjust the distribution of income for differences in the size and composition of households for some countries also has large impact on the resulting indicators, notably the at-risk-of-poverty rates.

EU-SILC measures income components to calculate gross household income and disposable household income. Besides these two core concepts a number of other income concepts can be derived from EU-SILC. In each case the income concepts used in the calculation of the indicators should be assessed against their fitness for purpose. This is especially true for the treatment of income from self-employment, as it can be negative or it can strongly fluctuate over time. Particularly in countries with considerable self-employment, the way entrepreneurial income is included in EU-SILC data can have a serious effect on measuring risks of poverty for certain population groups.

Finally, we should acknowledge that some income components are hard to measure, despite all the efforts we will put into their measurement. Income from self-employment and non-monetary income components (notably imputed rent) cause measurement problems in any income statistics in any country at any point in time.

7. Conclusions and recommendations

The recommendations we make in this paper on improving the European Statistics on Income and Living Conditions are part of the principles of data quality management as formulated in the quality declaration of the European Statistical System. Moreover, further improvement of the EU-SILC instrument also fits into the implementation and monitoring of the European Statistics Code of Practice (Statistical Programme Committee of the European Union 2005). Furthermore, many of the recommendations made in this paper have already been discussed or touched upon in the July 2005 independent report on *Taking Forward the EU Social Inclusion Process* (Atkinson *et al.* 2005, Chapter 5).

With respect to improving the data quality of EU-SILC, we recommend to focus the efforts on the quality dimensions *accuracy*, *coherence* and *comparability*. In particular efforts should be concentrated on suppressing biases caused by unit and item non-response (especially in case of differential non-response rates), measurement errors (notably under-reporting of income data) and processing errors. Comparisons and reconciliations of EU-SILC results with other national data sources or harmonised European data sources are essential in this respect.

[4] This is particularly the case for the elderly, who have often been able to accumulate wealth in the form of housing assets.

The selection and definition of EU social inclusion and social protection *policy assessment indicators* will further benefit from careful analysis of the fitness for purpose of the EU-SILC concepts used in the light of the data quality that might reasonably be expected. Special attention should be paid to the treatment of negative or strongly fluctuating *income from self-employment* in the published income data.

The production of *quality reports* as stipulated by the EU-SILC Framework Regulation is of vital importance to the project. However, a recurrent production of quality reports – or Robustness Assessment Reports as proposed by the Canberra Group – will be key to assess the results, especially for the hard-to-measure income components.

Finally, we should continue our work on *methodological studies* to improve the income measurement in EU-SILC as well as its other features. By exploring, documenting and comparing modes of data collection and types of procedures used in the EU Member States, we are able to identify best practices to yield good European and national statistics.

This paper has focussed on the relevance, comparability and coherence of EU-SILC. We did not discuss specific issues related to sample selection and design, data collection and processing procedures, timeliness and accessibility of the EU-SILC data. Consequently, the recommendations with respect to improving the relevance, comparability and coherence of EU-SILC will have to be weighted against issues as dealing with non-response, measurement and processing errors, improving timeliness and maintaining cost effectiveness.

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Comparability of income data across households/individuals and over time

Rolf AABERGE, Erik FJAERLI, Audun LANGØRGEN and Magne MOGSTAD

chapter 2

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COMPARABILITY OF INCOME DATA ACROSS HOUSEHOLDS/ INDIVIDUALS AND OVER TIME

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Abstract

The purpose of this paper is to provide a discussion of two basic comparability problems related to the standard definition and measurement of income, with application to distributional assessments. First, we focus attention on how to deal with problems of measuring dividends and capital gains that arises when the income reporting behavior is affected by tax changes. The second issue discussed is concerned with comparability of incomes when there is significant non-income heterogeneity between regions within a country. Empirical results based on Norwegian income data demonstrate the importance of accounting for comparability problems independent of whether they arise due to changes in the income reporting behavior of economic agents or are due to non-income heterogeneity in the population.

1. Introduction

An underlying assumption for the meaningfulness of comparing and ranking a set of income distributions according to the degree of inequality and poverty is that the assessment carries over to the distributions of economic well-being. This requires that there must be insignificant interpersonal variations in the conversion of individual incomes into individual well-beings. Otherwise, an equal distribution of income may yield significantly unequal well-being levels, and it becomes hard to justify equality in the income space in terms of distributional justice. The reason is that income is a good that does not have intrinsic value but is important merely as an instrument for individuals to pursue well-being. This implies that the population in an assessment of income distributions should, in principle, consist of identical income-recipients in every relevant aspect other than income. For this reason, comparisons of incomes across countries seek to adjust country currencies to common measures by accounting for important non-income differences such as variation in the pattern of prices across countries, typically by the use of purchasing power parities. Acknowledging, however, that the welfare basis of such real income comparisons may be rather limited due to methodological and data issues ranging from the basic index-number problem to disparities in national household surveys, cross-country studies of inequality and poverty regularly confine the comparisons to intra-country relative measures and do not seek absolute comparisons of levels of incomes in different countries[1]. By contrast, empirical analysis of income distributions *within a country* does usually not consider the implications of non-income differences between individuals beyond accounting for resource sharing and scale economies in the households by the use of equivalence scales. Since empirical evidence suggest other important sources to comparability problems of incomes within a country, such as a substantial price difference of housing between urban and rural areas, intra-country relative measures may nevertheless suffer from a lack of welfare basis. Consequently, the conventional assessments of income distributions risk to be biased.

As the LIS-project has demonstrated (see Atkinson et al, 1995), attaining cross-country comparability of income distributions in a single year is a time-consuming and demanding task. Doing so for multi-year studies has only rarely been attempted. Atkinson et al. bring forward differences in measurement techniques and definitions as major sources of non-sampling errors and, moreover, point out that cross-country comparison may depend on the choice of methodological framework. The purpose of this paper is to provide a discussion of some comparability problems related to the standard definition and measurement of income, independent of whether the data is based on administrative registers or sample surveys. First, we focus attention on how to deal with the problems of measuring dividends and capital gains that arises when the income reporting behavior is affected by tax changes. The second issue discussed in this paper is concerned with comparability of incomes when prices of basic goods, such as housing, differ significantly between urban and rural areas.

1.1. Tax reforms and income shifting behavior

It has become universally acknowledged that cross-country comparisons of income distributions should be interpreted with caution. As demonstrated by Atkinson et al. (1995) the survey methods of the OECD countries appear to be quite diverse. Some of the surveys are based on administrative and income tax records whereas others collect income data by interviewing a sample of individuals (households). The former method has formed the basis for collecting income data in the Nordic countries. Thus, there may be a better basis for cross-national comparisons in the Nordic area than in the entire OECD area. However, since tax reported incomes (as well as survey reported incomes) may depend both on the tax basis and the structure of the tax system the important question arises whether conventional income data produced by national

[1] Whilst Smeeding and al. (1993) and Atkinson and al. (1995) refrain from making absolute comparison of incomes across countries and limit the cross-country study exclusively to intra-country relative measures, many studies attempt to assess the World distribution; see e.g. Milanovic (2002) and Sala-i-Martin (2006).

statistical agencies are comparable over time. This question is particularly relevant when a major tax reform has taken place and pre- and post-reform income data are used as basis for comparing trends in income inequality[2]. The origin of the comparability problem is due to the standard practice of using yearly tax reported dividends and capital gains as a measure of the returns from equities. Section 2 discusses an alternative approach that improves comparability of income data over time. As an alternative to the standard practice of using yearly tax reported dividends and capital gains as a measure of the returns from equities, it appears more relevant to use a measure derived from a Hicksian version of the definition of income. The "Hicksian" measurement of the stock returns is less sensitive to changes in income reporting behavior than the conventional income definition and may thus provide a better basis for analyzing the trend in income inequality and the contribution to income inequality from stocks when the income concept is meant to capture the consumption potential of the individual.

1.2. Regional heterogeneity in prices and needs

To be meaningful, the assessment of income distributions within a country requires uniform price patterns of goods across regions. Since empirical evidence suggests that the prices of basic goods, such as housing, differ significantly between urban and rural areas, the conventional analysis of poverty and inequality based on the distribution of equivalent income within a country might be biased. Accounting for regional variation in consumer prices could be achieved in countries where region-specific price indices are produced. Unfortunately, this type of information is normally not available in the OECD-countries. Furthermore, it appears plausible that differences in observed prices, at least partly, reflect unobserved heterogeneity in the quality of goods. If this is the case, an equal distribution of income may yield significantly unequal well-being levels even after adjusting for differences in observed prices. In addition, even in cases where neither the pattern of prices nor the quality of goods varies across regions, norms and consumption habits might turn out to be region-specific. Thus, there might be no perfectly egalitarian income distribution after controlling for heterogeneity in price patterns and quality of goods at which the persons are equally well off. As pointed out in Coulter et al. (1992) and Cowell (1995), there are two possible strategies available for coping with these types of non-comparability problems. Either one transforms the income measure by incorporating the relevant non-income heterogeneity and aggregates across persons, or one uses the observed income data and accounts for non-income heterogeneity at the aggregation stage[3]. In practice, however, the first strategy is regularly infeasible, since the data requirements are far beyond what is usually available. It can, therefore, be necessary to reconsider the standard approaches conventionally applied at the aggregation state of measuring income inequality and poverty. Section 3 provides a critical discussion of this issue with focus on the measurement of poverty[4].

[2] Björklund and al. (1995) report a jump in income inequality in Sweden from 1989 to 1991 due to realized capital gains that possibly can be explained by changes in the tax legislation.

[3] See Mogstad (2006) for a study of income inequality pursuing both these approaches to account for non-income heterogeneity within a country. Firstly, the observed incomes are transformed into real incomes by constructing region-specific price indices. Secondly, he proposes a method that enables one to measure income inequality when income can be considered to be comparable within regions, but we are not able to achieve adequate comparability between the regions by transforming the observed incomes into real incomes. See Mogstad et al. (2006) for a study of poverty based on a conceptually analogous method as the second approach.

[4] Wodon (1999) pursues such an approach following a direct definition of poverty by using information about the cost of 'minimal nutritional requirements' as well as data about non-food expenditure in different geographic areas. However, this estimation approach may suffer from lack of theoretical justification with respect to determining appropriate level of minimal nutritional requirement, deciding which non-food goods that are necessities, allowing for different tastes etc.

2. Tax reforms, income shifting and comparability of reported capital incomes[5]

Empirical results for Norway and Sweden suggest that income inequality in the early 1990s first and foremost increased owing to a rising disequalizing contribution of capital income[6]. The rise in income inequality reported by the national statistical agencies coincided, however, with the implementation of major tax reforms that affected the financing incentives in the corporate sector and the income shifting incentives in small enterprises. Thus, when yearly tax reported dividends and capital gains are used as a measurement of the returns from shares, changes in the standard estimates of income inequality may be a result of changes in the income reporting behaviour rather than factual changes in the distribution of income. If this is the case then alternative methods for measuring the returns from stocks are called for.

1992 was for several reasons a turning point in the Norwegian economy. First, although the entire period of 1986-1991 experienced a continuous and significant reduction in the personal tax rates, 1992 was the year of the tax-reform that finally completed the transformation of the tax system. Second, the business cycles changed dramatically in 1991-92, from a long period of recession and high real interest rates to more prosperous times and lower interest rates. Third, the economy experienced structural changes during the 1990's, from traditional manufacturing to services and technology. Such changes are likely to affect the relative wage rates in different industries. Because of the central importance of these changes, we will concentrate our analysis on the changes between the two distinct periods of 1986-1992 and 1993-1998.

Official Norwegian income statistics show a sharp increase in dividends received by households after the 1992 tax reform. The reported capital gains rose as well, but not as much as dividends. A government white paper[7] concluded that "The increase in income from 1986 to 1996 has, in relative terms, been greatest for those with the highest incomes" and that "The most important reason for the greater increase in high incomes is that capital incomes have been more unevenly distributed in the 1990s. This was due in particular to the sharp increase in dividend payments and gains from the sales of shares etc." The results of Table 2.1, which summarizes the changes in official statistics from 1986, show a substantial rise in the proportion of capital income received by the highest decile. Moreover, the proportions of pensions and public transfers received by the 2nd - 5th deciles have increased substantially during the period.

5 Section 2 relies on Fjærli and Aaberge (2000).

6 See Aaberge et al. (2000).

7 See the Equitable Redistribution White Paper (the E.R. White Paper) on the distribution of income and living conditions in Norway (The Ministry of Health and Social Affairs, 1998-1999).

Table 2.1. The composition of gross income with respect to wage earnings, self-employment income, capital income and public transfers (percent) in 1986 and 1996.

Percent

Decile	Year	Wage earnings	Selfemploy-ment income	Capital income	Public transfers
1	1986	29.3	3.5	4.5	62.6
	1996	29.3	2.6	0.8	67.4
2	1986	52.3	7.1	4.1	36.5
	1996	31.4	5.9	2.2	60.5
3	1986	63.7	9.3	3.7	23.3
	1996	48.8	7.7	2.5	41.0
4	1986	70.5	8.9	3.7	16.9
	1996	63.6	6.7	1.9	27.8
5	1986	75.0	6.5	3.8	14.6
	1996	70.7	6.4	1.7	21.2
6	1986	77.1	7.3	3.8	11.7
	1996	76.4	6.4	1.7	15.5
7	1986	77.6	7.7	3.8	10.9
	1996	78.2	6.2	1.9	13.8
8	1986	78.4	9.9	3.9	7.8
	1996	79.5	7.4	2.1	11.0
9	1986	81.3	8.0	4.4	6.2
	1996	80.4	8.1	3.1	8.5
10	1986	68.5	20.5	6.8	4.3
	1996	64.2	12.9	18.4	4.6
All	1986	72.1	10.5	4.5	12.9
	1996	68.5	8.3	6.0	17.3

Source: Table 3.4 in the E.R.White Paper (Figures produced by Statistics Norway).

Moreover, the complete time-series for the trend in dividend receipts and capital gains during 1986-1996 show that the observed incomes from share ownership (in particular dividend receipts) increased sharply soon after the implementation of the 1992 tax reform.

There is a vast literature dealing with the effect of taxes on firms' dividend policy and choice of financing strategies. Indeed, the incentives imposed by the non-integrated and asymmetric taxation of capital were pointed out as one of the major problems in the pre-reform tax system in Norway as well as in many other OECD countries. The 1992 tax reform was first and foremost motivated by narrow tax bases and the problem of wide variation in effective tax rates and entailed changes in the taxation of capital income at both the personal and the corporate level, towards a tax regime that was supposed to be neutral across different sources of finance and payback alternatives.

An important issue that has been at focus in the economic literature is the problem of income shifting. Income shifting can be defined as actions taken by taxpayers to reclassify income. There is some international evidence on income shifting responses to tax reforms. Slemrod (1990) and Gordon and Mackie-Mason (1995) found timing and income shifting responses to the 1986 US tax reform. In Norway, the Ministry of Finance found evidence of income shifting through changes in organizational form (Ministry of Finance, 1997), as well as through income reporting (Ministry of Finance, 1998).

One example of income shifting is to reclassify wages to dividends (this is of course a possibility that is particularly relevant for the owner-managers of closely held firms). Before the tax reform, it would not always be profitable for owner-managers to receive all cash as dividends. Normally, a tax-minimizing strategy would imply a mix of both wages and dividends[8]. After the reform, payment of dividends is unquestionably the most favorable form of pay out compared to wages. Thus, some of the dividends received by households after 1992 cover not only return to capital but also reflects compensation for work effort by the owner-managers of closely held firms. It appears that the increase in dividends after the 1992 tax reform is particularly significant in smaller firms, which emphasizes the importance of such income shifting motives.

Since tax-incentives might play an important role for financial decisions in the corporate sector and for the choice of type of payout from small corporations to owners, the treatment of capital income in empirical analyses of the income distribution may be crucial for the results. Accounting for biases that may arise from changes in the income reporting behavior appears particularly important in periods where major tax reforms have taken place. This calls for a definition of income that is less sensitive to changes in the reporting of income than the conventional definitions used in empirical analyses.

An alternative approach is to use an income definition that captures the contribution from investments in stocks to the households' long-term consumption possibilities. To this end the income definition proposed by Hicks (1939) appears appropriate. Hicks defined income as the maximum amount that an individual can spend during a period and still expect to be as well of at the end of the period as at the beginning[9] (in real terms). The Hicksian income definition depends on the notion of *expectation* and *permanence*, and has for that reason only in exceptional cases been considered appealing as a basis for practical tax policy. For example, in Norway business income from self-employment is after the 1992 tax reform divided into (low-taxed) capital income and labor income by an imputation rule where a normal rate of return is applied to the book value of real assets. Furthermore, the tax base for the resource rent tax on hydropower plants is also calculated by imputation in a similar way. The use of administratively determined rates of return in the Norwegian tax system is justified on the basis of suppositions regarding the expected return to certain real assets and represents a "Hicksian" element in the definition of the tax base.

The empirical counterpart of the chosen Hicksian income definition, which subsequently will be denoted *Hicksian income*, is determined by imputation. The estimated market value of the households' stocks is multiplied by the long-run average rate of return on the Oslo Stock Exchange. Of course, it is not straightforward to pick a proper rate of return, since it can depend on the period chosen or geographically. Siegel (1998) reports an average total real rate of return on U.S. stocks of 9 percent in the entire post-war period 1946-1997 (arithmetic average of real annual returns). In the period of 1982-1997 the rate was 13.6 percent. Based on the index of Oslo Stock Exchange[10], the annual average real rate of return of quoted stocks proves to be 8.9 per cent for the period of 1986-1998 (calculated on the basis of annual means). This estimate should capture the long-term expected rate of return of the entire market portfolio fairly well. The results reported in the next section do not depend critically on the chosen rate, and admits minor deviations[11].

8 Fjærli and Lund (2001).

9 Actually, Hicks (1939) introduces three alternative versions of his general definition.

10 The OSE index is a total return-index that includes dividends.

11 The procedure for estimation of the market values of non-quoted stocks is explained in Fjærli and Aaberge (2000).

Another problem related to the conventional income definition is the treatment of negative incomes. The Gini coefficients reported in the E.R. White Paper are based on disposable income larger than or equal to zero. In order to make the results comparable, we have used the same truncation rule. However, the non-negativity restriction creates a problem when it comes to decomposing income by different income sources. Implicitly, truncating total income allows for example capital income or incomes from self-employment to be negative, as long as the remaining income components are sufficiently large. This procedure makes it, however, hard to interpret the contribution to income inequality from the various income components. To abandon this problem, we have introduced an alternative procedure by making separate truncations for each income component. Although the choice of truncation rule turned out to have a minor effect on the estimated Gini coefficients, it may nevertheless have a significant impact on the income components' contribution to overall income inequality.

The Hicksian measure of income is defined as the sum of the following income components:

1) Earnings
2) Self-employment income
3) Pensions and transfers
4) Interest receipts (net of the inflation component)
5) Imputed total real return to equities (equal to 0.089 times the estimated market value of stocks)

Minus

6) Taxes (net of childcare allowances)

Thus, the Hicksian income differs from the standard income definition by using a measure of expected total return rather than tax reported dividends and capital gains and losses as a basis for the measurement of stock returns.

As indicated above the standard reported estimates of income inequality rely on an income definition that is closely related to taxable income and thus might be rather sensitive to changes in the tax reporting behavior. However, by employing the more comprehensive Hicksian type of income definition suggested above, where observed dividends and capital gains are replaced by imputed total return to shares, the referred problems related to changes in income reporting behavior are abandoned. Table 2.2 displays the mean tax-reported returns to stocks and the alternative imputed return. Before the 1992 tax reform the imputed total return was about 4 - 6 times higher than the dividend receipts and capital gains reported for taxation. This result shows that only 15-25 percent of the nominal returns to equities were reported as taxable income in the period before the tax reform. By contrast, reported returns and imputed returns to equities were of the same magnitude after the tax reform. Accounting for inflation has greatest impact in the 1980's because the rate of inflation was substantially higher than in the 1990's.

Table 2.2. Mean tax reported dividend receipts and net capital gains vs. total return to stocks by imputation in equivalent amounts*. 1998 NOK

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Mean observed dividends and capital gains	918	1509	858	1227	975	709	983	3323	4277	5060	8169	9433	7642
Mean imputed total return to shares, nom rate of return	6531	5731	6998	2711	4576	4478	3931	3735	3865	6212	5724	7646	6145
Mean imputed total return to shares, real rate of return	3536	2832	3913	1758	3087	3198	3095	2940	3318	4844	4965	5854	4836

* Incomes are divided by the square root of the household size.

Empirical evidence from national studies of income distribution based on the standard definition of income demonstrates that share ownership without exception is strongly concentrated in the upper part of the income distribution. Thus, the increase in dividends after the 1992 reform concerns first and foremost the upper decile of the income distribution. Results reported in Fjærli and Aaberge (2000) show that the 10th decile had a real growth in disposable income of about 5 percent from 1992 to 1993, largely due to the increase in dividend receipts, whereas the average real income did almost not change. Dividends have continued to increase in 1994-1996. This fact has been considered to be the major cause of the observed increase in income inequality in Norway during the 1990s.

The trend in income inequality 1986-1998 based on the Gini coefficient and two alternative definitions of capital gains and dividends are reported in Table 2.3. Based on the standard definition we find that income inequality increased by 9.1 percent from the pre-reform period to the after-reform period. By contrast, when the Hicksian income definition forms the basis of measuring capital gains and dividends then income inequality is found to solely rise by 3.3 percent.

Table 2.3. Trend* in income inequality when income is measured according to Standard income and Hicksian income. 1986-1998

Year	Income inequality (Standard income)	Income inequality, imputed real return (Hicksian income)
	G	G
1986	0.224 (0.002)	0.233 (0.002)
1987	0.224 (0.003)	0.226 (0.002)
1988	0.223 (0.002)	0.230 (0.003)
1989	0.233 (0.004)	0.231 (0.003)
1990	0.232 (0.002)	0.236 (0.003)
1991	0.232 (0.003)	0.236 (0.003)
1992	0.230 (0.003)	0.241 (0.003)
1993	0.240 (0.005)	0.235 (0.004)
1994	0.249 (0.002)	0.243 (0.002)
1995	0.247 (0.003)	0.240 (0.002)
1996	0.255 (0.004)	0.243 (0.003)
1997	0.260 (0.004)	0.246 (0.003)
1998	0.249 (0.003)	0.237 (0.003)
Average of (1986-1992)	0.229 (0.001)	0.233 (0.001)
Average of (1993-1998)	0.250 (0.001)	0.241 (0.001)
Percentage change	9.07 %	3.27 %

* Standard deviation in parentheses.

By decomposing the Gini coefficient with respect to income components the changes in income inequality can be explored more carefully. Table 2.4 shows the results of the decomposition for each year and for both definitions of income. Owing to the very high concentration coefficients, the stock returns contributed much more to overall income inequality than to total disposable income.

Dividends' share of inequality is negligible before 1993, but increases sharply from 1993. Adjusting for the effect of changes in income reporting behavior, the contribution to inequality from stocks shows to be less important than what has been suggested by the standard reported estimates based on observed dividend receipts. While the standard income definition underestimates the effect of share ownership on inequality during the pre-reform tax regime by approximately 33 percent, the two income concepts provide similar results of the decomposition of income inequality after the tax reform.

As seen from Table 2.4 the contribution from stock returns to the change in overall inequality between and after the tax reform is less significant when we replace tax reported returns with imputed returns. It appears that all income components apart from taxes show increased contributions to inequality. The contribution from pensions and transfers increased by the same magnitude as the contribution from total returns, while the contributions from earnings and self-employment income increased slightly less. By contrast, the contribution from dividends to income inequality when income is based the standard income increased more than the joint contribution of the remaining income components. Table 2.5 reports the contributions from respectively return to stocks, taxes and other income components to changes in average income inequality.

Table 2.4. Contribution to mean income and income inequality (Gini coefficient) of stock returns when income is measured according to Standard income and Hicksian income

Year	Income share		Contribution to inequality		Inequality share	
	Standard income	Imputed real returns	Standard income	Imputed real returns	Standard income	Imputed real returns
1986	0.006	0.022	0.004	0.016	0.016	0.070
1987	0.009	0.017	0.006	0.011	0.029	0.050
1988	0.005	0.024	0.004	0.018	0.017	0.079
1989	0.007	0.011	0.006	0.007	0.026	0.030
1990	0.006	0.019	0.005	0.014	0.021	0.059
1991	0.004	0.019	0.003	0.014	0.014	0.060
1992	0.006	0.018	0.005	0.014	0.020	0.059
1993	0.020	0.018	0.019	0.014	0.078	0.061
1994	0.025	0.020	0.023	0.016	0.093	0.065
1995	0.029	0.028	0.027	0.023	0.108	0.096
1996	0.045	0.028	0.042	0.022	0.165	0.090
1997	0.050	0.032	0.046	0.024	0.178	0.099
1998	0.039	0.025	0.035	0.021	0.142	0.090
Average of (1986-92)	0.006	0.018	0.005	0.014	0.020	0.058
Average of (1993-98)	0.035	0.025	0.032	0.020	0.127	0.084
Percentage change from (1986-92) to (1993-1998)	470.65%	37.09%	590.18%	48.36%	528.57%	43.55%

Table 2.5. Contributions to change in average pre and post-reform income inequality (Gini) when income is measured according to Standard income and Hicksian income

Income component	Standard income	Imputed real returns (Hicksian income)
Wages	0.029	0.028
Self employment	-0.012	-0.010
Pensions and transfers	-0.007	-0.005
Other capital income	-0.006	0.001
Return to shares	0.027	0.007
Taxes	-0.011	-0.011
Total change (ΔG)	**0.021**	**0.009**

The results presented above question the conventional wisdom of a significant rise in income inequality in Norway during the 1990s as well as the claim that the rise in income inequality was largely due to a rising disequalizing contribution of capital income. However, since these results rely on a definition of income that fails to account for changes in income reporting behavior it is doubtful whether data from tax records for different years are comparable, especially when the actual time period covered the implementation of a tax reform.

3. Regional heterogeneity and comparability of income: the impact on poverty measurement with application to Norway

The standard practice for identifying the poor in most OECD countries is to use a poverty line defined as a specific fraction of the median equivalent income within a country. To be meaningful, this approach requires identical prices on goods and services as well as uniform norms and consumption habits across regions. Since empirical evidence suggests that these conditions are not fulfilled the results from poverty analysis based on a joint country-specific poverty line might be biased.

Accounting for regional variation in consumer prices could be achieved in countries where region-specific price indices are produced. However, this type of information is normally not available in the OECD-countries. Moreover, even in cases where the pattern of prices does not vary across regions, norms and consumption habits might turn out to be region-specific. Thus, an alternative approach to the standard method for measuring poverty in a country would nevertheless be required. Instead of attempting to transform the income measure to account for relevant non-income heterogeneity, it may thus be necessary to reconsider the standard approaches conventionally applied at the aggregation stage of measuring poverty. To this end, we propose a method that enables us to measure poverty when incomes cannot be made adequately comparable between subgroups. By dividing the municipalities into groups determined by geographic location and prices on basic goods comparability of income within but not between subgroups may be justified. By considering the distribution of individual equivalent income for each of the groups we may construct a set of group- or region-specific poverty lines. The objective is to increase the comparability of income between individuals who face identical prices and share norms and consumption habits, when income is supposed to capture the consumption potential for households/individuals.

3.1. The impact of heterogeneity in prices and needs on the measurement of poverty

In most OECD countries, the poor are defined as those with command over resources significantly below what is considered normal in the society, i.e. it is the economic distance aspect of inequality that defines poverty (O'Higgins and Jenkins, 1990). In practice, the poor are typically identified on the basis of a relative income poverty line defined as a specific fraction of the median equivalent income within a country[12]. In the language of economics, the income an individual commands is relevant for evaluating individuals' ability to pursue well-being because it tells us something about the set of commodity bundles he may achieve for a given set of prices. However, it is not straightforward to draw inferences about who are unable to attain a reasonable level of well-being based on income data, since the capability to achieve well-being from a given level of income may vary between individuals. In particular, it might be significant interpersonal variations in the conversion of incomes, just as in other kinds of resources and primary goods, into the ability to do this or be that[13]. Thus, one might infer that if one wants to go beyond describing the distribution of important means to achieve well-being, such as income, and extend the perspective to assessing the ability to achieve well-being a link has to be established between the ability to convert the relevant means to achieve into basic achievements.

In order to provide such a link, a first step is to confront the two fundamental problems of the indirect approach to measuring poverty in terms of income short-falls, put forward by Sen (1979, 291): *"First, if the pattern of consumption behavior has no uniformity there will be no specific level of income at which the 'typical' consumer meets his or her minimum needs. Second, if prices facing different groups of people differ, e.g. between social classes or income groups or localities, then poverty threshold will be group-specific, even when uniform norms and uniform consumption habits are considered. These are real difficulties and cannot be wished away"*. Thus, the meaningfulness of poverty analysis based on a joint country-specific poverty line requires a pattern of prices that do not vary across regions. However, empirical data from Norway and other OECD countries show that prices on basic goods, such as houses, differ significantly between urban and rural areas. Thus, a given amount of income will give greater consumption possibilities in areas with low housing prices than in areas with high housing prices. Therefore, neglecting price differences between regions can result in biased estimates of poverty, when income forms the basis of the measurement of poverty. Furthermore, one could also question whether individuals' needs apply broadly to the entire nation or differ according to geographic location. Arguably, the perception of minimum needs depends on the reference group's circumstances, which presumably are heavily influenced by the community to which they belong. If one agrees with Sen (1984) that there is significant variability in the commodity requirements within a given country, then using a joint country-specific poverty line may appear inappropriate even when prices across regions are similar. A possible response to these problems, which is compatible with the relative income poverty line approach, is to introduce a set of region-specific poverty lines. This can be achieved by classifying the municipalities according to region and price level on basic goods. Each group's region-specific poverty line can then be determined by a certain fraction of the median equivalent income in that group. The purpose of applying region-specific poverty lines is to improve poverty estimates by restricting comparison of income to individuals who live in the same community and compete in the same consumer market and therefore face similar prices on key consumer goods. The poor are then defined as those whose incomes fall considerably short of the income commanded by the "representative" individual in their community.

3.2. A region-specific approach for measuring poverty within a country

12 A large body of empirical research on poverty employs relative income poverty lines. This approach is followed in the study of poverty on national level and by region in the Nordic countries (Gustafsson and Pedersen, 2000). Furthermore, it is used to describe the poverty pattern in the OECD countries (Forster and Pearson, 2002), in the European Union (O'Higgins and Jenkins, 1990) and in the US (Formby, 1997).

13 See Sen (1992).

To account for differences in prices and needs in the measurement of poverty in Norway, it appears relevant to classify the 435 municipalities according to their regional location. Furthermore, since the level of housing costs is the main expenditure for most households, especially for those with low income, housing prices will be used as a second classifying variable. Specifically, we divide the municipalities into quartiles according to their average housing price per square meter[14]. This is possible since data on prices per square meter for houses sold in each municipality are available for the year 2001[15]. Next, we divide the municipalities into three groups corresponding to the quartiles they belong to; the 1st quartile is labeled *low housing prices*, the 2nd and 3rd quartiles *medium housing prices*, and the 4th quartile *high housing prices*.

By combining the three housing price categories with seven regions, the municipalities are divided into 21 groups. Next, region-specific poverty lines are determined as half of the median equivalent income in each of the respective groups (Table 3.1). As expected we find a positive association between a municipality's region-specific poverty threshold and the average housing price. This relationship may arise because individuals' capacity to purchase goods, such as housing, depends on the level of resources of the other individuals around them through the geographic pattern of competition, which makes it likely that housing prices increase with the general income level in a municipality. Furthermore, a high general income level means that the median income will be high and in turn the poverty threshold as well. Therefore, a resident in a municipality with high housing prices will need relatively high income to be defined as non-poor, compared to an individual living in a municipality where housing prices are relatively low[16].

The region-specific poverty line approach allows identification of the poor by restricting comparison of equivalent income to individuals who belong to the same group of municipalities. Hence, one avoids comparing income between individuals from municipalities with high housing prices and individuals from municipalities with relatively low housing prices, even if these municipalities are neighbors. For example, the urban municipality of Trondheim with high housing prices will not belong to the same group of municipalities as its rural neighboring municipality Agdenes where housing prices are low. By contrast, analyses based on a joint country-specific poverty line specify the poverty threshold in terms of the median equivalent income in the country as a whole. Hence, one implicitly makes the contentious assumption that all individuals within a country face the same prices and have identical minimum needs (after accounting for differences in economics of scale in consumption according to the equivalence scale that is selected). By comparing the poverty thresholds in Table 3.1, it is clear that the country-specific poverty line is below the region-specific poverty lines in some of the regions with high housing prices. On the other hand, the country-specific poverty line is larger then the region-specific poverty lines when housing prices are low or medium.

14 In this paper, we will group the municipalities according to real estate prices. One could argue that rental prices would be a more appropriate classifying variable for identification of poverty thresholds. However, detailed data on local level for rental prices are not available in Norway. Moreover, most people in Norway are, by large, owners rather then renters. Furthermore, Norwegian data show that the geographic pattern for real estate prices is relatively stable and remarkably similar to the geographic pattern for rental prices (Langsether and Medby, 2004).

15 Source: Statistics Norway, Division for Construction and Service Statistics.

16 The relevance of this method is supported by the empirical results of Van Praag et al. (1982), where survey data indicate that the socially perceived level of income necessary to avoid poverty is greater in cities compared to rural areas.

Table 3.1. Region-specific and country-specific poverty lines, 2001

Region	Housing prices	No. of municipalities	Poverty line (NOK) (Defined as half of the median equivalent income)
Oslo and its surrounding municipalities	Low	0	-
	Medium	2	81700
	High	21	93800
Eastern Norway	Low	8	73700
	Medium	33	76900
	High	7	81500
South Eastern Norway	Low	2	79000
	Medium	37	79500
	High	33	83000
South Western Norway	Low	5	75400
	Medium	31	77400
	High	20	83000
Western Norway	Low	17	77000
	Medium	62	78700
	High	19	83400
Mid-Norway	Low	25	73000
	Medium	18	76100
	High	6	83800
Northern Norway	Low	50	78100
	Medium	36	79400
	High	3	86100
Norway		435	83200

Below, we compare the effects on the national level of poverty as well as the pattern of the geographic and demographic poverty profiles when using region-specific rather than country-specific poverty lines. The informational basis for the empirical analysis is a household register covering the entire resident population of Norway for 2001, which is supplemented with detailed income data from the Tax Assessment Files. Furthermore, we use yearly income after tax as an indicator of individuals' economic resources[17]. Income after tax, which is defined in close agreement with international recommendations (e.g. Expert Group on Household Income Statistics, 2001), incorporates earnings, self-employment income, net capital income, public cash transfers and taxes. To enable the comparison of incomes across individuals belonging to households of varying size and composition the standard OECD equivalence scale is applied, for which the weight of the first adult is set to 1, additional adults are given weights of 0.7, and each child gets a weight equal to 0.5. The joint country-specific as well as the region-specific poverty lines are determined as half of the corresponding median equivalent income.

[17] In order to make inference about the geographic as well as demographic composition of the poor, survey data will not suffice due to too few observations. Thus, we have used data from the 2001 Census where the income accounting period is one year. However, there can be problems related to such an approach since some individuals can temporarily have low yearly income without suffering from serious deprivation, while others can temporarily have high yearly income but still suffer from deprivation.

The results presented in Table 3.2 show that 3.2 per cent of the Norwegian population is classified as poor in 2001, when the standard country-specific threshold is applied. In comparison, the population of poor estimated on the basis of a set of region-specific thresholds is equal to 3.3 per cent. Thus, the national poverty estimate is only slightly affected by the use of a set of region-specific thresholds instead of a joint country-specific threshold.

Table 3.2. Poverty rates for Norway by urban and rural municipalities, 2001*

	Urban municipalities	Rural municipalities	Total population
Country-specific poverty line (defined as half of the median equivalent income)	3.2	2.9	3.2
Region-specific poverty lines (defined as half of the median equivalent income in each group)	3.5	2.2	3.3

* Urban and rural municipalities include 232 and 203 local jurisdictions, respectively

Although the overall extent of poverty in Norway in 2001 is rather insensitive to the choice between region-specific and country-specific poverty lines, the empirical results show that both the geographic and demographic poverty profiles depend largely on this methodological choice. In fact, the results demonstrate that the analysis of poverty based on a country-specific threshold produces downward biased poverty rates in urban areas and upward biased poverty rates in rural areas. Specifically, a comparison of the poverty rates by municipality reveal that the poverty rate increases in most city municipalities as well as in the majority of the municipalities in the surroundings of Oslo when a joint country-specific poverty line is replaced by a set of region-specific poverty lines. A common feature for these municipalities is that housing prices are relatively high. Previous empirical studies on poverty in Norway based on a joint country-specific poverty line have concluded that young singles and both first and second-generation non-western immigrants dominate the poor segment of the Norwegian population[18]. Introducing region-specific poverty lines makes this structure even more clear. For example, the poverty rate for second-generation immigrants increases by 4.6 percentage points when a joint country-specific poverty line is replaced by region-specific poverty lines.

3.3. Concluding remarks

In order to evaluate and design poverty reduction programs, it is necessary to provide an understandable picture of the poverty profile in a society. It is thus important to introduce poverty thresholds that account for the heterogeneity in prices and minimum needs within a country. The method applied above relies on information about individuals' places of living and key prices as a basis for specifying a set of poverty lines. According to the different region-specific poverty lines, the poor can then be identified as those whose incomes fall significantly short of the income commanded by the "representative" individual in their community.

[18] See for example Andersen and al. (2003).

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Discussion

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DISCUSSION

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The EU-SILC data are designed to study the distribution of income and well-being in each member state of the European Union, and to enable comparisons among countries. Paul van der Laan's paper deals with the income concept in EU-SILC, its relevance, its feasibility and the remaining challenges. This is a very fine paper that refers to all the EU recommendations and regulations that guide this EU-wide statistical exercise. The discussion of the income concept is mainly based on the recommendations of the so called Canberra group of which he himself was a member. I agree with his conclusion to focus the efforts on the quality dimensions of the surveys "accuracy, coherence and comparability". But I should like to add some points.

First let me note that the EU-SILC data are not representative of all the inhabitants of the member states. Although it is mentioned in the paper, which groups are missing, (the homeless, the population in institutions, and obviously the illegal inhabitants) I should like to emphasize that each country should at least produce estimates of the population shares of the resident population that are not covered by EU SILC, even if one does not know very much about the living conditions and the well-being of these individuals. In addition to the total numbers at least the age and sex structure of this groups not covered by the surveys should be estimated, too. One could also expect that each country mentions in which institutions which shares of the population live. This information should accompany the EU-SILC data so that the users of these surveys can qualify their results. Remembering that the share of the elderly and of those in need of permanent care will continuously increase such information would become even more important in the future. One can even imagine an additional EU survey that describes the living conditions of the groups not covered by EU-SILC.

Second I should like to note that both papers do not consider the special problems of getting sufficient and reliable information about foreigners and about other persons with migration background that live in each country. Since the living conditions of this growing population group will become more and more important in politics it seems advisable to devote more resources per capita to the investigation of this group than to that for the indigenous population. Questionnaires in the most important foreign languages and bilingual interviewers might help. As is well known poverty rates can become very much biased downwards if the population group with migration background is not represented correctly.

I should like to stress a third point that is also made by Paul van der Laan. It is important to compare the grossed up sums of important variables, like market income, unemployment benefits, pensions, social assistance benefits and so on, with duly corrected aggregates of the National Accounts or of ESSPROSS, and to show which shares of these variables are covered in each country by the surveys. For some transfers this can and should also also be done with the number of recipients.

Paul van der Laan advises that special attention should be paid to the treatment of negative or strongly fluctuating income from self-employment. I should like to add that a retrospective question about the average incomes of this type (including the income of farmers) during the past three years might be helpful. It would be useful to introduce an additional variable with these averages.

I should like to emphasize another point that is made by Paul van der Laan only in passing. That is the use of only one equivalence scale, namely the modified OECD equivalence scale. At least for Germany it can be shown that this scale does not correspond to the scales that are implied in social benefits for households of different size, which are decided by Parliament. Although the use of a single scale for all the member states may not make much difference for the results of the summary distribution measures, it has a great influence for the results concerning subgroups, and especially for their poverty rates. As a first step, I suggest, therefore, that all the indicators should be calculated alternatively with the modified OECD scale (1.0, 0.5, 0.3) and with the old OECD scale (1.0, 0.7, 0.5). These two scales seem to encompass the range in which the implied scales of the member states lie. This hypothesis can be checked by using the information given by the regular publication of all the social protection regulations of the member states in MISSOC.

Rolf Aaberge states at the beginning of his paper: “An underlying assumption for the meaningfulness of comparing and ranking a set of income distributions according to the degree of inequality is that the assessment carries over to the distributions of well-being. This requires that there must be insignificant interpersonal variations in the conversion of individual incomes into individual well-beings.” This statement that refers to comparisons in general can be made more specific since there are seven different types of comparisons.

First, one can compare individuals in households of a specific country with respect to their relative position in the distribution of nominal incomes, and can calculate summary measures of income inequality and poverty. The individuals remain anonymous. For these calculations it can be assumed that errors in measurement compensate to a high degree. But these errors become the more important the smaller the subgroup for which these calculations are done.

Second, one can compare these summary measures of inequality and poverty for each country over time. In this case reliable statements about trends can be made even if there are errors in measurement provided one can assume that they remain approximately constant over time.

Third, one can aim at comparing the nominal income or nominal equivalent income of each member of a panel over time, which means that the comparison refers to identifiable individuals in a country that are only anonymous to the researcher for reasons of privacy. These analyses are most strongly influenced by errors in measurement at the individual level because one cannot distinguish them from real changes and because there will be no compensation of errors.

The fourth approach aims at a comparison of summary measures of inequality and poverty between countries. Obviously, such a comparison does not refer to the absolute levels of nominal or real income but only to the relative positions of anonymous individuals. But these comparisons at the level of disposable income in addition to the errors in measurement can be biased because of different systems of social protection. I come back to this point later on.

The fifth perspective aims at a comparison of the changes of relative positions of members of a panel in different countries, presumably condensed in some summary measures of income mobility, and measures of income mobility for certain groups, e. g. the initially poor population. Such a comparison shows the degree of stability of the various strata of society in the countries under review.

These five perspectives of comparison only refer to relative positions defined by one of the nominal income concepts in each country separately. They do not deal with absolute levels of nominal or real income.

As a sixth approach one can compare absolute levels of real incomes between countries by recalculating nominal incomes with purchasing power parities keeping in mind the limitations of such comparisons[1]. This approach shows differences in average and median real incomes between entire populations and – perhaps more interesting – between sub groups within each population.

The most ambiguous seventh approach consists of a ranking all individuals of all the member states by their real incomes within a single distribution and of calculating summary measures for the entire EU and, additionally, interpret the changes of these measures over time.

The comparison between countries of summary distribution measures based on real incomes, however, does not give new insights, if all the nominal incomes in each country are corrected by the same index of purchasing power. Only if group-specific indices of purchasing power are used, additional insight can be gained. This is one of the problems Rolf Aaberge deals with.

The Canberra Group on whose recommendations Paul van der Laan mainly based his discussion of the income concept did not recognize clearly the differences in the social protection systems of the countries to be compared[2]. Since universal coverage of the entire population for the main social risks by mandatory systems does not exist in all the member states[3] the measurement of well-being by the proxy of equivalent disposable income is biased. This is especially important with respect to social risks that can hit everybody: Sickness, accident, old age and the need for care. This means that the well-being of the group of individuals who do not provide privately for these risks is overestimated by disposable income as defined by the Canberra group contributions. To improve comparability it is necessary to deduct from disposable income fictitious contributions for an adequate private insurance the benefits of which are comparable to the mandatory systems. This corrected income concept can be called “social risk corrected disposable income”.

Rolf Aaberge’s paper deals with a kind of metadiscussion referring only to Norway because

- he introduces an extended income concept in line with a Hicksian definition of income,
- he analyses the Norwegian income distribution comparing the results based on a standard income definition and his extended definition, and
- he introduces regional aspects into the measurement of poverty.

The results Aaberge derives are based on tax registers and additional registers that are available in Norway. They contain much more information than can be expected from the EU-SILC surveys. The Hicksian definition of income, for instance, includes imputed returns to assets the calculation of which needs information on the value of assets, and of the changes in their values. Since this information is not available with EU SILC, the Hicksian concept cannot be used for EU-wide comparisons. Therefore, I refrain from a discussion of the merits of this concept compared to the concept used in Paul van der Laan’s contribution.

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1 Compare Appendix 3 of the study of the Canberra Group.

2 The Canberra Group mentions social security contributions to private schemes but it includes only contributions actually paid (comp. the discussion on p. 138). Here we are recommending imputed contributions for those who did not make provisions.

3 Compare MISSOC 2004.

Rolf Aaberge also opens up a new line of criticism when he addresses the problem of regional differences within a country with respect to the price level and even to the prices of specific goods, and to average incomes of regions from which regional poverty lines can be derived. Obviously, this criticism can be extended, on the one hand, by distinguishing smaller and smaller regions within a country, and on the other hand, by applying it to comparisons between countries. This would mean that purchasing power parities have to be differentiated by regions within countries. Additionally, one has to decide whether to use a single country-wide poverty line or even region-specific poverty lines within each country. From a puristic point of view this critique is valid.

It is well-known that price indices and purchasing power parities calculated country-wide can only be considered an approximation to determine the real incomes of individuals. This problem also extends to the use of equivalent disposable *real* income as a proxy for the well-being of individuals. But given the fact that regional price indices and other regional information are not available one has to live with this critique keeping in mind a possible bias.

There is one way to partly take account of this critique that is feasible with the data of EU SILC. One could introduce an additional refinement of the income concept by subtracting housing costs from disposable income, and call this new income concept “free disposable income” (in addition to the correction for the non-universal coverage of important social risks.). Obviously, the poverty line would also have to be corrected by deducting average housing costs from the original poverty line to get a refined poverty line. Moreover, the equivalence scale has also to be adjusted. The calculation of summary distribution measures and poverty measures for each country and comparisons of countries could then be based on this refined income concept.

If one also wants to compare absolute levels of real income purchasing power parities excluding housing costs have to be used. Since housing costs are presumably the most important cause for within-country and between-country differences in purchasing power of nominal income such a procedure can weaken the critique mentioned by Rolf Aaberge.

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EU-SILC and welfare measurement

Extreme incomes and the estimation of poverty and inequality indicators from EU-SILC

Philippe VAN KERM

chapter 1

EXTREME INCOMES AND THE ESTIMATION OF POVERTY AND INEQUALITY INDICATORS FROM EU-SILC

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Abstract

Social indicators are known to be sensitive to the presence of extreme incomes at either tail of the income distribution. It is therefore customary to make adjustments to extreme data before estimating such statistics. EU-SILC being a central source for the estimation of social indicators in Europe, it is important to evaluate the impact of such adjustments and assess how much resulting cross-country comparisons are affected by alternative adjustments. The paper presents the results of a large scale sensitivity analysis considering both simple, classical adjustments and a more sophisticated approach based on modeling parametrically the tails of the income distribution. Reassuringly, ordinal comparisons of countries are found to be robust to variants of data adjustment procedures. However, data adjustments are far from innocuous as cardinal comparisons of countries reveal sensitive to the treatment of extreme incomes, even for seemingly small adjustments.

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1. Introduction

EU-SILC is bound to become the reference source for income and social exclusion statistics in the European Union. Indeed, EU-SILC is identified as one of the few reference data sources for estimating the common statistical indicators for monitoring and reporting on social inclusion that were endorsed at the Laeken European Council in December 2001. By providing a common data source containing comparable individual- and household-level data on income and living conditions, EU-SILC opens up many opportunities for thorough distributional comparisons both over time and across European countries. It is therefore crucial to make sure that estimation of welfare indices (of poverty or inequality) from the EU-SILC instrument is as accurate as possible.

As demonstrated by the contributions to this volume, accuracy of estimates of poverty and inequality involves a bewildering array of issues. It ranges from the mere definition of the underlying concept of "economic well-being" that one is trying to capture (typically, a person's access to goods and services), or the definition of the income components measured in the data, to the selection of appropriate summary welfare indicators, via the definition of the basic unit of analysis and the within-household income sharing assumptions, or the quality of the collected data. The report of the Canberra Group (2001) provides a thorough discussion of many of these issues, Atkinson, Cantillon, Marlier & Nolan (2002) make reflections in the context of social indicators estimation, and van der Laan (2006) and Verma (2006), in this volume, address several of these issues with respect to EU-SILC.

The present paper focuses on one particular problem, namely the treatment of extreme income data. It reports on a large-scale sensitivity analysis evaluating the impact of extreme incomes on welfare indicators and the effect of data adjustments typically used to keep their impact under control, on the basis of the first official release of EU-SILC 2004 data. The paper gives further explanation about why extreme incomes matter particularly for welfare indicators, then describes the sensitivity analysis and summarizes the main lessons that were drawn. For the sake of brevity, numerical results are not reported but the full set of results is available in a report available from the author on request[1].

2. Extreme incomes and the estimation of welfare indicators

It is well-known, in particular since the work of Cowell and Victoria-Feser (1996a, 1996b, 2002), that welfare indicators estimated from micro-data can be very sensitive to the presence of a few extreme incomes in the underlying dataset (also see Cowell & Flachaire, 2004). This is particularly problematic for indicators of inequality as most of them are not robust to the presence of data contamination at one or both ends of the distribution. This formally means that a single value, provided it is sufficiently large (or small), can potentially drive the estimated indicator arbitrarily large (or small). Poverty indicators are considered robust provided the poverty line is exogenously determined, or is itself robustly estimated, but this generally holds under the assumption that income data are positive, or at least are bounded from below (that is, can not be arbitrarily small). Welfare indicators –inequality indicators in particular– are therefore potentially biased if the data are contaminated by 'mistakes' taking the form of very high or very low incomes. Such erroneous extreme observations can arise for various reasons. They can be gross mistakes, such as miscoding of a decimal separator or they can be due to severe reporting error by survey respondents, both leading to wrong income estimates which can possibly be traced at the data cleaning stage. But it is important to realize that incorrect extreme values can also arise even if income data are correctly collected because the measured annual income is not an error-free signal of a person's economic well-being. Think of extremely low (especially negative) incomes. Non-positive economic well-being (viewed as the access to goods

[1] A first set of results is available from the conference website (http://www.stat.fi/eusilc) and the complete analysis is available for download as an IRISS Working Paper at CEPS/INSTEAD (http://www.ceps.lu/iriss/wps.cfm).

and services) is an implausible situation as it would imply starvation. However, because of limitations in the concept of income to adequately capture well-being, there are several reasons for observing very low, even negative, incomes that do not directly translate into very low or negative economic well-being (Eurostat, 2006b)[2]. Such observations may not be plainly tagged as "mistakes" in the sense of error of data collection but they are clear expressions of a mis-measurement of economic well-being.

Another implication of the sensitivity of welfare indicators to extreme incomes is that, even if there is no contamination in the data –extreme incomes are real, accurate measurements of people's well-being–, the sampling variability of welfare indicators can be large because of the sparseness of very high/very low incomes in the underlying population, thereby limiting the reliability of inferences made to the overall population of a country. The close link between robustness to contamination and sampling variability is formally clear from the *influence function* of the estimators which serves both as a tool for assessing the robustness properties of a statistic (see Hampel *et al.*, 1986) and as a component of their sampling variance in some linearization methods (see Deville, 1999)[3]. In addition, notwithstanding the large sampling error problem, one may question whether it is acceptable that a few data points –a few responding households– have a large leverage on estimated national indicators.

In recognition of these issues, it is customary to inspect the data and make some simple adjustments prior to estimating indicators, such as eliminating or recoding a fraction of the data[4]. The objective is to keep the influence of extreme incomes under control, thereby limiting the risk of making large (potentially unbounded) estimation errors and reducing the sampling variability of the estimates. (Analysts have also tended to favor indicators thought to be more robust to the presence of extreme incomes (e.g. percentile ratios) over indicators with more attractive theoretical properties (such as (generalized) Gini, Generalized Entropy or Atkinson inequality indices)[5].) However, while data adjustments have potential benefits and are often deemed necessary, their application is generally of an *ad hoc* nature and one rarely estimates the magnitude of their impact on the estimated indicators, or assesses the sensitivity to alternative adjustments (recoding rather than deleting data, for instance). In the context of EU-SILC which primarily involves cross-country comparisons, the problem is compounded because differences in the prevalence of extreme observations across countries are likely to lead to different impacts for different data adjustments.

3. Assessing the impact of data adjustments on welfare indicators in EU-SILC 2004

Given the anticipated importance of welfare indicators estimated from EU-SILC for benchmarking national performance with regard to redistributive and social policies, it appears important to assess accurately the impact of extreme incomes and the effect of the data adjustments typically applied. A sensitivity analysis has been set up to this end. A series of welfare indicators has been estimated for all fourteen countries available in the EU-SILC 2004 data and the estimation has been repeated with a variety of different data adjustments procedures.

[2] First, some elements are counted as income deductions. Negative incomes can arise because of taxes that have to be paid on incomes received in an earlier year (Eurostat, 2005). Losses can be observed with self-employment income (Eurostat, 2006a). Inter-household mandatory payments (alimonies) may also be a source of substantial income deductions. Second, several sources of income are not captured in standard definitions of disposable income (e.g. capital gains or home-production). Furthermore, income is measured during a limited time period but people can draw on past (and future) incomes to maintain their command over goods and services.

[3] See also Osier (2006).

[4] Eurostat (2006b), for example, discusses the particular problems posed by zero and negative incomes and suggests a series of data adjustments.

[5] Note that some of the more sophisticated measures are not even identified in the presence of extreme small (non-positive) incomes.

3.1. Data adjustments

Three families of data adjustments were considered in the sensitivity analysis. The first two are standard methods: trimming and winsorizing (a.k.a. top-/bottom-coding) a fixed percentage of the data at both ends of the income distribution. The third approach makes use of a parametric model for the tail of the distribution which is then used to impute extreme incomes from a (robustly estimated) parametric tail distribution. For completeness, following Cowell, Litchfield & Mercader-Prats (1999), an extreme adjustment is also considered which consists in removing data relying heavily on data sources known for their low reliability and with high prevalence of extreme values, namely self-employment incomes and incomes from interests, dividends and profits.

Trimming the data is the most standard strategy to prevent extreme incomes to influence estimates. It consists in removing from the dataset a given percentage of the highest and/or lowest incomes. This implicitly considers that extreme observations contain no information about the economic well-being of the recipients. Trimming as a tool for making 'robust' welfare comparisons in distributional analysis is thoroughly discussed in Cowell & Victoria-Feser (2006a), while Hampel *et al.* (1986) discusses such an approach in contrast to more sophisticated procedures. In the sensitivity analysis, estimations have been made with trimming percentages of 0.25%, 0.50%, 0.75%, 1% and 2%, both one-sided and two-sided. (In practice, trimming percentages are often chosen in the range 0.5 to 1 in both tails.) Additionally, to demonstrate the potentially large impact of just a few observations, estimation has been run by trimming only the single highest income, the top 5 incomes, and the top 10 incomes as well as the bottom 1, 5 and 10 incomes.

Winsorizing is a close relative to trimming. The difference is that the extreme data are not removed from the datasets but are replaced by the value of the trimming thresholds. This is also referred to as 'top-coding' or 'bottom-coding' which is often applied with respect to data confidentiality issues. While trimming drives the influence of extreme incomes to zero by eliminating them, winsorizing allows them to keep a high influence on the estimates, yet imposing a limit. Winsorizing can be seen as a particular form of income imputation.

Trimming and, to a lesser extent, winsorizing are the most commonly adopted practices for making estimates robust to outlying observations. However, Hampel *et al.* (1986) emphasize that this practice can be viewed as overly conservative –especially trimming– in the sense of trading-off too much data information against robustness. One more sophisticated approach to addressing robustness problems of inequality and poverty measures is to estimate a parametric model for the income distribution tails whose parameters are estimated using methods robust to outlying observations. The robust, parametrically estimated tails are then combined with the empirical distribution function for the bulk of the data to obtain a semi-parametrically estimated distribution of incomes from which inequality and poverty indicators can be estimated. This approach is detailed in Victoria-Feser & Ronchetti (1994) and Cowell & Victoria-Feser (2006b)[6].

As such, this approach is not based on data adjustments. Distribution parameters are estimated from the available data and welfare indicators are estimated using special formulae or with numerical integration algorithms from the empirical distribution function. It is however possible to use robust parametric models for data adjustments. The idea is to impute extreme incomes by replacing the observed values by random draws from the robustly estimated parametric tail distributions. Simulation uncertainty is introduced by the random draws, but this is easily controlled by simulating a set of replicate income data, estimating poverty and inequality on each of the replicate, just as one would do with the original micro-data, and taking as indicator the average over the replications. This practice is akin to multiple imputation (Little & Rubin, 1987).

[6] See Brazauskas (2003) for a recent application in an actuarial context.

The robust estimation of a parametric tail model may appear much more technically challenging than standard adjustments, but there are expected gains to the exercise because this approach is meant to result in a more optimal trade-off between data information and robustness[7].

Following Cowell & Flachaire (2004), Davidson & Flachaire (2004) and Cowell & Victoria-Feser (2006b), a Pareto distribution was used as the parametric tail model. An inverse Pareto distribution was used for the lower tail. There is a long tradition of using the Pareto distribution to fit the upper tail of income distributions (see Kleiber & Kotz, 2003), but the practice is less common for modeling the lower tail. The present exercise should be taken as illustrative. Further investigation is probably called for to confirm the validity of this choice and to consider alternative specifications[8].

Standard maximum likelihood can be used to estimate the parameters of these tail distributions. However, maximum likelihood estimates are not robust and are known to be themselves sensitive to the presence of extreme incomes. It is therefore important to estimate the parameters with an algorithm that provide robust estimates of the Pareto distribution parameters. The method applied in this analysis is the so-called *optimal B-robust estimator* (OBRE) detailed in Victoria-Feser & Ronchetti (1994) and Cowell & Victoria-Feser (2006b). Extreme incomes were multiply imputed by drawing from the estimated tail distributions. Eight sets of replicate values were drawn. Different parameters for the tail distributions were estimated for each country. The model fitted well the upper-tail of the distributions in all countries. Estimation for the lower tail was more problematic, especially in two countries (Portugal and Sweden).

The OBRE algorithm used to estimate the Pareto parameters robustly is an iterative algorithm which involves determining iteratively robustness weights to all the data points. Therefore, a by-product of the algorithm is a set of weights that reflect how much “influential” each datum is (Hampel *et al.*, 1986, Victoria-Feser & Ronchetti, 1994). Data with a weight of 1 are considered non-outlying according to the model, whereas deviating observations end up with a weight between 0 and 1 that reflects the degree of “deviation”. These weights were exploited to devise yet another possible approach to handle extreme incomes consisting in keeping all income data unaffected, but multiplying the sample weights by the “influence weights” returned by the application of the OBRE algorithm. Application of these adjusted weights when computing poverty and inequality indicators partially offsets the effect of the largest and smallest observations but retaining them in the data[9].

As a final check, a drastic data adjustment was applied to assess the impact and the sensitivity of cross-country comparisons to the exclusion of incomes notably unreliably measured, namely self-employment income and income from interests, dividends and profits. Observations were discarded if the considered income source represented more than a quarter of either gross household income or disposable household income. This procedure should obviously not be taken as a standard for estimating inequality and poverty as people relying on self-employment incomes represents a substantial population. However as we compare inequality or poverty for sub-populations which, it can be argued, report their income more reliably, it provides a benchmark to assess the potential influence of unreliable income sources on country rankings in terms of welfare indicators (see Cowell *et al.*, 1999, for a similar exercise).

7 Note, for practical purposes, that the technical difficulty can be circumvented if estimation of the tail distribution parameters is made centrally and multiply imputed values for extreme incomes are distributed along with the datasets. Estimation is then no more difficult than from the original data. Analysts would not be required to engage into the more difficult parameter estimation stage themselves.

8 In particular, it is conceivable to model the lower tail of the distribution with a model preventing non-positive values, yet it clearly does not fit the observed data.

9 Note that trimming can be seen as a particular case of data re-weighting where observations receive either a weight of 1 or a weight of 0 if they fall below/above the trimming thresholds.

3.2. Inequality and poverty measures

The sensitivity analysis considered the impact of the different procedures on the following set of indicators.

- *Central tendency indicators*: mean and median equivalent income. Since both can be used to determine poverty lines, their sensitivity gives us indication about the sensitivity of the determination of the poverty line.

- *Inequality indicators*: two percentile-ratios (P80/P20 and P90/P10) which are robust in the sense that arbitrarily set income values can not make the ratio arbitrarily large; two income share ratios (S80/S20 and S90/S10) which are non-robust statistics; the Gini coefficient; and a set of Generalized Entropy measures (GE(0), GE(1), GE(2)) and Atkinson inequality measures (A(0.5), A(1), A(2)) which are known to be non-robust and potentially very sensitive to extreme incomes as well as undefined in the presence of non-positive incomes (with the exception of GE(2)). Note that the Gini coefficient and the S80/S20 are both in the list of Laeken indicators.

- *Poverty indicators*: three Foster-Greer-Thorbecke with parameters 0 (a.k.a. the headcount ratio or at-risk-of-poverty rate), 1 (a.k.a. the average poverty gap ratio) and 2 (a.k.a. the average squared poverty gap ratio) and the median poverty gap ratio among the poor (a.k.a. the relative median at-risk-of-poverty gap). The poverty line was set at 60 percent of the median equivalent income. The headcount ratio was also estimated with a line set at 50 percent of the median. The at-risk-of-poverty rate and the relative median at-risk-of-poverty gap are Laeken indicators. All poverty indices were also estimated for households with dependent children.

All indicators were estimated from the single-adult equivalent household income estimated at the household level. Data were weighted by the household size times the household sample weight in order to depict the distribution of income among individuals.

4. Main lessons and discussion

It is not the purpose of this paper to present the full set of results from the sensitivity analysis. Rather, only the main lessons that can be drawn from the exercise are summarized here[10].

The main lesson that emerges from the exercise is probably that ordinality in cross-country comparisons is generally preserved, irrespectively of the data adjustment procedure applied. Marked rank reversals are rarely observed because of the treatment of extreme incomes: e.g. high/low inequality or poverty countries remain identified as such in all scenarii. Admittedly, this is not a surprizing result, but it is certainly a reassuring baseline.

However, this result must be carefully qualified. Cardinal comparisons of countries *are* sensitive to data adjustments made to control for extreme income data. Even if the relative ranks of countries are rarely affected by the treatment applied to extreme incomes, the apparent *magnitude* of cross-country differences can vary substantially, even with relatively small data adjustments. Care is therefore called for, and it is recommended to check the sensitivity of one's cardinal comparisons to different data adjustments before making strong statements about it. This is true for most of both inequality and poverty indicators. Poverty measures are *not* notably less sensitive to the treatment of extreme incomes than inequality measures (especially measures determined by poverty gaps, such as FGT indices with parameter 1 and above). However, it is mostly

[10] There is, however, virtue in carefully looking at the results for specific indicators or distinct procedures. Full results of the sensitivity analysis are therefore available in separate report available from the author on request.

extreme low incomes, and how they are handled, that matter for poverty indicators whereas inequality indices are more sensitive to extreme high incomes. Theoretically sound inequality indices such as Generalized Entropy measures and Atkinson inequality measures are particularly problematic because they suffer from either estimation impossibility with non-positive values or from higher sensitivity to extreme incomes. The routine data adjustments considered here do not really appear appropriate for their estimation.

Different data adjustment procedures can lead to different results. Adjustments that modify/impute the extreme data without removing them from the dataset lead to results that are markedly more stable than trimming procedures. In particular, the trimming proportions can matter a lot. On the contrary, the proportion of data winsorized, or the limit above which a parametric model is applied tend to be less determining. Again, even if ordinal comparisons are generally preserved under alternative adjustment methods, cardinal comparisons may be affected. For example, both the estimated Gini and S80/S20 inequality indicators fall by about 10 to 20 percent if the top and bottom one percent of the income data are trimmed. Winsorizing the same sample fractions leads to falls of about 3 to 10 percent, while the parametric-tail imputation for these two statistics leads to falls in the range of -2 to 3 percent.

Common data adjustment procedures have been applied to all countries. While country-specific adjustments are hard to defend in such an exercise, one may argue that the amount of data contamination may vary from country to country and that "optimal" adjustments should be tailored for each country. Although this is arguably valid, it is hard to come up with objective arguments for this tailorization. Careful examination of the sensitivity analysis suggests that, provided a common procedure is adopted (e.g. trimming percentages or winsorizing or parametric modeling), adopting different parameters (such as different trim percentages in a "sensible range") is unlikely to lead to complete changes in the ordinality of cross-country comparisons for most of the measures. Winsorizing has an edge over trimming in this respect as it tends to be less sensitive (if at all for quantile-based measures) to the sample percentage that is "imputed". A similar argument can be put forward for model-based imputation. In addition, parametric-tail modeling is *de facto* selecting country-specific parameters (the parameters of the Pareto distributions) that lead to the best fit to the hypothesized Pareto distribution although the fraction of the data which are imputed has yet to be decided by the analyst. But even then, goodness-of-fit of the Pareto distribution can give indication about where to select the cut-off.

The advantage of trimming is the ease of implementation, its effectiveness in discarding the impact of extreme values, its long tradition, and the possible interpretation of the results as depicting what happens to the "innner *p* percent" of the population, even in the absence of data contamination. However, results show that its effectiveness is at the cost of substantially affecting the estimated indicators and being sensitive to the trimming percentage. This is consistent with the claim found in Hampel *et al.* (1986) that trimming is trading-off too much valid data information against robustness. This may be particularly true in the EU-SILC since the dataset can be considered as a "clean" dataset. The available EU-SILC user database has undergone substantial pre-processing, and grossly outlying observations have been scrutinized and possibly adjusted already (Eurostat, 2004). Winsorizing is also straightforward and leads to more stable estimates. It suffers however from a lack of natural interpretation; what does the adjusted sample represent if there were no contamination? The imputation approach based on a parametric tail model seems a promising possibility. It has theoretical advantages in terms of 'optimal' trade-off between robustness and conservation of data information. As far as interpretation is concerned, it does not modify the underlying distribution but merely assumes that the tails follow a parametric distribution. The observation that parametric tail adjustments lead to much smaller modifications of the results may be indicative that trimming and winsorizing are making excessive data adjustments. Again this is a plausible fact considering the extensive prior data cleaning of the dataset[11].

[11] The parametric tail approach has also been reported by Davidson & Flachaire (2004) to have virtues with respect to resampling-based variance estimation.

Self-employment income remains a source of concern: (i) it is a major source of extreme incomes on both tails of the distribution, and (ii) it may substantially affect cross-country comparisons (especially when southern European countries are concerned). Self-employment income is traditionally difficult to collect and often the least reliable among the major income sources. Inspection indeed revealed that it may have leverage on social indicators as a source of extreme incomes. Some important differences across countries have emerged and it can be conjectured that the different practices in the collection of data within EU-SILC is cause of concern.

The position taken in the analysis was not to consider negative and zero incomes as different from the rest of the data on *a priori* grounds. The main reason is that given the definition of household disposable income, non-positive incomes are plausible. Even if we agree that a household's command of goods and services can not be below a certain minimal amount to secure the survival of its members, given limitations of the income measure as an indicator of economic well-being, we can not rule out the presence of 'true' small or negative amounts ('true' in the sense that they are not the result of errors or mis-reporting in any of the income components collected). They were not treated differently from the rest of the data. Nevertheless, it is more a matter of principles since, in practice, we end up correcting these values to the extent that they are treated as extreme values by the data adjustment procedures in the lower tail. An important exception is the parametric modeling approach, which models the distribution of low (and negative incomes) rather than discarding or recoding them. This leads to data adjustments with negative values and prevented the estimation of some inequality measures.

Needless to say, the analysis summarized in this paper does not help identifying a single all-in-one approach, nor does it help identifying the adjustment that makes the indicators the most accurately representative of the true value of the indicator if economic well-being were observed directly. All adjustments are simply meant to keep the magnitude of potential errors under control, balancing robustness and data information. It is worth repeating the evidence that no single adjustment guarantees to lead to estimates closer to the "true" underlying welfare indicator. Adjustments ought to be considered in light of the resulting stability of the estimates, and, more importantly, sensitivity checks are useful to re-assure ourselves that conclusions are not dramatically affected by extreme incomes and they way the are handled. Part of the analysis is also exemplary. In particular, the parametric tail approach implemented here would deserve further testing and fine-tuning, especially with regard to the lower tail[12]. Additionally, the analysis has focused on the impact of adjustments on point estimates. A complementary analysis of the variance stabilization achieved by the various adjustments could further help selection of a specific procedure.

One can argue that data adjustments are always hazardous in the absence of objective information about the validity of the measured data. Subsidiary information about sources of economic well-being (people's accumulated physical or financial assets in particular) would come in useful to assess the reliability of income data, even if they are not themselves incorporated in the income concept. Perhaps more practically, over time, the longitudinal dimension will become relevant for making reliability assessment of the recorded incomes, both by allowing the estimation of social indicators based on income flows received over longer periods, and by serving as potential checks of household's reporting of income.

[12] Combined approaches could also be considered by, say, trimming negative incomes and applying a parametric tail model to small positive values only. It is also conceivable to adopt an asymmetric strategy with different procedures to handle extreme high and extreme low incomes, although one must bear in mind that both extremes can cause serious trouble.

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EU-SILC complex income components

IV

Measurement of property income in EU-SILC

Veli-Matti TÖRMÄLEHTO

chapter 1

MEASUREMENT OF PROPERTY INCOME IN EU-SILC

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Abstract

The results from EU-SILC 2004 indicate that property income is an important component of households' primary income in some countries. The present paper explores some conceptual and practical issues related to the measurement of income derived from ownership of financial and non-financial assets. The concept of property income in EU-SILC is reviewed and contrasted to National Accounts' concepts and international recommendations. Evidence from the 2004 EU-SILC data as well as from the Finnish national database is utilised to assess potential comparability problems in the measurement of property income.

1. Introduction

This paper discusses some conceptual and practical issues related to the measurement of income derived from ownership of assets in EU-SILC. Evidence from the fourteen EU-SILC 2004 countries shows that the share of property income ranged from 1 to 10 percent of disposable income[1]. This variation seems to indicate that for some countries, income from property is an important source of income. The variation in the shares may, of course, also partly be a result of differences in the data generating processes. Despite standardisation of procedures and concepts, quite some variation still exists between the countries in the potential error sources of the EU-SILC implementations.

The EU-SILC data will be used to rank countries according to level of income inequality and to monitor changes in inequality. A reasonable degree of comparability in measurement of property income is desirable for indicators such as share ratios and Gini coefficients where errors in the upper tail matter. It must be noted, however, that EU-SILC (and household sample surveys in general) may not be the best source to study the tails of income distributions; other alternatives, such as total income statistics or taxation statistics, where available, may prove more useful e.g. in studies of "top incomes", including property income, capital gains, stock options, or CEO pay.

This paper is structured as follows. First, the EU-SILC definition of property income is contrasted to the National Accounts' definition and international guidelines for micro statistics. Next, some results from the EU-SILC 2004 cross-sectional user data are presented and comparability issues specific to property income are discussed. An extended definition of property income is then constructed by adding realised capital gains and imputed rents of owner-occupiers to disposable income of the Finnish EU-SILC data. The significance of these components for main income-based indicators is assessed briefly. The paper concludes with a summary and recommendations.

2. The concept of property income

A definition of property income is provided in each of the following three standard references on household income statistics: National Accounts (SNA93/ESA95), the Canberra Expert Group recommendations (2001), and the ILO report on household income and expenditure statistics (2003). National Accounts is a natural benchmark for EU-SILC because international comparability is one of its objectives and the EU-SILC income definition is very closely related to National Accounts definitions. Table 1 highlights this by stating the property income definitions in the ESA95 and the EU-SILC regulation. The EU-SILC definition is a modified version of the ESA95 definition, with some additions and changes, such as explicitly stating the income reference period and replacing "income receivable" with "income received less expenses accruing" in the definition.

[1] Before 2007, countries may record property income gross or net of taxes and/or social contributions so the shares are *not* comparable, but there is considerable variation within gross and net countries as well. The figures refer to equivalent incomes.

Table 1. Definitions of property income in ESA95 and EU-SILC regulation

Quote from the ESA95 manual:	Quote from the EU-SILC regulation:
(4.41) Property income (D.4) is the income receivable by the owner of a financial asset or a tangible non-produced asset in return for providing funds to, or putting the tangible non-produced asset at the disposal of, another institutional unit	(2.4) Property income is defined as the income received less expenses accruing, during the income reference period, by the owner of a financial asset or a tangible non-produced asset (land) in return for providing funds to or putting the tangible non-produced asset at the disposal of another institutional unit.

Since property income is derived from ownership of assets[2], a typology of assets is a natural framework for property income components. Table 2 maps the National Accounts' asset types to income components in NA and their rough equivalents in EU-SILC. The components which are considered as property income are shown in italics.

The definitions of property income state that property income is derived from ownership of a) financial assets and b) tangible non-produced assets. Consequently, intangible assets, such as copyrights and patents, and produced non-financial assets, such as dwellings, are excluded. In EU-SILC, dwellings nevertheless yield property income (income from rentals). While the practice itself may be justified, it makes the definition given in Table 1 and the sub-components of the EU-SILC property income in Table 2 inconsistent. National Accounts is consistent because the asset type "dwellings" yields entrepreneurial income/mixed income for households, not property income.

An important conceptual and practical difference is that the EU-SILC definition includes only interest received but the National Accounts definition covers both interest received and paid, i.e. net interest payments. This is also the recommendation of the Canberra Group, while the ILO gives preference to counting only interest received. The real conceptual difference is, however, only interest paid on consumer debt, which in EU-SILC is treated as household final consumption expenditure[3]. Interest paid on "producer loans" should be deducted from the corresponding income received, i.e. interest paid on business or investment loans from self-employment income (PY050) or rentals (HY040), and interest paid on mortgage on the main residence (HY100) from imputed rents (HY030) from 2007 onwards.

As a practical matter, separating different types of interest payments from each other may be difficult in some countries, e.g. if debts are bundled together irrespective of their intended use. It may also be difficult to separate total repayments to interest payments and loan instalments. For EU-SILC, these kinds of problems could be solved by imputation or modelling. Deducting also interest paid on consumer debt could lead to negative property incomes.

Distributed incomes of corporations (dividends, withdrawals) are conceptually equivalent in NA and EU-SILC. Profits from capital investment in an unincorporated business are taken to be the EU-SILC counterpart to withdrawals in the National Accounts definition. In practice, distinguishing profits withdrawn by working owners from those of non-working owners may be difficult in EU-SILC[4]. This adds to the "grey area" of what is recorded as self-employment income (which may be different from income of the self-employed) and what as income from capital in EU-SILC.

2 Property income received from business assets, i.e. in connection with financial and other assets belonging to the enterprise, is defined to be part of self-employment income in EU-SILC (section 2.2 of the regulation).

3 Here neglecting the effects of FISIM in National Accounts (separating total interest to service charge and pure interest elements).

4 In Finland, for example, profit sharing by "sleeping partners" is included in self-employment income.

Table 2. Assets and incomes in National Accounts and EU-SILC. (Non-financial asset AN, financial asset AF)

Asset type (ESA95 asset classification)	National Accounts primary income	EU-SILC target variable
AF2 Currency and deposits AF3 Securities other than shares AF4 Loans (assets)	*a) interest received (D.41);*	*1. Interest, dividends, profits from capital investment in an unincorporated business (HY090);*
AF5 Shares and other equity	*b) distributed income of corporations (D.42):*	
	(1) dividends (D.421);	
	(2) withdrawals from income of quasi-corporations (D.422).	
	c) reinvested earnings on direct foreign investment (D.43)	(Not relevant for household sector)
AF611 Net equity of households in life insurance reserves AF612 Net equity of households in pension funds reserves	*d) property income attributed to insurance policy holders (D.44);*	Excluded from income[*] (PY080 Regular pensions and annuities from individual private plans)
AN2111 Land	*e) rents (D.45).*	*2. Income from rental of a property or land (HY040)*
AN1111 Dwellings (+ other AN111 Tangible fixed assets)	(Mixed income/entrepreneurial income)	
	(Operating surplus/entrepreneurial income)	(HY030 Imputed rent)
AF4 Loans (liabilities)	*(1) Interest paid on:* • *mortgage loans* • *business loans* • *consumer loans*	(HY100 Mortgage, main residence) (PY050 Self-employment income) Excluded from income
AN1123 Entertainment, literary or artistic originals (AN112 Intangible fixed assets)	(Mixed income/entrepreneurial income)	(PY050 Self-employment income: royalties)

* The table relates to the existing EU-SILC regulation. Following the recommendation of the EU-SILC methodological Task Force, it has been decided that PY080 should be added to disposable income.

Asset type "Land" yields rental income in both NA and EU-SILC. By contrast, as already noted, rental incomes from dwellings[5] are treated differently. Rental income may be actual (monetary) or implicit (imputed, in-kind). Actual rents from property leased to others are property income (HY040) in EU-SILC. In National Accounts they are seen as payments for services produced by the owners of the property and thus generate mixed income/entrepreneurial income. The EU-SILC treatment of actual rents is in accordance with the ILO guidelines, while the Canberra Group avoids the decision between self-employment income and property income by treating them as a separate (unspecified) component.

In EU-SILC, implicit or imputed rents from owner-occupied dwellings are grouped together in the same target variable (HY030) with imputed rents from subsidised or free rented dwellings, apparently on the basis of the valuation method or

5 And from other buildings and structures.

because imputed rent is seen as a general device to take housing costs into account[6]. In National Accounts, implicit rents are a reward for own-account production of housing services and generate operating surplus/entrepreneurial income. A logical and feasible solution for EU-SILC might be to treat actual rents and implicit rents of owner-occupiers as property income received from ownership of a dwelling, i.e. as income from capital. The "income from employment" treatment of National Accounts may not be very realistic.

Royalties are self-employment income in both EU-SILC and NA as well as in the Canberra recommendations. The ILO resolution, however, notes that royalties could be conceived of as property income derived from intangible produced assets. Royalties are not necessarily earned from activity during the income reference period and some royalties may be based on inherited ownership of patented or copyrighted materials. Because the receipts are not necessarily tied to labour input, at least within the income reference period, the ILO recommendation is that royalties should be property income, not income from employment.

Two of the National Accounts components which do not appear in the EU-SILC definition are "Reinvested earnings on direct foreign investment" and "Property income attributed to insurance policy holders". The first one does not in practice add to household sector income but the second one does. Property income is in this case investment income from insurance technical reserves held by households in life insurance and pension funds reserves. In the EU-SILC context, this item can be seen as related (but not equivalent) to profits from life insurance savings, including regular pensions and annuities from voluntary individual private pension plans. The Canberra Group and the ILO suggest that these should be property income, while in EU-SILC it is unclear at the moment whether they should be a part of primary income, social insurance, or something else.

A notable omission in both EU-SILC and National Accounts definitions are capital gains, or holding gains in the SNA terminology, i.e. gains and losses made by households solely because relative prices of the assets they own change. Such gains can be neutral or real, depending on inflation, and unrealised or realised, depending on whether the assets are actually sold or not. In addition, a distinction must be made between gains made during the entire holding period and during the income reference period. Including capital gains in income would be important at the top of the income distribution, and for studies covering a long period of time (Franz et. al., 1998).

It can be argued that *real* (inflation adjusted) and *realised* (from assets sold) holding gains made *within the income reference period* can be used to finance consumption or saving without reducing the value of net worth. Therefore these kinds of gains could be part of the EU-SILC disposable income. While unrealised capital gains may change consumption behaviour (wealth effect), they are not immediately at households' disposal and cannot be consumed to satisfy everyday needs. Their inclusion is therefore more controversial.

Following the recommendation of the Canberra Group, the EU-SILC regulation does not include capital gains in disposable income[7]. This is in accordance with the treatment in National Accounts. The justification for doing so probably is not the same, though: the EU-SILC income concept is not tied to income derived from production while the National Accounts' concept is. The effect of including realised capital gains in income is discussed in section 4.

6 For owner-occupiers, the EU-SILC target variable HY030 is conceptually equivalent to National Accounts' net operating surplus from own-account production less interest paid on mortgage. Imputed rents from social housing are not included in disposable income in National Accounts because they are social transfers in kind and therefore a part of adjusted disposable income.

7 Despite excluding gains/losses from income, the EU-SILC regulation states that taxes paid on capital gains should be included in taxes (definition of target variable HY140). This follows the convention of National Accounts (at least in Finland) but does not make sense in practice on micro statistics, and results in negative incomes if capital gains taxes are properly measured.

Finally, it must be noted that the Luxembourg Income Study has taken the Canberra recommendations into account in its operational income definition. The definition of LIS property income (variable V8 cash property income) includes cash interest, rent, dividends, annuities, royalties and excludes capital gains, lottery winnings, inheritances, insurance settlements, and all other forms of one-off lump sum payments. Interest paid is deducted from interest received (V8X). In other words, the definition is more consistent with the ILO definition in that it adds royalties to property income, but follows the Canberra Group in that interest paid is deducted.

3. Evidence from the EU-SILC cross-sectional UDB 2004

The intermediate quality reports prepared by the countries give an assessment about the applied income concepts and deviations from the EU-SILC definitions. There are only minor remarks on property income in these reports. This would suggest that in principle an attempt has been made to measure rents, interests, and distributed profits as stated in the regulation. The question should then be how good the measurement has been. Several, but not all, countries note that property incomes are under-estimated in their implementation of EU-SILC.

3.1. The recipients and the distribution of property income

The SILC data only distinguishes rents (HY040) from interest and distributed profits (HY090). Because countries may at this stage provide data net or gross of taxes and/or social contributions, net and gross countries are compared separately when necessary. Gross recorded variables are used where available[8].

Basic data on recipients and allocation of property income into the two target variables, and concentration to disposable income distribution is shown in Table 3. There is considerable variation between the countries. In the Nordic countries, distributed profits and interest received are relatively more significant than income from rentals. In Norway, Sweden, and Denmark the share of HY090 was more than 90 percent of total property income. All these countries measure incomes entirely from registers and record them gross[9]. In Austria, Luxembourg, Portugal and especially Greece the case is the opposite: 75 percent or more of property income consists of rental income HY040.

The highest shares of households with non-zero property incomes are recorded in the pure register countries Norway, Denmark, and Sweden. In Estonia, Portugal, Ireland, Greece, Luxembourg, Austria, and Spain less than 40 percent of all households received property income. The share of households with property income is positively correlated with the share of interest and distributed profits. One might speculate that there could be underreporting of interest received because most households presumably have a bank account and get at least small interest on their deposits.

Some interesting variation between the countries can be observed in the concentration of property income. In Finland and Norway, property income, as defined in EU-SILC[10], is particularly concentrated to the top quintile: more than 80 percent of property income goes to the richest quintile. Sweden is at the other extreme with about half of property income going to the top quintile. In many countries the share going to the top quintile is around 40 percent of total property income and the share going to those above the median is around 80 percent. The concentration of property income to the population above the median income indicates that inequality indicators, such as Gini-coefficient and income share ratio, are more vulnerable to errors in measurement of property income than at-risk-of-poverty indicators.

8 Net to gross conversion is thus an additional error source. It is not discussed in this paper.

9 Finland collects interest received from interviews and other sub-components from registers.

10 Realised capital gains are included in the national income distribution statistics of these countries.

Table 3. Recipients and concentration of property income

	% of households who received:			% of total property income		Concentration of property income by equivalent disposable income			
	Property income	Rents	Interest and distributed profits	Rents	Interest and distributed profits	Below at-risk-of-poverty threshold	Above threshold, below median	Deciles VI-VIII	Deciles IX -X
Austria	29	6	25	74	26	6	19	19	62
Belgium	71	7	69	37	63	5	23	24	53
Denmark	98	2	98	7	93	..	..	..	..
Estonia	6	2	5	50	50	5	16	17	68
Finland	63	7	62	14	86	1	7	10	84
Ireland	18	4	15	60	40	6	18	19	63
Luxembourg	27	9	20	74	26	1	9	20	71
Norway	99	2	99	3	97	2	8	8	84
Sweden	80	2	80	5	95	4	24	24	52
Spain (net)	35	5	33	55	45	5	18	22	60
France (net)	75	6	74	31	69	4	18	25	58
Greece (net)	19	17	2	97	3	5	19	28	54
Italy (net)	50	7	48	42	58	4	16	25	60
Portugal (net)	17	5	14	75	25	5	18	19	63

Figure 1 depicts Kernel density estimates of non-zero property income in Denmark, Finland, Norway, and Sweden in the SILC 2004 data[11]. Extensive use of register data and other similarities would suggest that the degree of comparability between these countries could be quite high. Figure 1 does not quite support this. The most obvious difference is the bimodal distribution of Denmark due to negative property incomes. Finland has a spike at around 10 euros[12]. Similar concentration of recipients at certain levels of property income is a notable feature in some other countries as well. This may be a feature of data collection (e.g. incomes asked in categories or in exact amounts, rounding, imputations, and measurement from registers) or a reflection of the real situation.

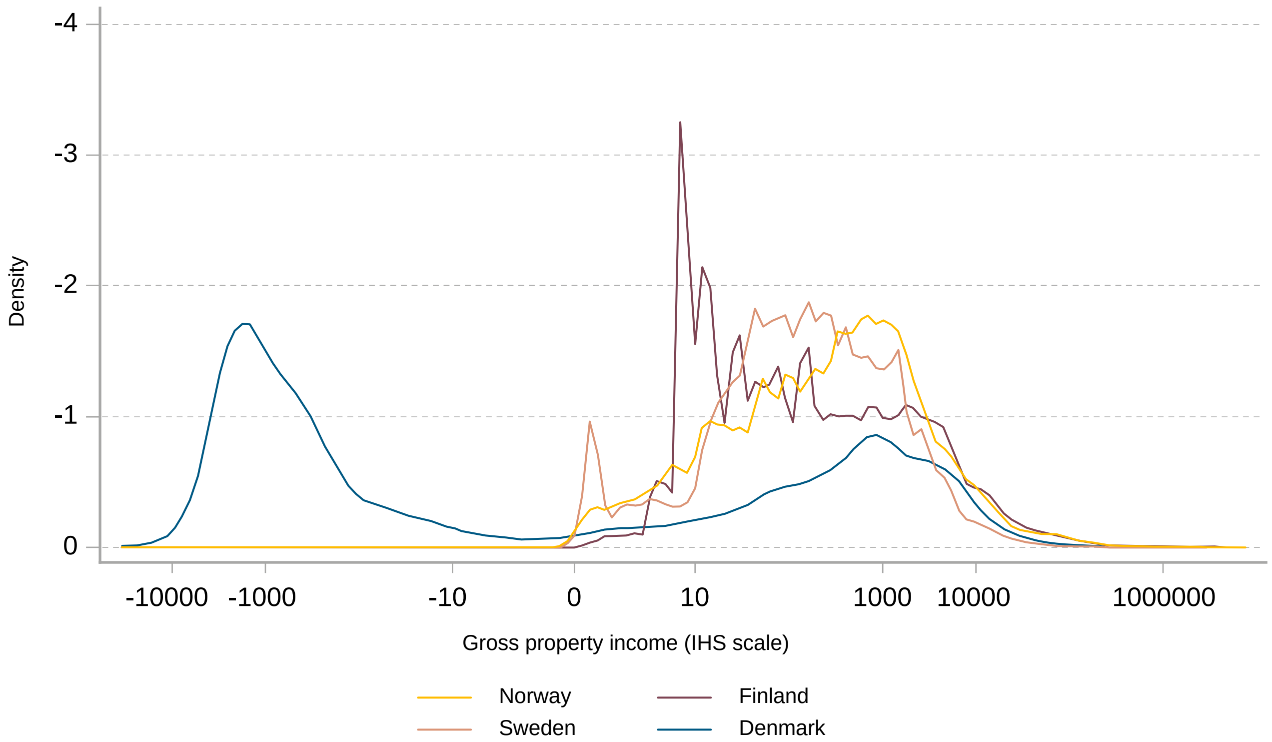
There should be no negative values in property income target variables because the only deducted item, expenses, are not likely to exceed the receipts[13]. Property income paid should not be deducted if there is no corresponding income component (self-employment income, imputed rent). In the data, both HY090 and HY040 are indeed always positive for all countries except Denmark, where more than half of the households have negative values in interest and distributed profits variable HY090. The reason for this is that interest paid has been deducted from interest received in the Danish SILC. Negative values are retained in the data to show the effect on indicators.

11 Logarithmic transformation is approximated with inverse hyperbolic sine transformation to retain negative values.

12 More specifically, 8.5 percent of all property income recipients received exactly the same amount, 7 euros.

13 If they do, it is unlikely that negative values are reported or registered. In case of rents from dwellings, there may be occasions when e.g. leasing an apartment is not temporarily profitable because of deductions (e.g. repair costs) and so negative values might occur. Unlike with self-employment income, there is no target variable for negative rental income.

Figure 1. Density estimates of gross property income in selected countries



The contribution of property income to overall inequality can be described by decomposing Gini coefficient of equivalent disposable income $\mathbf{G}_y$ by income source. In Table 4, the contribution of property income to income inequality is broken down to the share of property income from disposable income $\mathbf{S}_k$ (column 2), the inequality of property income itself among the population $\mathbf{G}_k$ (column 3, within-source Gini of property income), and the correlation between property income and rank of disposable income $\mathbf{R}_{yk}$ (column 4, Gini correlation). All of these may be affected by taxation. The contribution is higher for gross incomes and therefore net and gross recording countries have to be considered separately.

Table 4. Contribution of property income to disposable income Gini (equivalised incomes, person weights). Sorted by absolute contributions

	(1) Disposable income Gini G_y	(2) Share of property income S_k	(3) Property income Gini G_k	(4) Gini correlation R_{yk}	(5) Concentration (3)*(4)	(6) Absolute contribution (2)*(5)
Finland	0.253	9 %	0.95	0.84	0.794	0.071
Norway	0.252	10 %	0.91	0.80	0.728	0.070
Denmark	0.239	2 %	2.95	0.38	1.115	0.024
Luxembourg	0.256	4 %	0.94	0.68	0.634	0.024
Belgium	0.264	3 %	0.86	0.50	0.426	0.015
Sweden	0.228	3 %	0.86	0.46	0.395	0.011
Austria	0.258	2 %	0.95	0.52	0.488	0.010
Ireland	0.316	2 %	0.97	0.63	0.605	0.009
Estonia	0.374	1 %	0.98	0.58	0.567	0.003
Greece (net)	0.331	5 %	0.91	0.53	0.489	0.022
France (net)	0.283	3 %	0.84	0.58	0.481	0.016
Italy (net)	0.329	3 %	0.88	0.62	0.543	0.016
Spain (net)	0.307	2 %	0.95	0.59	0.563	0.012
Portugal (net)	0.377	2 %	0.97	0.53	0.509	0.009

Because under-estimation is suspected by several countries in their quality reports, income share may be the most decisive factor in explaining the variation between countries in the contribution to overall inequality (column 6). If the distribution of property income is uneven, as expected, this should show up as a high within-source Gini coefficient. If property income is concentrated to high income household, this should show up as a high Gini correlation with disposable income. An index of concentration is obtained by multiplying correlation with within-source Gini (pseudo-Gini, column 5).

It comes as no surprise after Table 3 that Norway and Finland stand out as countries with the highest contributions of property income. The shares and correlations in these countries are high, whereas the within-source Ginis reach high values in other countries as well. The lowest contributions are found in Estonia (gross recorded) and Portugal (net recorded). Because of negative values resulting from deducted interest paid, the within-source Gini in Denmark is higher than one, which results in a high index of concentration and a low income share.

3.2. Issues in comparability

To assess the quality of the results, it is necessary to consider how the data on property incomes are actually generated in different countries, and to benchmark the results with alternative sources. Regarding measurement and estimation, we restrict to some comments relevant for measuring property income: register versus interview data, non-response, sample allocation, and estimation.

In EU-SILC, income data is collected directly from households, from administrative and statistical registers, or from both. Norway, Denmark, and Sweden take all property income data from registers, while Finland collects interest received from interviews and other components from registers. The other countries in EU-SILC 2004 collected income data mainly from interviews.

Register data should suffer less from observational errors than interviewed data. In register-based measurement, errors related to interviewer, instrument (questionnaire design) and mode of collection (telephone/visit/mail) are eliminated. The respondent error is dependent on whether the registered data is self-declared or provided by the institution/individual paying the amount. In Finland, the latter is mostly the case with dividends, while rental incomes are largely self-declared to tax authorities. The only interviewed component, interest received, is known to be under-reported and consequently severely under-estimated with respect to macro figures.

Item non-response rates of property income range from around 70 percent in some countries to zero in the pure register countries. The countries implement their own imputation procedures and methods. The comparability of the results of imputations and a need for more standardisation among countries are issues which should be examined. Certain question types may help to reduce unintentional item non-response: making non-response more "visible" with question-and-answer-design using screening questions may be a better alternative than tabular design type of questions when asking about incomes (Timm, 2004). Eurostat also suggests asking about incomes directly and in income categories (Eurostat, 2004) and this practice is followed by some countries.

In the design stage, measurement of property incomes could be improved by stratification and allocation of the sample into the strata in such a way that it results in a higher chance of selection of high-income households. This would yield more efficient property income estimates. In addition, it would reduce the problem of influential observations (weighted outliers) because smaller sampling weights would be associated with high incomes. Over-sampling of this kind is not common in the EU-SILC implementations, and indeed such a procedure might be in conflict with the primary aim of the instrument, namely measuring poverty and social exclusion[14].

The achieved sample is always substantially smaller than the selected sample because of unit non-response: response rates ranged from about 50 percent to 90 percent in 2004. In the estimation stage, unit non-response is compensated for by adjusting, or re-weighting the design weights of the respondents using sample-level information (direct non-response correction), external data (calibration) or both. Calibration to external sources eliminates sampling variance of certain statistics of selected variables, e.g. total sums or shares of low-income persons. Register data, in particular, offers the possibility to create "strong" calibration models because it is essential that the survey variables correspond to the auxiliary information used (cf. Lundström & Särndal, 2001, p. 29).

Countries can independently choose the kind of auxiliary information they use in their calibration models. The choice is dictated by and large by the availability of auxiliary data but also by the objectives set by the statisticians responsible for the survey. As an example of different objectives, certain total income sums are fixed in the Finnish EU-SILC calibration model, among them dividends and realised capital gains[15], while in Denmark the calibration model includes external information on register-based income poverty and equivalent incomes. In the Finnish case, the calibration variables are highly correlated with Gini coefficient, income shares, and income totals, whereas in the Danish case they are highly correlated with the characteristics of low-income population. The Danish calibration model improves accuracy of poverty rates, while the Finnish model has substantial impact on inequality indicators such as share ratio S80/S20 and Gini coefficient (Museux & Osier, 2006). Calibration models which use demographic and geographical information but no income data may have a much smaller impact on precision of income-based indicators.

[14] Finland seems to be the only country which intentionally over-samples high-income households in EU-SILC. The reason for this is integration of EU-SILC with an existing national survey.

[15] This has been considered necessary in order to maintain coherence with register-based total income statistics which covers the whole population. When total sums are compared to e.g. National Accounts, the discrepancies are not explained by sampling error but by conceptual differences and coverage and sector delineation issues.

Of the above mentioned issues, data source is certainly the most crucial point as it affects either directly or indirectly all the other issues mentioned above. Quality of income data from registers and interviews has been studied in great depth in a more general context e.g. within the Chintex -project. For example, the ranking of Finland in terms of poverty rate may change substantially if interviewed data is used instead of register data (Rendtel et. al., 2004; Epland, 2006). A lesson one might want to draw from the EU-SILC 2004 property income tabulations presented before is that the use of registers in itself is not a guarantee for a high degree of comparability.

Different calibration models may not be the most crucial aspect of international comparability, but it is certainly good to be aware of the variables used when benchmarking the results. It is possible to get an almost exact match with external sources using register data and a suitable calibration model (e.g. income totals or number of register-based poor individuals). The traditional way to benchmark survey results is to compare the estimates of total amounts to those of some external source, such as National Accounts. If the sources are independent and the adjustment of concepts is done carefully, the amount of under-estimation of survey data can be quantified by comparing interval estimates to "true" values. Property income has been found to suffer from more serious under-estimation than other income components (Moore et. al., 2000; Atkinson et. al., 1995).

In the EU-SILC quality reports, several countries comment on severe under-estimation of property incomes, but coherence of total sums with National Accounts totals is rarely presented[16]. Data on National Accounts by institutional sector are, however, published in the Eurostat web site and may be used to compare the figures on interest received and distributed profits to their conceptual equivalence in EU-SILC. Rents cannot be compared because they are "hidden" in mixed income in National Accounts.

Several reservations are in order before making the comparison. Despite considerable effort, household sector accounts in NA are not strictly comparable and problems exist in important points such as what is included in the household sector and how consumer and producer households are defined. The recent allocation of indirectly measured financial intermediate services (FISIM) to institutional sectors in NA complicates even the comparison of "simple" components such as interest received and paid. Data on withdrawals from quasi-corporations (analogous to profit sharing by sleeping partners in EU-SILC) is probably the most unreliable component as direct information is often lacking. Dividends, in contrast, are often known from tax sources in National Accounts. Gross and net measurement in EU-SILC, again, complicates the situation.

Despite the problems, we dare to present Table 5 which compares the EU-SILC data with National Accounts data published by Eurostat. The share of interest and distributed profits (HY090G/N) from disposable income (HY020) in EU-SILC is contrasted to the share of interest and distributed profits received (D41+D42) from net disposable income (B6N) in National Accounts. While the exact numbers are not important and may equally well tell about problems with NA figures rather than with EU-SILC figures, the overall variation in coherence between countries suggests that under-estimation may not be uniform across countries. The results indicate that countries with the highest contributions of property income to inequality, Finland and Norway, may have reasonably coherent estimates in EU-SILC and National Accounts. For the other countries, there is considerable discrepancy, and the EU-SILC shares are always lower than the National Accounts shares.

[16] Austria is the only country which provides assessment of the under-estimation of property income with respect to National Accounts. With property income included, difference between SILC 2004 gross income and NA adjusted gross income is 5.4 and excluding property income 5.9 %. This indicates significant underreporting of property income.

Table 5. Interest and distributed profits in NA and EU-SILC, % of disposable income

	Austria	Belgium	Denmark	Finland	Norway	Estonia	Greece (net)	Spain (net)	France (net)	Italy (net)	Portugal (net)
National Accounts	12 %	9 %	7 %	9 %	10 %	7 %	5 %	6 %	9 %	24 %	6 %
EU-SILC	1 %	2 %	2 %	8 %	9 %	0 %	0 %	1 %	3 %	2 %	0 %

Source: EU-SILC XUDB 2004: (HY090G/HY020 or HY090N/HY020); Eurostat: National Accounts by Institutional Sector (D41+D42/B6N for sectors S14 or S14_S15). Ireland, Luxembourg, Sweden: no NA data available.

4. An extended definition of property income

In this section, national data are used to extend the definition of property income to include net gains from owner-occupied dwellings and realised capital gains/losses. Net imputed rent will be added to the EU-SILC definition in any case, so the examination serves to illustrate the kinds of effects this will have in one country. Realised capital gains, on the other hand, are likely to remain outside of the income concept. Whether this has any bearing for the indicators or for comparability is an issue we try to empirically assess in this section.

4.1. Realised capital gains

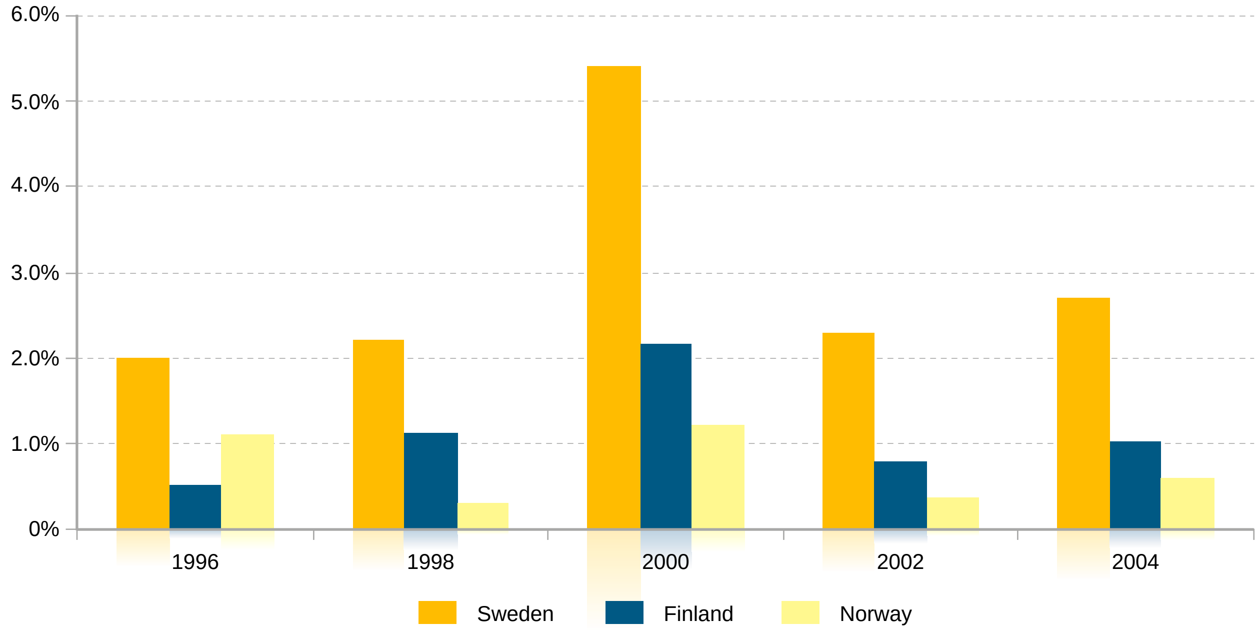
Realised capital gains/losses typically accrue to households from sale of own dwelling or financial instruments such as shares or mutual funds. Realised capital gains can be measured from registers and are included in the national income concept at least in three Nordic countries; Finland, Norway, and Sweden. In all three countries, capital gains have a visible effect on both the level and inter-temporal changes of measured income inequality. This can be seen from Figure 2 which presents the increase in Gini-coefficients in Finland, Norway and Sweden when realised capital gains (and taxes paid on them) are included in the income concept[17]. The effect of realised gains has been particularly strong in Sweden, at most 5.4 percentage points in 2000. In all three countries, the effect is different at different points in time. In addition to pro-cyclical effect due to development of prices, from time to time the tax rules may change and have an effect on the volume of sales and, consequently, on income level and dispersion measures.

The fact that indicators of income inequality become more volatile with realised capital gains can be considered a reflection of reality and not a reason for rejecting gains from income. Two more serious objections are that even with register-based measurement, the problems of conceptual validity and comparability remain. First, measurement of realised capital gains from tax files may not be in accordance with the Canberra Group recommendation of measuring real gains made within the income reference period. For example, in Finland the gains in fact refer to nominal gains within the holding period, i.e. they include both neutral and real holding gains made during the entire period of ownership of the asset. Second, the measurement of realised capital gains is not comparable across the three countries in Figure 2. In Sweden, all gains are measured, whether they are subject to tax or not. In Finland and Norway, a majority of capital gains from sale of own dwelling is not taxed and is not recorded in the tax files[18]. This probably explains the larger effect of realised gains in Sweden.

[17] The data are based on national Income Distribution Surveys conducted by Statistics Norway, Statistics Sweden, and Statistics Finland. Income concepts according to national definitions. Modified OECD-scale was used for Norway and Finland and a national scale for Sweden.

[18] In Finland, profits from selling main residence are not taxed if the residence has been owned and occupied for more than two years during the ownership period.

Figure 2. Increase in Gini-coefficient (%-points) when realised capital gains are included in disposable income



In the absence of register data, measurement of capital gains would be very difficult. Some variants of imputing all (not just realised) holding gains exist, e.g. imputing long run change in value of assets owned (cf. the 1st meeting of Canberra Group, p 145) but they are not likely to be feasible for producing annual comparable data for EU-SILC.

4.2. Net imputed rent from owner-occupied dwellings

It would be easy to conceive that imputed rents of owner-occupied dwellings stem from ownership of assets and should be considered as property income. This would be consistent with the asset classification and treatment of actual rents received as property income in EU-SILC. The recommendations, however, take different standpoints on the issue. The Canberra Group gives preference to following National Accounts and considering imputed rents of owner-occupiers' self-employment income. The ILO suggests treating imputed rent as income from household production of services and neither as property income nor as income from self-employment. The EU-SILC definition takes yet another approach by taking the valuation method as the guiding principle. In EU-SILC, all kinds of imputed rents are added up to target variable HY030, irrespective of the reason for the difference between cost of renting similar accommodation from a competitive market and actual housing costs paid by the household. The difference may be related to ownership of assets (owner-occupied dwellings), to employment (dwelling provided by employer), and to redistribution of income (subsidised rented dwelling owned by government or NPISH). It would be essential to be able to distinguish imputed rents related to employment, ownership, and redistribution from each other. This can be dealt with by specifying reason for tenure status "accommodation rented at a reduced rate" and "accommodation is provided free" (target variable HH020)[19].

[19] Annual measurement of benefits from subsidised housing in a way that is comparable inter-temporally within and across countries may be even more difficult than imputing rents for owner-occupiers. The share of households in subsidised rented accommodation (tenure status HH020=3) ranges from zero in Denmark to 15.3 percent in France and 18.4 percent in Finland. The comparability of this variable should be examined if the aim truly is to calculate imputed rents for social housing as part of disposable income. Moreover, user cost is a suitable estimation method only for owner-occupied housing so countries with small but existing subsidised rental markets need to find a different estimation method.

4.3. The extended income concept

In this section we describe what kind of effects realised capital gains and net imputed rent may have on income inequality and poverty indicators using the Finnish SILC 2004 data augmented with variables available in the national database. The two income components are simply added to EU-SILC definition of disposable income (HY020) and selected key indicators are then compared before and after[20]. Both added components are significant in terms of the total amounts. The share of current EU-SILC property income definition out of disposable income is 9 percent. Adding realised capital gains would increase the share of property income to 10.7 percent and adding net imputed rent to 16.7 percent. Adding both would increase the share to 18 percent.

Table 6. Sensitivity of selected indicators to alternative income concepts: the Finnish EU-SILC 2004.

	EU-SILC concept (HY020)	With realised capital gains	With imputed rent	With capital gains and imputed rent
Gini coefficient	0.253	0.264	0.250	0.260
S80/S20	3.5	3.7	3.5	3.6
At-risk-of-poverty rate, %	11.0	10.9	11.2	11.5
age 0-15	9.5	9.6	11.4	11.8
age 16-34	14.2	14.2	17.2	17.5
age 35-64	7.8	7.7	7.8	7.8
age 65+	16.6	16.4	11.5	11.9
Threshold, 60 % of median, euro	9,984	10,016	10,925	10,972
Poverty gap	19.4	19.4	19.5	19.2
Gini, those at risk of poverty	0.12	0.12	0.11	0.11

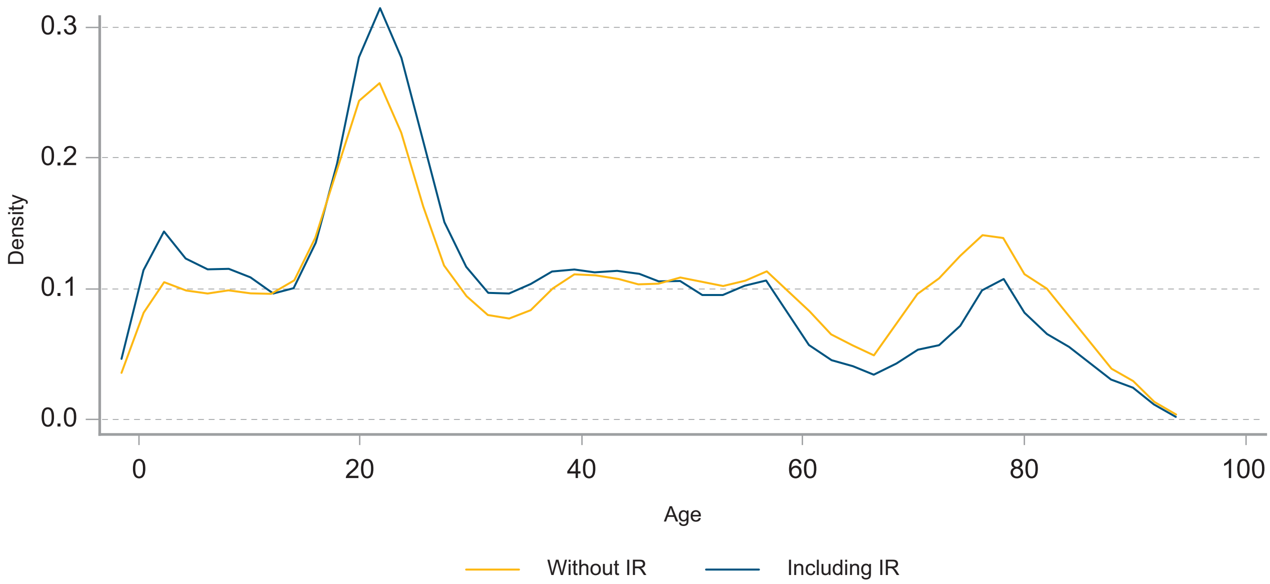
Realised capital gains concentrate largely to people above the median and consequently have a negligible effect on poverty indicators. The Gini coefficient increased by one percentage point. Given the sensitivity of capital gains to stock market prices and the ensuing volatility and cyclical patterns, an increase of this magnitude bears some significance in inter-temporal comparison of inequality in one country. In terms of comparability across countries, the difference in inequality indicators may not significantly change the interpretation of the results. Given this, and the comparability and validity problems even with register-based measurement referred to before, the advice of the Canberra Group to consider capital gains as an optional memorandum item seems to be justified. Countries where capital gains are available from registers should naturally remove taxes on capital gains from their EU-SILC taxes as well and the regulation should be corrected at this point (i.e. definition of taxes paid HY140).

When net imputed rent is added to income, low income cut-off increases by 10 percent. Indicators do not change drastically on the aggregate: inequality decreases and at-risk-of-poverty increases only slightly, and poverty gap and inequality among the poor remain almost unchanged. The aggregate figures, however, mask considerable flows in and out of poverty because of net imputed rent. Adding imputed rent causes re-ranking depending on how households' income has changed with respect to increased at-risk-of-poverty threshold.

[20] Net imputed rent is estimated with rental equivalence method using external rent statistics for the valuation of housing consumption and deducting relevant housing costs, depreciation, and interest paid on mortgage. The data are available in the SILC 2004 UDB in target variables HY030G and HY100G for Finland.

Imputed rent changes most visibly the age profile of people at risk of income poverty. In Finland, addition of imputed rent puts more people aged under 40 at risk of income poverty and leaves less people aged over 55 under the poverty line (Figure 3). At-risk-of-poverty rate of the elderly (over 65) would be reduced almost one third from 16.6 to 11.5 percent, that of those aged 16 to 34 would increase from 14.2 to 17.2 percent, and that of children (0-15 years) from 9.5 to 11.4 percent. Similar kinds of effects by age have been found in other studies (e.g. Frick & Grabka, 2003).

Figure 3. Age profile of population at-risk-of-poverty with AND without net imputed rent



The age profile differences are explained mostly by tenure status differences between age groups and by reduced housing costs by age. On average, interest paid on mortgage decreases by age because the share of outright owners increases. The share of other deducted expenses and the imputed annualised value put to “wear and tear” (depreciation, consumption of fixed capital) are related to characteristics of the dwelling and are more or less constant across the age groups in this model[21].

The different methods, assumptions, and the underlying data used in measuring imputed rent may yield very different poverty rates and profiles. Tentative experiments with the Finnish data (not reported here) using different ways to estimate rental equivalence (stratification from external sources, hedonic regression and Heckman regression with EU-SILC sample data) indicate that the methods and the underlying data are of crucial importance. In any case, it is easy to conclude that imputed rent changes our view of who the poor are. A comprehensive study on the effects of different estimation methods should be conducted to find out whether its addition increases or decreases international comparability of the EU-SILC income data.

[21] In this data, 45 percent of home-owners paid interest on mortgage. In the rental equivalence method, net imputed rent can be negative if expenses exceed imputed gross rental equivalence. In the Finnish data, 2.3 percent of home-owners had negative net imputed rents, half of them were less than 35 years old and they were all paying off mortgage.

5. Summary and recommendations

The current concept of property income in EU-SILC is adapted from international recommendations and is closely related to the definition in National Accounts. Some small refinements could be made to the current EU-SILC definitions, such as making the definition of property income consistent with the sub-components, and the definition of taxes coherent with the definition of income (i.e. capital gains taxes should not be included in taxes).

The operational income concept should at least distinguish between income from employment, income from capital, and redistribution of income. In this regard, some of the adaptations, such as treating actual rents received as property income instead of self-employment income, seem sensible. Some choices are less transparent, such as treating net imputed rent of owner-occupiers together with all other types of imputed rent. A logical and feasible solution would be to treat imputed rent of owner-occupiers as a separate sub-component of property income, imputed rent from dwelling provided by employer as non-cash employee income, and imputed rents from free or subsidised dwellings as transfers received. Issues such as whether royalties are self-employment or property income, or whether regular income from voluntary life and pension insurance savings should be property income or something else, may be empirically less important. It also seems evident that while realised capital gains may have a significant effect on inequality indicators, their exclusion from the international income concept is justified on grounds of feasibility.

The results on property income in the EU-SILC 2004 varied between countries in such a way as to cast doubt on the degree of comparability. The interview vs. register issue does not explain the differences; the differences in concentration and income shares among the register countries suggest that all aspects, beginning from conceptual validity and ending at different calibration models, may come into play. The standardisation of some aspects could be controlled more, e.g. by further monitoring the validity of the income concepts and not accepting deviations unless it can be demonstrated that they are empirically insignificant. Measurement errors related to interview data collection could be reduced by examining and sharing information on questionnaire designs and proposing standards for imputation methods. The flexibility aspect of EU-SILC naturally puts limits to strict standardisation of measurement, but also to the design and estimation stages of the survey process.

The apparent under-estimation of property incomes in EU-SILC 2004 would be less serious if all countries under-estimated in a comparable way. This does not seem to be the case. Since the EU-SILC income concept is closely related to National Accounts income definition, it would be useful to have a standardised comparison of adjusted and unadjusted income aggregates with National Accounts totals from every country in their quality reports. The minimum requirement would be to present such comparison for main aggregates, such as wages and salaries, self-employment income, property income, transfers received, and transfers paid.

Income advantage derived from the most common asset of households, i.e. own apartment or house may be seen as old-age provision which has strong effects on indicators such as at-risk-of-poverty rate by age. The magnitude of these effects may depend on the methodological choices (rental equivalence, user cost), the underlying data used (external rent statistics, EU-SILC sub-sample etc.), the estimation techniques (e.g. hedonic regression or the Heckman method), and comparability of the EU-SILC target variable on tenure status (HH020). More methodological and substantive studies are needed on this topic. In view of the methodological problems, and to ensure consistent time series of indicators in the coming years, the safest strategy would be to produce the imputed rent variable but to postpone the inclusion of it in disposable income until feasibility studies can confirm a reasonable degree of comparability.

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Assessing the distributional impact of “imputed rent” and “non-cash employee income” in micro-data

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chapter 2

eurostat

ASSESSING THE DISTRIBUTIONAL IMPACT OF "IMPUTED RENT" AND "NON-CASH EMPLOYEE INCOME" IN MICRO-DATA

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1. Why considering non-cash income components?

Empirical research on economic inequality almost always relies on monetary income measures (sometimes also consumption expenditures are used), largely ignoring incomes in-kind. However, by and large there is agreement about the importance to integrate non-monetary income components into cash-based income measures as to improve the comparability of distribution results across different population subgroups at one given point in time as well as across time and across space such as regions or countries[1]. Non-cash income advantages may stem from either privately or publicly provided sources or transfers, and may be related e.g. to the provision of goods and services in the health, education or housing sector. An improved statistical coverage of these issues is seen as crucial within the framework of welfare comparisons across EU member states and the respective National Action Plans for Social Inclusion (NAP-Incl). There is amble evidence for cash- and non-cash public transfers to vary substantially across Europe and any statistical conceptualisation of welfare comparisons (e.g. micro-data for comparative research such as the ECHP and EU-SILC) will be biased if it was only based on monetary income and finally, will provide inconsistent time-series if the harmonisation of social policies was also causing changes in the applied policy instruments (e.g. when moving from in-kind to cash transfers or vice versa)[2].

Designed to address these issues, the pan-European research project AIM-AP[3] includes studies focusing on the distributional impact of an incorporation of non-cash income components in the areas of education, health, housing, home production and fringe benefits in a number of EU member states.

This paper focuses on two specific types of non-cash income as these are or will be included in EU-SILC, namely "imputed rent" and "non-cash employee income". The first component can be circumscribed as an income advantage for

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1 See e.g. Smeeding & Weinberg (2001) and the Canberra Group (2001) recommendations on how to establish household income statistics for comparative purposes.

2 It must be noted that such interregional variation must not be relevant only at the cross-national level but within countries as well. A very illustrative example is given by the rather different instruments used for housing subsidization in Germany: On the one hand, "object subsidization" by means of social housing (where the construction of the building was subsidized and renters pay below-market rent over a specified period) was the preferred approach for decades in West Germany. In more recent times however, a direct (monetary) subsidization of the needy households is used by means of housing allowances. As such, any (interregional) comparison between West and East Germany focusing only on monetary income will be biased in favor of East Germany.

3 AIM-AP (Accurate Income Measurement for the Assessment of Public Policies) is funded by the European Commission within the 6th framework program, priority 7: Citizens and Governance in a knowledge based society, Contract No CIT5-CT-2005-028412 see http://www.iser.essex.ac.uk/msu/emod/aim-ap/

households either living in owner-occupied housing or in rented accommodation paying a below-market rent. The second issue encompasses non-cash components of employee income which may be provided free or at reduced price to an employee as part of the employment package by the employer. In the 2004 EU-SILC definition, this merely contains the "private use of company cars"[4]. After describing principles and actual implementation of both non-cash components in EU-SILC 2004 and SOEP 2002, the more substantive focus of this paper is to analyse incidence and relevance as well as the impact of both non-cash components on the overall income distribution. Section 2 is on imputed rent (IR) and section 3 on non-cash employee income. Section 4 gives preliminary conclusions on future harmonisation of such measures in light of the need for improved cross-national comparability.

2. The case of "imputed rent" (IR)

2.1. Principles

When dealing with income advantage from housing, the European Commission defines imputed rent as follows: "*The imputed rent refers to the value that shall be imputed for all households that do not report paying full rent, either because they are owner-occupiers or they live in accommodation rented at a lower price than the market price, or because the accommodation is provided rent-free. The imputed rent shall be estimated only for those dwellings (and any associated buildings such a garage) used as a main residence by the households. The value to impute shall be the equivalent market rent that would be paid for a similar dwelling as that occupied, less any rent actually paid (in the case where the accommodation is rented at a lower price than the market price), less any subsidies received from the government or from a non-profit institution (if owner-occupied or the accommodation is rented at a lower price than the market price), less any minor repairs or refurbishment expenditure which the owner-occupier households make on the property of the type that would normally be carried out by landlords. The market rent is the rent due for the right to use an unfurnished dwelling on the private market, excluding charges for heating, water, electricity, etc.*"[5]

According to this definition potential beneficiaries of IR include owner occupiers, rent-free tenants and tenants with below-market rent including those who live in public or social housing as well as those who enjoy a rent reduction by their respective landlord (e.g., relatives or employer). Approaches to capture IR in theory as well as in praxis in EU-SILC and the SOEP (as well as in other micro-datasets) include the following approaches.

2.1.1. The "rental equivalence method" or "opportunity cost" approach

The "rental equivalence" method focuses on the opportunity cost of housing in non-subsidized rental markets. It is often based on a hedonic regression approach, following in principle a two step procedure ("Regression rental equivalence"):

- Run a regression model with rent (per housing unit or better per square meter) as dependent variable based on the population of tenants in the private, non-subsidized market. RHS-variables may include a wide range of characteristics of the dwelling, tenure, etc.
- Apply the resulting coefficients to otherwise similar owner-occupiers. This procedure may be extended to

[4] Obviously, there exists a link between these two areas, given that employer-provided housing at a reduced rent may be considered under both frameworks. In fact, an investigation by Eurostat showed that Finland and France consider including employer-provided housing advantages in the measure of non-cash employee income (variable HY030) to be more appropriate than inclusion in imputed rent (variable HY030). As important as this will be for cross-national comparison, we will not further investigate this issue in this paper.

[5] Commission Regulation (EC) No 1980/2003 of 21 October 2003 implementing Regulation (EC) No 1177/2003 of the European Parliament and of the Council concerning Community statistics on income and living conditions (EU-SILC) as regards definitions and updated definitions.

tenants paying below-market rents. Obviously, this straightforward approach is being improved by correcting for potential selectivity into the owner-status (e.g. by applying a Heckman selection correction) as well as by considering measurement error in the imputation process, i.e., by adding an error term to the imputed rental value, thus maintaining variance of the final construct. As mentioned above, a major advantage of this method is to allow the definition of IR for all potential beneficiaries including tenants paying no or below-market rents.

An alternative way to derive the gross imputed rental value can be based on stratification of data on rents paid by “true” tenants, either within the same dataset or as given in external statistics on rents (“Stratification rental equivalence”). Depending on size of the underlying data and the distribution across the various stratification variables, all available households are assigned to one of the strata receiving the very same rent information within the stratum. As such, this approach might suffer from insufficient variation across individual households.

After defining gross imputed rent, either by means of regression or stratification, all relevant costs need to be deducted in order to obtain the required *net* measure of IR. This includes specific costs such as operating and maintenance costs (excluding heating) for both, tenants with below-market rents and owners. Above and beyond this, also owner-specific costs need to be considered: interest payments from the purchase of the home[6], property taxes[7], depreciation (i.e., consumption of fixed capital) etc. It is particularly the deduction of interest payments within this *net* calculation that reduces the income advantage from owner-occupied housing. Interest and mortgage payments are especially important over the course of an entire lifetime, because, with time, total mortgage payments represent a higher percentage of the total mortgage that has to be paid off and the level of actual ownership increases. As a result, older homeowners tend to benefit more from the income advantages of owner-occupied housing.

2.1.2. The “user cost method” or “capital market” approach

This approach has its starting point in the alternative use of capital on the capital market. A household’s decision to move into homeownership represents a trade-off, as it foregoes the opportunity to invest in financial assets from which real income flows are created in the form of income from interest and dividends[8]. In many micro-data (e.g. the US PSID) the capital market approach is calculated based on the current market value of owner-occupied housing, V, estimated by the homeowner himself, and outstanding mortgages, M, which need to be deducted from the estimated market value[9]. In any case, if the resulting value of net home equity, $V - M$, is positive, IR is calculated on the basis of this value and a nominal interest rate, i, otherwise IR is assigned a value of Zero[10].

6 Owner specific housing costs include the costs of financing the self-occupied home. With respect to IR one needs to differentiate repayment of a mortgage (=amortization which resembles savings) and mortgage interest (to be considered as consumption). Thus, only mortgage interest should be deducted from *gross* Imputed rent.

7 Whether property taxes need to be deducted in case of EU-SILC data depends on whether this component is already considered in other variables such as HY120 and HY140.

8 Along the lines of the capital-market approach, empirical calculation of the imputed interest from capital tied up in housing for homeowners is described by Saunders *et al.* (1992) as follows: “*Hence the implicit rate of return on housing equity will equal a safe private market rate of return [...] on an equal value of investment. The annual rate of return which is used in this case is approximated by a two per cent real return (two per cent above the change in overall consumer prices for a country in the year studied). Inflation plus two per cent was thus multiplied by home equity to estimate imputed rent.*” (Saunders *et al.*, 1992:11).

9 Information on the market value of the home may also come from external statistics: E.g. in the BHPS, regional and county-level housing prices are used to construct estimates of current home value. In combination with details about house purchases and mortgages provided by the respondents, a value for current outstanding mortgage debt and therefore net housing wealth or home equity is generated.

10 Although widely used in income distribution analyses, this operationalization may seriously overestimate the true return on the investment in real estate because applying a nominal interest rate to equity confounds the effect of inflation on returns. Instead of applying a nominal interest rate, i, to total home equity given by the difference of market value, V, and outstanding mortgages, M, this nominal interest rate may be applied to the outstanding mortgage only, while the calculation of the return on the investment in housing needs to consider inflation, i.e., the real interest rate, r, should be applied to the dwelling’s current market value, V. Obviously, even in the absence of taxation, $i\ (V - M)$, is different from $(r\ V) - (i\ M)$. By definition, the latter measure will produce smaller estimates for IR (see Frick & Grabka, 2003 for an illustration of this differential treatment of V and M in case of the PSID).

A problem with the capital market approach as applied to the PSID data is that it revolves around the estimation of the current market value of the property in the opinion of the homeowner, which may distort objective estimation due to the affinity to the own property. This is especially true for homeowners who are living in their home for a long period of time and are continuing to base their estimation on the original purchase price, which does not necessarily reflect the value of the object if it were to be sold *now*[11]. A valid *net* measure of IR would require deduction of all relevant owner-specific costs (see section 2.1.1). Besides this potential overestimation the failure to consider depreciation as the building becomes older may be an additional problem in this approach. Finally, it should be noted, that this approach can be implemented for owner-occupiers, only.

2.1.3. *The "self-assessment" approach*

This approach is based on rather simple questions to either owners or tenants. In particular, owner-occupiers would be asked for a fictitious market rent if they were renting their accommodation. Again, a valid net measure of IR for owners requires deduction of all relevant owner-specific costs.

Subsidized tenants would be asked for an assessment of what their "normal rent" (market rent) would be if their rent payments were not subsidized. In this case, IR would be derived on the basis of the difference between actual rent paid and self-assessed market rent.

2.2. Empirical implementation in EU-SILC 2004 and SOEP 2002

In the following section, the empirical implementation of IR in EU-SILC and SOEP is described. Although it is planned to include a measure of IR in EU-SILC in 2007, in the version of 2004 such a measure is only available for Denmark, Finland and France. Additionally, each of these countries uses a different approach and finally, the IR measure for Denmark and Finland is *gross* (i.e., not deducting interest payments on mortgages) while the French version is yet the only one providing the targeted *net* measure. In the case of SOEP, all three approaches described above can be operationalized as *net* measures for the survey year 2002 which allows for effective sensitivity analysis with respect to the choice of methodology.

The German SOEP, started in 1984, is the longest-running household panel in Europe. In 2005 about 11,400 households were interviewed with more than 21,000 adult respondents. Detailed information is available from http://www.diw.de/gsoep and Haisken-DeNew & Frick (2005); recent developments and plans for further enhancements of this survey are described in Wagner, Frick & Schupp (2006).

2.2.1. *Methods used in EU-SILC 2004*

According to the results of a questionnaire on the "Methodology to estimate IR for EU-SILC (target variable HY030G/HY030N)" sent by Eurostat to all member states in February 2006, the statistical offices of Denmark, Finland and France apply the following approaches.

[11] Kiel and Zabel (1999) provide evidence that the self-estimates by U.S. home-owners are overestimating actual house prices by approximately 5 percent. Recent buyers report house values 8.4 percent higher than the stated sales prices. Length of tenure has a significantly negative effect on owners´ valuation.

Denmark: Except for the answers to the above mentioned Eurostat questionnaire there is no information available on the Danish approach[12]. The approach currently applied by Statistics Denmark for EU-SILC is a mixture of the „user cost method“(see section 2.1.2) for the group of owner-occupiers and a self-assessment (see section 2.1.3) for tenants (whereas for the Household Budget Survey and in National Accounts the “rental equivalence method” is in use). IR for owners is in principle calculated as 4% of the taxable value of the property, which is considered a “relatively good estimate of the market value”. These values of the properties are provided by the municipalities. Tenants are asked whether their rent-payments resemble a market rent or whether they enjoy a reduction of any kind (including living rent-free). For those paying reduced rents the difference between “normal rent” and “the rent they actually pay” is asked for. This value is taken as IR for tenants. Although Statistics Denmark considers this approach to be “most feasible and transparent in the case of Denmark”, it obviously does not consider any relevant costs involved, leaving a *gross* measure of IR for home owners, which by definition overstates the income advantage as such and most likely, the share of beneficiaries as well.

Finland: Statistics Finland uses the very same method to impute IR in all its statistics, namely the stratification rental equivalence approach (see section 2.1.1) drawing on information from an external data source. Based on average market rents per square meter as given in the rent statistics of Statistics Finland, households are stratified in a total of 128 strata constructed from the following variables: year of construction (6 classes); number of rooms (4 classes); dwelling type (3 classes); region (2 classes). Any owner-occupier and tenant household in a given stratum in the EU-SILC dataset is given the same value of gross rent per square meter (excluding costs for heating, water, electricity, etc). From this imputed rental equivalence value the following costs are deducted: Depreciation (imputed); minor repairs and structural insurance (mean imputation based on HBS); maintenance charges, ground rent, extra heating costs (all asked in SILC/IDS). Finally, from the resulting gross imputed rent (SILC-variable HY030G) interest paid on mortgage (derived from register information and stored in SILC-variable HY100G) needs to be deducted yielding a household specific value for net IR. This variable in EU-SILC is HY030N, however, in the data-version available to the authors this net value is not generated for Finland. In order to control for the relevance of considering this component, the following analysis for Finland will consider both, gross as well as net imputed rent (the latter being calculated by the authors as mentioned above). It will be an empirical question to find out to what degree the gross version overstates the share of households holding this income advantage as well as their “true” value of the income advantage.

Imputed rent for Finnish tenants who pay below-market rent and have leased their home from another private household are given an imputed rental value calculated by the maximum of (the difference of estimated gross rent and rent actually paid, Zero). For households in social housing, no IR is calculated at all, since – according to the national Finnish definition – this implicit income advantage is considered as “social transfer in kind” and thus included in the corresponding EU-SILC variable. Obviously, given the effective means-testing of social housing, this (non-)implementation will impact on the share of renters benefiting from IR as well as on their respective income position and overall inequality.

France: In France, the regression based “rental equivalence method” is being applied to generate net imputed rental values, not only in EU-SILC, but also in the Household Budget Survey and the National Accounts[13]. The underlying hedonic regression of rents is performed on an external data source, the 2002 Housing Survey. This survey includes a set of variables (the “tronc commun des enquêtes-ménages”) which all household surveys conducted by INSEE have in common, and thus allows to export the rent equations to the other surveys including EU-SILC. A total of 8 regression models is estimated: separately for houses and flats for each of the following four groups: “owners still paying of their mortgage”,

[12] Statistics Denmark is currently (re)considering its position concerning IR in the SILC-data set.

[13] A documentation of the French approach including and an analysis of the impact of including IR on poverty by tenure status is given in Marquier (2003).

"outright owners", "tenants in public housing", and "other tenants paying reduced rents"[14]. A Heckman correction has not been applied and depreciation (consumption of fixed capital) is not considered. Although the IR measure for France is considered net of all relevant costs, it is unfortunately not clear from the documentation in the Eurostat questionnaire, which costs actually have been deducted from gross imputed rent.

2.2.2. Methods applicable in SOEP 2002

Based on the SOEP data for 2002, three of the above mentioned methods can be implemented, the regression-based "opportunity cost" approach, the "capital market" approach, and the "self-assessment" approach[15]. Following the implementation of theses approaches is described in some more detail:

(a) The regression-based opportunity cost approach

Implementation of the opportunity cost approach for Germany relies on a hedonic regression estimation of the logged gross rent per square meter (not including costs for heating and warm water) actually paid by main tenants in privately financed housing (excluding social housing and any households with reduced rent)[16]. In order to control for eventual selection into the state of ownership, a Heckman selection correction is applied. In the regression we also control for eventual clustering effects at the regional (*county*) level.

Applying the resulting regression coefficients to the population of otherwise comparable owner occupiers and subsidized tenants yields an estimate of the *gross* value at market prices (without costs for heating and warm water). In order to maintain variation in the resulting estimates of IR, a randomly chosen error term from the distribution of renters is added. Finally, multiplying the inverse of the estimated monthly fictitious rent by the size of the housing unit (in square meters) and by 12 yields an annual measure of *gross* imputed rent.

For owner-occupiers owner-specific costs for maintenance and operating costs as well as interest on mortgages and taxes[17] need to be considered in order to achieve a *net* measure of IR. Information on interest and mortgage payments for the previous year serves as the basis for determining the level of interest payments which unfortunately is not observed separately in SOEP. Instead, information on owner's mortgage repayments is surveyed as monthly loan or mortgage payment *including* interest. In order to differentiate amortization from interest we assume a (German) standard repayment scheme with a fixed repayment period of 30 years using an annuity scheme (=constant redemption amount)[18].

[14] The very comprehensive list of independent variables includes Household income (5 classes), Year of construction (7 classes), Climatic area (7 classes), Nationality (4 classes), Degree of urbanisation (7 classes), Household type (8 classes), Occupation (7 classes), Status in employment (6 classes), Work contract (3 classes), Marital status (4 classes), Number of unemployed persons in the household, Household size, Age of the reference person (13 classes), education of reference person (9 classes), Type of dwelling.

[15] While the first method allows to define IR for owner-occupiers as well as for any tenant living for either rent-free or at reduced rents, the implementation of two other approaches allow IR to be granted to owner-occupiers only.

[16] Explanatory variables include: condition of building, size of housing unit in square meters, year of construction, occupancy in years, community size, regional information about levels of market rent (6 classifications), city center, East vs. West-Germany, type of house, general endowment (central heating, garden, etc.), disposable income, nationality of head, SOEP-subsample identifiers.

[17] Obviously, tax regimes differ greatly across countries with respect to general taxability (what is taxed), tax rate, deductibility of costs related to property purchase, and various forms of promotion of home-ownership. This variability cannot be described to a fully extent in this paper. In case of Germany, the magnitude of tax issue is less relevant: Tax on the acquisition of real estate (*Grunderwerbssteuer*) needs to be paid in the year of purchase (3,5 % of market value), local property tax (*Grundsteuer*) is rather low (1% to 1.5% of the tax relevant property value which is based on a 1936 evaluation scheme which is way below the market value) and net imputed rent is not taxed at all in Germany. Mortgage interest are not tax-deductible in Germany. The deduction of *relevant* costs including taxation as such might vary considerably across countries and should be a major concern for cross-national comparability.

[18] We assume constant payments based on 7% annual interest and a 1% principal over the course of an average period of 30 years. In addition, we assume that mortgage payments begin at the same time in which the household moves into its new home. We do not allow for interest payments, if occupancy lasts for more than 30 years or if the property is inherited. However, for cases where the true repayment period is shorter than 30 years, our approach will introduce bias towards an overestimation of interest payments which in turn will yield lower amounts of IR.

Operating, maintenance, repair costs are taken into account by a lump sum of approx. 1,60 Euro per month/m^2, instead of considering real, but discretionary investments by the owners. This might be seen as an alternative way to deal with depreciation. In case of owner related costs exceeding the estimated income advantage (especially at the beginning of the mortgage repayment period), IR is assigned a value of zero (i.e., there is no negative value of IR).

For rent-free households we do not deduct any costs, assuming that operating costs are part of the income advantage. For tenants with below market rent, IR is defined as the difference between currently paid rent and estimated fictitious rent (assuming constant operating costs for renters and owners). Again, if currently paid rent exceeds estimated market rent, IR is set to Zero. Within the group of renters with below market rent, one can differentiate “Tenants in social housing” and “Tenants with rent reduction by relatives or employers”.

(b) The capital-market approach

The implementation of this approach is based on a self-assessment of the current gross market value of the occupied housing unit by the respondent. Because this information is only gathered from owner-occupiers in the survey year 2002, IR according to the capital-market approach cannot be specified for tenants in SOEP (unless there was reliable external information available which could be matched to the micro-data). Home-owners who do not own their property outright are also asked for the outstanding mortgage debt for the self-occupied home[19]. The difference between market value and outstanding mortgage debt gives a measure of net equity which is then multiplied by a real interest rate of x% as to derive IR. For sensitivity purposes in the following empirical analyses we apply x=2%, 3%, and 4% respectively. In any of those three variations we deduct maintenance, operating and repair costs as described above for the opportunity cost approach (i.e., lump sum of approx. 1,60 Euro/month/m2).

(c) The self-assessment approach

In the SOEP, owner-occupiers are asked for an estimate of what they think would be the “monthly rent without heating costs”: *And if you lived in this flat or house as tenant: what do you estimate would be the monthly rent without heating costs? About …… Euro.”* Starting from this self-assessed gross measure, we again need to deduct maintenance, operating and repair costs and interest payments on mortgages as described above for the opportunity cost approach. A net measure of IR is given if the remaining value is positive, otherwise IR is set to Zero. Given the focus of the question on owner-occupiers, this approach does not provide an estimate of IR for tenants[20].

[19] In case of item-non-response on the market value and the outstanding debt, regression-based multiple imputation methods have been applied (see Frick, Grabka & Marcus 2007).

[20] This self-assessment variable is highly affected by Item-Non-Response: about 22% of all owner-occupiers do not provide a valid answer, most likely because they lack a sufficient overview of the housing market. Higher non-response on this question can be found among elderly home-owners, those living in rural areas, with long tenure, and in buildings in less favourable condition. This can be taken as indication that these persons have a reduced knowledge about the true market prices of their property which, given the above mentioned characteristics, also tend to be less valuable. In other words, ignoring this population by assuming missing completely at random (MCAR), would most likely introduce an upward bias in the measure of IR. In order to keep the survey sample population complete as well as to counter eventual selectivity problems, a regression-based imputation for these non responding households is carried out. Basis are owner occupiers who provided a valid answer to this self-assessed information; the dependent variable is the logarithmic of the self-assessed market rent per square meter. Covariates coincide with those in the hedonic regression model for the opportunity cost approach. In order to maintain variance we also assign an error term chosen from the residual distribution of the observed cases.

2.3. Imputed Rent: Comparative inequality analyses using EU-SILC and SOEP

There is considerable empirical evidence in the literature about the impact of IR on substantive research results, especially on income inequality and poverty[21]. Somewhat less prominent is work which explicitly considers the impact of the choice of the method as well as the empirical implementation of the various build-in assumptions to interfere with substantive research[22]. A general finding is that the consideration of IR in the income measure, *ceteris paribus*, improves the relative income position of the elderly. However, the degree of "poverty reduction" as well as the impact on overall inequality very much depends on the applied methodology.

The empirical implementations in this paper will allow contrasting results on incidence and relevance of IR as well as its impact on inequality for four countries using three distinct methods for varying populations or modifications. Thus, the tables in this section will reflect the following versions: For Germany, the SOEP data for 2002, provides net measures of IR based on …

- *regression based opportunity-cost* approach for owner-occupiers and tenants as well as for owner-occupiers, only (2 variations)
- *capital-market* approach using (assuming a real interest rate of 2%, 3% and 4% for sensitivity purposes) for owner-occupiers (3 variations)
- the *self-assessment* approach for owner-occupiers (1 variation).

Results for these 6 estimates will be contrasted to those derived from EU-SILC 2004.

- Denmark using a *gross* measure of IR based on the "*capital market*" or "*user cost*" approach (implemented by 4% of the value of taxable equity) for owner-occupiers and a self-assessed value for renters in subsidized housing.
- Finland providing a *gross* (as well as a *net*) measure of IR based on the *stratification* approach (2 variations), however, not granting IR to tenants in social housing.
- France using a net measure of IR resulting from a regression-based "rental *equivalence*" or "*opportunity cost*" approach.

The basic unit for the following study is the individual in the context of her household. Disposable annual income as of the previous year is transformed into equivalent income by applying the modified OECD equivalence scale. Assuming constant economies of scale, the same equivalence approach is applied to potential income advantage from IR.

After briefly describing the overall distribution of the population by housing tenure and country (table 1 and 1a), we measure IR as a share of annual equivalent post-government income gives information about the relevance of this income source across the income and age distribution (tables 2 and 3, respectively). Table 4 focuses on the impact of IR on a range of inequality and poverty measures[23]. Inequality and poverty decomposition by age (in table 5 and tables 6) stress the relevance of IR as a means of old age provision (it must be noted that - in contrast to some findings in the literature - we

[21] Smeeding et al. (1993) found a leveling effect on inequality in Germany, Sweden, Canada and Norway. Meulemans & Cantillon (1993) show declining income inequality for Belgium, Eurostat (1998, 2005) reports a poverty-reducing effect in selected EU-countries, Yates (1994) states that income inequality declines slightly in Australia, and Frick & Grabka (2003) show a poverty reduction and a decline in inequality in Germany, the UK and USA.

[22] See Frick & Grabka, 2001 and 2003 using data for the US, the UK and West Germany, and Eurostat, 2006b using the Spanish HBS.

[23] For the analyses of inequality with and without IR we apply some well established measures being sensitive to income changes at different parts of the distribution: i.e., the Gini coefficient, Mean Log Deviation (MLD) and the Half Squared Coefficient of Variation (HSCV). Poverty measures as suggested by Foster, Greer & Thorbecke (1984) are applied with alpha being set to the value of zero (=poverty risk rate, FGT0) and to the value of 2 (=poverty intensity, FGT2).

explicitly consider IR also for tenants). The principle way of presenting the impact of IR in tables 2 to 6 is to contrast the results for the baseline model (given by the purely cash-based measure) with those derived from the measure including IR – i.e. we present the absolute value of the respective term of interest (e.g., income share, poverty risk rate, inequality measure, etc) as well as the percentage deviation of the respective results once including the non-cash component.

Housing tenure and IR (Tables 1 and 1a): As expected, the big majority of Danes and Fins live in owner-occupied housing (more than two third), followed by France (about 60%) and finally Germany with less than 50%. Less known but most important for the analysis at hand, we find that 10% of the overall population in Germany live in subsidized rented accommodation; in Finland and France this share is even higher (17% and 18%, respectively)[24].

Table 1 adds information on the share of beneficiaries of IR in the 4 countries by tenure status[25]. About 45% of the entire population in Germany enjoy a positive value of IR. Broken down by tenure status, this is true for ¾ of all owners and roughly 20% of the renters. In line with the higher share of owner-occupiers in Denmark, Finland and France the percentage share of beneficiaries of IR is also much higher (between 65 % and 74%) than in Germany. A most striking result is that almost all individuals in owner-occupied housing in these three countries enjoy IR, which in DK and FI might be related to the fact that a *gross* measure of IR is applied. As such, we also find a slight reduction in the incidence of IR in Finland once we employ a net measure of IR, although the share is still above 96%. It is not clear for France, which also considers a *net* measure, why we find such a high share of IR incidence among owners – this might be related to a differential treatment of relevant costs (however, this does not become clear from the Eurostat documentation). Further sensitivity analyses for Germany show that a non-consideration of operating and maintenance costs in the opportunity-cost approach would yield a share of 85% of owners with positive IR (as compared to 75% once correctly deducting those costs); this obviously makes a good case for arguing about a harmonized treatment of such costs.

Income Effects by income decile, Relevance (Tables 2 and 3): In Germany the inclusion IR causes income to rise by about 2% to 7%, depending on the approach applied. There is a tendency for decreasing relevance of IR with increasing income. The additional consideration of (mostly low income) tenants strongly reinforces this picture. Again, comparing the Finnish results based on gross and net IR, there is indication for gross IR to overstate the income advantage among high income households. First, the overall income advantage is reduced from 12% in the gross measure to 10% once using net IR; but more important this change is mostly concentrated at higher incomes. Drawing from this finding for Denmark, where also a gross measure is applied, we can assume that the currently found U-shaped pattern might disappear when employing a net measure. Table 3 clearly shows a much more pronounced relevance of IR for the elderly, who – in case of Germany using the opportunity cost model for owners and renters – enjoy a share of IR twice as high as is true for the younger cohorts (13. and 6%, respectively). Again the Finnish data exemplifies the effects of moving from a gross to a net measure is also relevant in conjunction with age. The income advantage for the elderly (with mostly outright owners) remains basically unchanged whereas younger owners tend to be still paying off their mortgage and thus enjoying lower levels of IR when applying a net measure[26].

Inequality and Poverty effects (Table 4): As a starting point it should be mentioned that the inequality and poverty results of the baseline models for all countries are in line with the literature. Denmark and Finland exhibit the lowest degree of inequality and poverty, followed by France and Germany showing the highest degree of inequality (especially at the upper end of the distribution). The inclusion of IR in principle yields for all countries the expected result of decreasing

[24] Unfortunately, the EU-SILC data for Denmark does not allow for a similar differentiation of renters.

[25] For Germany, we consider here only the opportunity cost approach which can be extended to renters; for Finland we included both, a *gross* and *net* measure of IR.

[26] The income effect in Finland using a gross IR measure is for the youngest cohort 10.4% and changes to 7.6% when applying a net measure.

inequality (the change is also of surprisingly similar size), no matter what inequality measure is applied. This result is strongly supported by the findings for poverty as measured by the FGT-index: the poverty reduction effect is positively related to the value of alpha[27].

Inequality decomposition by age (Table 5): As shown above, the inclusion of imputed rent in the income measure in a general tends to decrease inequality and poverty – except for the case of Denmark. Decomposition of inequality (assessed by the MLD) by age groups shows a rising income advantage from owner occupied housing and reduced rent accommodation for the elderly, arguing for the relevance of owner occupied housing as a means of old age provision. All these results are in line with those presented in Eurostat (2006) based on the Spanish HBS as well as in Frick & Grabka (2003) for the U.S., the UK and West Germany. While inequality decomposition results for the middle age groups do change least in Germany, France and Finland when including IR, in Finland and France we also find increasing inequality among the young population. In line with the findings above, the Finnish data shows a stronger reduction in between group inequality when including a net measure of IR as compared to a gross version (which overstates the true income advantage of the younger rich). The results for Denmark appear to be outliers given that decomposition shows an increase in inequality for all three age groups once including IR. It is not clear whether this is due to the gross nature of the IR measure.

Poverty Decomposition by age (Table 6): This conclusion is strongly confirmed when decomposing poverty intensity (FGT2) before and after introducing IR into the income measure. In all countries’ baseline model, the contribution of the youth to aggregate poverty exceeds 40% although their respective population share varies between 26% and 30% only. After inclusion of IR, their contribution to aggregate poverty rises by as much as 7% in Denmark, 10% in Germany, 14% in France and even 27% in Finland. On the other end of the age distribution we find the expected corresponding massive reduction in poverty intensity for the elderly (ranging from minus 34% in Germany to minus 55% in Finland). Again, this is to be interpreted in favour of investments into own property as a very effective means of old-age provision. These findings are perfectly in line with those by Zaidi et al (2006) for Denmark (also using EU-SILC data), who find a reduction in the poverty risk rate among the elderly due to the inclusion of IR from 25% to 10% for men aged 75 and over (the corresponding figures for women of this age group are 22% and 9%, respectively).

2.4. Concluding methodological comments on IR

Germany: The preferred method of defining net IR for Germany on the basis of SOEP data is the regression based opportunity-cost approach. This approach can be implemented using a set of standard variables available in most population surveys; it also can easily be applied to tenants with below market rents (including rent-free tenants) which is especially interesting for longitudinal research on income mobility in case of changing tenure status. Limitation of the implementation of this approach for countries with small private rental markets do not apply for Germany, where this share is more than 50% of the housing market and represented accordingly strong in the SOEP micro-data.

However, from a methodological point of view, it is most interesting to realize some conflicting results across the various methods. For Germany, where we can apply different approaches (for different populations either including or excluding tenants in subsidized housing) using the very same data, we find e.g. the expected levelling effect of IR on income inequality in both, the regression-based opportunity-cost approach and the self-assessment approach. However, for the capital-market approach inequality (when measured by means of Gini coefficient and MLD) is slightly increasing once including IR. A second remarkable result for the exercise on the German data comes with the consideration of IR for

[27] Decreasing poverty (risk rate and intensity) due to inclusion of IR is given by definition, since we keep the poverty line from the baseline model constant for this exercise. It must be noted that the picture is rather unclear for the capital-market approach in Germany where we find positive as well as negative changes (but all are not much different from zero).

tenants with below market rents (including those with Zero rents). The inequality and poverty reduction effect of IR is about twice as large if one considers tenants as well as owner-occupiers as compared to results of analyses granting IR only to owners, thus pushing the inclusion of IR for *all* potential beneficiaries in a well balanced approach.

Finland: In case of Finland the different handling (i.e., the exclusion) of social tenants in the IR measure is strongly interfering with cross-national comparability. As currently specified in EU-SILC, unbiased income distribution analyses would require the simultaneous consideration of other income variables (here: social transfers in kind) which is not the case in any other country considered in this analysis. Above and beyond this phenomenon we find, as expected, considerable variation between results derived from gross versus net versions of IR. This is true with respect to (income) levels, but more important with respect to the variation across the income and age distribution. Due to the non-consideration of higher owner-specific costs at younger ages, the inclusion of a *gross* measure of IR exerts much stronger changes for the younger population than a *net* version does: A correct specification, i.e. the *net* measure of IR, yields lower shares of beneficiaries among the younger population, a correspondingly lower share of income for this population and – as shown by inequality and poverty decomposition – an even more pronounced relevance of IR as a means of old age provision.

Denmark: Given that EU-SILC for Denmark also defines a gross measure of IR, we may draw from the Finnish case when interpreting the Danish results, i.e., we can presume a similar bias in favor of the young population and income advantages of IR for the young should be smaller once employing a net measure.

Concluding, whatever approach for defining IR might be chosen, it is most relevant that the national institutional framework is considered appropriately. This includes policies promoting home ownership when interpreting empirical results using IR measures such as the (non-)taxation of net IR, the (non-)taxation of capital gains on the sale of an owner-occupied home up to a certain amount, the deductibility of mortgage interest, the deductibility of local property taxes. One may also in principle consider determining IR for persons with multiple homes for their own use (such as second home, holiday flat) although this is not recommended by Eurostat (for EU-SILC). Certainly a limitation to this is given by the restricted information available in most survey data, which concentrates at the primary address.

Above and beyond these arguments, the following measurement issues should be considered when determining IR in micro data:

- Population: are all potential beneficiaries identifiable in the micro-data and is it possible to derive a measure of IR for all of them?
- Estimation of “true” market value/rent: availability of information within the survey or need to refer to external information?
- Potential bias in self-assessed data on market value, outstanding debt, market rent?
- Item-non-response on any relevant component might be source of bias.
- Opportunity-cost-approach
  - regression-based: need for detailed covariates describing the housing unit
  - stratification-based: may understate true variation.
- Costs: are all relevant cost components considered or at all attributable in order to derive a true *net* measure of IR?

3. The case of "company cars" (CC)

The rationale of the following analysis is very similar to the one for IR in section 2 above. There we analyzed the implication of non-cash income components for a welfare-oriented measure (equivalent post-government income), while in this section we will concentrate on the relevance of non-cash compensation schemes on the labour market. Labor economists become increasingly aware of the relevance to include non-cash labor income. Based on US micro-data Pierce (2001) finds that including voluntary fringe benefits increases dispersion measures, while the opposite is true for the inclusion of legally required compensation components. Analyzing trends over the 1980s and 1990s he argues that „Fringe benefits have become less equally distributed […] and compensation inequality rose […] by a greater amount than did wage inequality" (Pierce 2001: 1520). However, when comparing the following results to this finding it should be kept in mind that Pierce uses a very wide definition of non-cash components[28] while in the EU-SILC data at hand, this is only one component namely, "private use of company cars".

3.1. Empirical application using EU-SILC

This section focuses on the impact of non-cash employment income (EU-SILC variable PY020G) on the distribution of cash and near-cash employee-income (EU-SILC variable PY010G). In the current version of EU-SILC 2004, only the value of "private use of company cars (CC)" is included. In exact definition this variable is supposed to encompass: "Company cars and associated costs (e.g. free fuel, car insurance, taxes and duties as applicable) provided for either private use or both private and work use. […] The value of goods and services provided free shall be calculated according to the market value of these goods and services. The value of the goods and services provided at reduced price shall be calculated as the difference between the market value and the amount paid by the employee." (Eurostat 2006a: 5-6)[29]

An effective cross-nationally comparative analysis of these measures requires that all of those are defined in the same way: for wages and salaries one would like this to be a *gross* measure as to reduce the impact of national tax and transfer systems[30]. Unfortunately, this is not the case for several countries in EU-SILC 2004, which have to be excluded from the analyses:

- France, because the value of CC is already included in the cash employee-income measure and cannot be differentiated
- Portugal, Italy, Greece and Spain, because gross cash employee income is missing altogether

In other words, this analysis can be performed on the basis of EU-SILC 2004 data for the following countries only: Belgium (BE), Denmark (DK), Estonia (EE), Finland (FI), Ireland (IE), Luxembourg (LU), Norway (NO), and Sweden (SE), assuming the same definition and measurement of CC in all those countries according to the Eurostat recommendation.

[28] Pierce (2001) uses a wide definition of compensation which considers voluntary fringe benefits (related to leave, pensions, and health insurance) and legally required compensation costs (e.g. compensation insurance and social security).

[29] The available documentation does not give any indication for national deviations from this Eurostat recommendation, neither with respect to the definition nor the measurement of income advantages from the private use of company cars (CC). See Eurostat (2006a: 5-6) for a list of future components to be included in this variable starting from survey year 2007.

[30] However, even gross incomes may inhibit national specificities which will interfere with distributional analyses, e.g. the gross pay scheme for white collar workers in the German public service differs according to marital status and number of children.

3.2. Company cars: Comparative inequality analyses based on EU-SILC

The population of interest for the following analysis are individuals (up to 65 years of age) with positive measure of gross annual cash and near-cash employee-income (EU-SILC variable PY010G)[31]. For the analyses of inequality with and without CC we again apply some well established measures giving more weight to income changes at different parts of the distribution. We investigate the share of beneficiaries by cash employee income quintile (incidence analysis; table CC-1). Measuring CC as a share of cash employee income gives information about the relevance of this income source across the income distribution (table CC-2). Table CC-3 focuses on the impact of CC on a range of inequality measures. In tables CC-2 and CC-3 we contrast the results for the baseline model (given by a cash-based compensation measure) with those derived from the measure including CC – i.e. we present the percentage deviation of the respective results once including the non-cash component.

Although this analysis is of rather exploratory nature, one might expect that non-cash components (here: the use of a company car for private purpose) will be less common among lower incomes. Following from this, one would expect inequality to increase once including a measure of CC and this increase should be more accentuated when using inequality measures which are sensitive to changes in the upper part of the income distribution (e.g. half SCV).

***Incidence*: Beneficiaries of non-cash employee income (Table CC-1)** The share of beneficiaries of CC varies to a great extent across Europe: While in Norway and Ireland only 2% to 3 % of the analysis population enjoy this fringe benefit, this share is between 5% and 8% in Luxembourg, Estonia, Belgium and Denmark, whereas we find extraordinarily high shares in Finland and Sweden where about ¼ of all individuals with positive cash labour income also have a company car for private use. In line with our expectation, this compensation component is more prevalent for higher incomes, and in fact, there is a continuous increase of the share of beneficiaries across income quintiles: About every second individual among the top 20% of cash labour income earners in Finland and Sweden as well as about every fourth in the same income group in Belgium and Denmark uses a company car for private purposes.

***Relevance:* Income Effects (Table CC-2):** Our way of defining the relevance of the income advantage from "company cars" is based on the proportional share of the overall compensation coming from non-cash employee income. Although table CC-1 showed a very high incidence in some of the eight countries considered here, the relevance of CC is rather mediocre in all countries. We find the highest share in Estonia (slightly more than 2 %) and the lowest in Belgium (0.4%). Again, when comparing this effect across the income distribution, the results are in line with those of table CC-1: i.e., the higher the cash-income quintile, the higher the relevance of the non-cash component. Throughout all countries only the top quintile has an above average proportional share of CC.

Inequality effects (Table CC-3): In principle, the baseline models exhibit inequality information which is pretty much in line with our expectations: the Scandinavian representatives show the lowest degree of wage inequality and the liberal Irish labor market appears to be most unequal together with transition economy of Estonia. More important however for the sake of this paper is the finding that – in line with Pierce (2001) – the inclusion of CC in the overall compensation measure yields higher degree of inequality. This is true for all countries and all measures applied (there is only a minor exception to this rule for the 90:50 decile ratio in Estonia[32]). And as expected the increase is most accentuated when using the half SCV, an inequality measure which is sensitive to changes in the upper part of the income distribution.

[31] In order to reduce the impact of outliers and measurement error, we apply a 1%-top and bottom-trimming.

[32] This deviation most likely is not statistically significant different from zero. Obviously, given the nature of the underlying survey data, confidence bands should be provided for all these measures. However, this would hamper the readability of such tables even more.

From a comparative perspective it might be relevant to note whether the inclusion of CC into the cash employee income measure yields a different ranking of countries by inequality. However, not a single country is ranked differently than in the respective baseline model. This result might be influenced by the fact that in none of the eight countries considered the income share coming from CC is more than 2.1 % (the case of Estonia), i.e., one would expect that a more comprehensive measure of non-cash employee components as is strived for in EU-SILC 2007 would also yield a more diversified impact on overall compensation inequality.

4. Conclusion and looking ahead

Comparing cash-based welfare positions across time and space need to be complemented by the consideration of non-cash measures in order to achieve a more complete measure of the analytical construct of interest (e.g. housing transfers which may be granted either in-cash or in-kind). Firstly, both non-cash components considered in this paper (IR and CC) are of significant relevance across Europe. Secondly, there is considerable degree of cross-national variation with respect to incidence and relevance of both components. Most important from the point of distribution analysis, *within* country income variation (i.e., "equivalent household income" in case of IR and "gross employee income" in case of CC) is significantly affected. From a comparative point of view, such cross-national differences with respect to the country specific degree of inequality due to the inclusion of IR or CC may also yield different ranking of countries (e.g. as measured by the Gini coefficient). Above and beyond these findings, there is room for analysing the effectiveness of certain policies, such as the promotion of homeownership. This can be illustrated by means of inequality and poverty decomposition analysis in case of including IR which gives important insight in the relevance of investing in own property as a means of old-age provision. Especially with respect to IR, cross-national comparability is clearly influenced by the choice and implementation of alternative methodologies. While the "rental equivalence methods" estimate the opportunity cost of housing, the "user cost or capital market" estimates the opportunity cost of capital. Obviously, in times of volatile financial and housing markets, IR measures according to these two approaches do not have to coincide.

Furthermore, implementation of either of those approaches is also very much a matter of data availability and other national restrictions, e.g. in case of IR and given the sample size of the available micro data, the size of UK non-subsidized rental market is presumably too small for the analysis of the private rental market as the basis of the regression-based rental equivalence approach. This argument can easily be extended to even more countries, if the regression was based only on non-subsidized tenants with new contracts in order to explicitly consider "tenure discount".

If a given component (e.g. imputed rent) is very unequally distributed, adjusting for this one component of non-cash income may even complicate the comparability issue as contrast to ignoring this component all together. This issue becomes obvious in case of "employer-subsidized rent", where the question under discussion is whether to categorize this income advantage as either "non-cash income from housing" (EU-SILC variable HY030) or as "non-cash employee income" (EU-SILC variable PY020). Clearly, if not all countries deal with this in the very same way, any cross-national analyses will be biased, if one includes only one variable or the other instead of both of them at the same time.

Finally, due to the lack of longitudinal data in EU-SILC as of 2004, we could not investigate the relevance and importance of non-cash components for income *mobility* analyses. However, it is most likely that the inclusion of IR in the income measure especially for elderly with low income will not only improve their income position and reduce the poverty risk rate in this group as shown in the analyses presented in this paper, but this rather also will help to stabilize income above and beyond the expected low degree of variation of other income sources such as income from the public pension system. The comprehensive inclusion of IR also for non-owner occupiers who live in rent-free or rent-reduced accommodation will also be crucial for mobility analyses for those occasions where parents hand over their deeds to their children (e.g. for tax purposes) in exchange for lifelong usufructury right of living in their formerly self-owned property.

Summing up, further work on the standardization of the method for calculating and measuring non-cash income components as well as on the harmonization of the relevant inputs should therefore be of major concern to producers and analysts of cross-nationally comparative income data such as in EU-SILC – as is true for any potential component of non-cash employee income. It is obvious that even for the three countries with existing information on IR in EU-SILC 2004 (i.e., Denmark, Finland and France) the degree of achieved harmonization is by no way acceptable: It is not that much that different approaches are applied, which may be very well justified. It is the differential treatment of costs leading to various *gross* and *net* versions of IR as well as the fact that the populations potentially enjoying IR are defined differently across countries. I.e., in the Finnish data the implicit income advantage of tenants in public housing is considered as “social transfer in kind” and thus included in a different EU-SILC variable. This might indeed be a meaningful way to deal with this phenomenon. However, it is not advisable to apply different approaches within one dataset, which is explicitly designed for cross-national research.

As such, any deviation from a generally proposed approach to capture such non-cash income effects will have to be well justified as not to jeopardize cross-national comparability. However, given explicit cross-national variation (including those in the tax and transfer regimes), “functional equivalents” for capturing non-cash income components are being sought for, and not necessarily “national applications of pre-defined algorithms”.

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Tables

Annex

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Table 1: Housing tenure

	Housing tenure (% population living in ...)			
	Germany 2002	Denmark 2004	Finland 2004	France 2004
Owner-occupied housing	47.4	67.2	71.4	60.4
Rented accomodation, total	52.6	32.8	28.6	39.6
thereof:				
• non-subsidized	42.5	-	11.7	21.1
• rent-free	2.7	-	0.9	4.0
• reduced rent	7.4	-	16.0	14.5
Total	**100**	**100.0**	**100.0**	**100.0**

Source: SOEP 2002, EU-SILC 2004.

Table 1a: Housing tenure and IR

	Population with positive IR by housing tenure (%)				
	Germany (Net IR)	Denmark (Gross IR)	Finland (Gross IR)	France (Net IR)	Finland (Net IR)
Owner-occupied housing	74.5	94.6	100.0	97.4	96.1
Rented accomodation, total	19.1	3.8	6.3	36.9	6.3
thereof:					
• non-subsidized	0.0	-	0.0	0.0	0.0
• rent-free	100.0	-	74.2	81.5	74.2
• reduced rent	99.7	-	7.4	78.2	7.4
Total	**45.4**	**64.8**	**73.2**	**73.5**	**70.5**

Imputed Rent (IR) = Income advantages from owner-occupied, rent-free and reduced-rent housing

Table 2: Income Effects by decile: Relevance

	Germany (Net IR)							Denmark (Gross IR)		Finland (Gross IR)		France (Net IR)		Finland (Net IR)	
Equiv. Post-Gov`t Income Decile	Baseline	% Change in Equiv. Post Gov`t Income due to IR by decile using ... Approach						Baseline	% Change	Baseline	% Change	Baseline	% Change	Baseline	% Change
		opportunity cost		Capital-market 2%	Capital-market 3%	Capital-market 4%	self-assessment								
	Euro	owner-occupiers and renters	owner-occupiers	owner-occupiers			owner-occupiers	Euro		Euro		Euro		Euro	
1 (bottom)	5,674	19.6	8.8	2.9	6.3	9.9	11.3	9,138	13.5	7.960	16.6	6.374	20.2	7.960	15.6
2	9,446	10.5	6.0	2.1	4.5	6.9	7.4	13,892	7.8	10.767	12.8	9.331	17.1	10.767	11.6
3	11,626	9.3	5.8	2.3	4.8	7.4	7.5	16,156	7.5	12.439	12.0	11.128	14.7	12.439	10.5
4	13,282	7.2	4.6	1.8	4.0	6.3	6.2	18,364	8.4	14.063	12.5	12.725	14.8	14.063	10.8
5	14,982	8.4	5.8	2.5	5.0	7.7	7.2	20,325	8.8	15.773	11.7	14.324	14.8	15.773	9.6
6	16,773	7.2	5.6	2.3	4.9	7.6	7.3	22,205	9.3	17.497	11.6	16.042	13.9	17.497	9.2
7	18,954	6.5	5.1	2.7	5.3	8.1	6.4	24,375	10.3	19.378	11.7	18.039	14.7	19.378	9.4
8	21,913	6.3	4.9	2.4	4.8	7.3	6.3	26,935	10.5	21.651	10.9	20.678	13.5	21.651	8.3
9	26,381	5.5	4.8	2.2	4.6	7.0	5.9	30,632	10.8	25.090	10.6	24.707	14.3	25.090	8.4
10 (top)	42,895	5.3	4.6	2.3	4.6	6.8	5.3	41,384	11.3	35.170	10.0	36.715	11.5	35.170	8.2
Total	**18,191**	**7.1**	**5.2**	**2.3**	**4.8**	**7.3**	**6.5**	**24,262**	**10.4**	**19.355**	**12.0**	**17.171**	**14.4**	**19.355**	**10.1**

Table 3: Income Effects by age

Age	Germany (Net IR)							Denmark (Gross IR)		Finland (Gross IR)		France (Net IR)		Finland (Net IR)	
	Baseline	% Change in Equiv. Post Gov`t Income due to IR by age using ... Approach						Baseline	% Change	Baseline	% Change	Baseline	% Change	Baseline	% Change
		opportunity cost		Capital-market 2%	Capital-market 3%	Capital-market 4%	self-assessment								
	Euro	owner-occupiers and renters	owner-occupiers	owner-occupiers			owner-occupiers	Euro		Euro		Euro		Euro	
Below 25	16,050	5.7	3.6	1.4	3.2	5.1	4.3	20,758	9.2	16.491	10.4	15.264	13.4	16,491	7.6
25-64	19,835	6.0	4.5	2.0	4.0	6.2	5.4	24,284	9.6	19.647	10.7	18.072	13.6	19,647	8.7
Over 64	16,178	13.4	10.5	5.2	9.9	14.7	13.6	18,382	13.2	15.031	16.8	16.785	17.0	15,031	16.6
Total	**18,191**	**7.1**	**5.2**	**2.3**	**4.8**	**7.3**	**6.5**	**24,262**	**10.4**	**19.355**	**12.0**	**17.171**	**14.4**	**19,355**	**10.1**

Imputed Rent (IR) = Income advantages from owner-occupied, rent-free and reduced-rent housing

Table 4: Inequality and Poverty effects

Inequality / poverty Indicator	Germany (Net IR)							Denmark (Gross IR)		Finland (Gross IR)		France (Net IR)		Finland (Net IR)	
	Baseline	% Change in inequality and poverty due to IR using ... Approach (using constant poverty line)						Baseline	% Change	Baseline	% Change	Baseline	% Change	Baseline	% Change
		opportunity cost		Capital-market 2%	Capital-market 3%	Capital-market 4%	self-assessment								
	Index	owner-occupiers and renters	owner-occupiers	owner-occupiers			owner-occupiers	Index		Index		Index		Index	
Inequality															
Gini	0.2949	-2.0	0.2	0.5	1.2	2.1	0.4	0.2195	3.9	0.2317	-0.6	0.2675	-0.1	0.2317	-1.2
Atkinson 0.5	0.0762	-5.0	-0.5	0.6	1.3	2.6	-0.5	0.0417	4.5	0.0433	-1.5	0.0580	-0.8	0.0433	-2.5
Atkinson 1.5	0.2279	-10.0	-3.6	-0.2	-0.3	-0.3	-3.3	0.1432	-2.7	0.1257	-1.3	0.1669	-0.5	0.1257	-2.7
Mean Log Dev.	0.1594	-6.9	-1.4	0.3	0.9	2.1	-1.2	0.0915	2.1	0.0888	-1.4	0.1202	-0.6	0.0888	-2.7
Half SCV	0.2690	-6.3	-2.4	-0.2	-0.7	-0.8	-3.3	0.0853	6.4	0.0979	-2.4	0.1368	-2.8	0.0979	-2.7
Decile Ratio															
90 : 50	1.88	-1.8	-0.3	0.2	0.5	1.4	-0.1	1.57	2.7	1.67	-0.9	1.82	0.1	1.67	-0.7
90 : 10	3.66	-3.4	1.6	0.4	2.3	5.1	2.3	2.68	4.0	2.85	0.7	3.32	1.7	2.85	-0.5
50 : 10	1.95	-1.5	2.0	0.2	1.8	3.6	2.4	1.71	1.2	1.70	1.6	1.82	1.7	1.70	0.2
Poverty															
FGT0	15.14	-21.2	-10.5	-4.7	-8.0	-10.2	-12.5	10.95	-24.1	10.95	-35.2	13.63	-34.9	10.95	-33.3
FGT1	4.38	-24.5	-11.3	-4.4	-8.3	-11.6	-13.3	2.84	-21.1	2.04	-37.3	3.14	-35.0	2.04	-35.4
FGT2	2.08	-29.5	-14.7	-5.6	-10.6	-14.5	-16.4	1.37	-25.5	0.68	-39.7	1.18	-37.3	0.68	-37.4

Table 5: Inequality decomposition by age

	Germany (Net IR)							Denmark (Gross IR)		Finland (Gross IR)		France (Net IR)		Finland (Net IR)	
Age	Baseline	% Change in inequality decomposition (MLD) due to IR by age using ... Approach						Baseline	% Change	Baseline	% Change	Baseline	% Change	Baseline	% Change
		opportunity cost		Capital-market 2%	Capital-market 3%	Capital-market 4%	self-assessment								
	Mean Log Dev.	owner-occupiers and renters	owner-occupiers	owner-occupiers			owner-occupiers	Mean Log Dev.		Mean Log Dev.		Mean Log Dev.		Mean Log Dev.	
Below 25	0.162	-6.3	0.0	1.0	1.8	3.0	0.2	0.090	3.6	0.079	6.8	0.106	4.7	0.079	4.4
25-64	0.157	-5.4	-1.2	0.6	1.1	1.9	-1.2	0.087	3.0	0.088	-1.0	0.120	-1.2	0.088	-1.9
Over 64	0.132	-10.9	-2.4	-0.2	1.5	4.9	-0.6	0.076	2.3	0.075	-8.9	0.131	-6.7	0.075	-9.2
Total	**0.159**	**-6.9**	**-1.4**	**0.3**	**0.9**	**2.1**	**-1.2**	**0.091**	**2.1**	**0.089**	**-1.4**	**0.120**	**-0.6**	**0.089**	**-2.7**
Within Group Ineq.	0.154	-6.5	-1.1	0.6	1.3	2.7	-0.7	0.086	3.1	0.083	0.0	0.117	-0.6	0.083	-1.3
Between Group Ineq.	0.005	-17.3	-11.3	-7.2	-11.1	-13.7	-13.4	0.006	-13.5	0.006	-20.6	0.003	2.2	0.006	-23.2

Imputed Rent (IR) = Income advantages from owner-occupied, rent-free and reduced-rent housing

Table 6: Poverty Decomposition (based on FGT2) by age

	Germany (Net IR)							Denmark (Gross IR)		Finland (Gross IR)		France (Net IR)		Finland (Net IR)	
Age	Baseline	% Change in contribution to aggregate poverty (FGT2) due to IR by age using ... Approach (using constant poverty line)						Baseline	% Change	Baseline	% Change	Baseline	% Change	Baseline	% Change
		opportunity cost		Capital-market 2%	Capital-market 3%	Capital-market 4%	self-assessment								
	FGT 2	owner-occupiers and renters	owner-occupiers	owner-occupiers			owner-occupiers	FGT 2		FGT 2		FGT 2		FGT 2	
Below 25	42.6%	10.2	8.3	3.8	6.6	8.7	9.9	40.8%	7.3	40.7%	27.2	40.7%	14.6	40.7%	27.3
25-64	42.9%	1.2	-1.0	0.8	0.8	0.5	-1.1	51.5%	1.3	48.0%	-10.3	47.8%	-2.2	48.0%	-10.1
Over 64	14.5%	-33.5	-21.6	-13.4	-22.0	-27.2	-25.8	7.7%	-47.5	11.3%	-54.4	11.4%	-42.9	11.3%	-55.5
Total	**100.0%**							**100.0%**		**100.0%**		**100.0%**		**100.0%**	

Baseline Model: Excluding Imputed Rent.
Post-Govt.-Income: Annual income equivalized using the modified OECD-scale; EU-SILC: 1% top and bottom trimming.
Analysis population: Individuals living in private households with Post-Govt.-Inc.>0

SOEP Implementation of various approaches to measure net IR:

(1) Opportunity-cost approach: Regression of gross rent per square meter paid by main tenants in private, non-subsidized housing using heckman-selection. Resulting regression coefficients are applied to otherwise comparable owner-occupiers (or tenants in subsidized housing). From the resulting value all relevant costs (mortgage interest, maintenance and operating) are deducted.
(2) Capital Market approach: The net market-value (market-value minus outstanding mortgages) is multiplied with a fix presumed real interest rate of 2%, 3% and 4%. From the resulting value owner-specific (maintenance and operating) costs are deducted.
(3) Self-assessment approach. The original question in the SOEP which is asked from owner-occupiers only: “And if you lived in this flat or house as tenant: what do you estimate would be the monthly rent without heating costs? About .... Euros.” From the resulting value owner-specific (mortgage interest, maintenance and operating) costs are deducted.
Deduction of owner-specific costs: operating and maintenance (1.585 Euro per month per square meter), interest on mortgages

EU-SILC Implementation of measuring IR; cf: Eurostat (2006): Imputed Rent, 3rd meeting of the EU-SILC task force on methodological issues, 4-5 April 2006, Doc. EU-SILC DOC TFMC-12/06.

Denmark “User cost method”, i.e. “Capital Market approach” (Gross IR), for owner-occupiers. Self-assessment approach for tenants.
Finland: “Stratification rental equivalence” (Gross and Net IR)
France: “Regression rental equivalence”, i.e. “Opportunity cost approach” (Net IR)

Sources: SOEP, survey year 2002; EU-SILC, survey year 2004.

Table CC-1: Beneficiaries by cash employee income quintile (% Population receiving CC) [Incidence]

Cash Employee Income Quintile	Belgium	Denmark	Estonia	Finland	Ireland	Luxem-bourg	Norway	Sweden
1 (bottom)	0.6	2.2	1.2	11.3	0.4	0.9	0.2	12.3
2	2.5	2.2	3.5	15.5	0.5	3.1	0.9	16.9
3	5.6	3.2	5.3	16.9	1.8	3.3	1.0	20.6
4	7.0	6.4	7.2	29.1	4.3	3.4	1.4	29.8
5 (top)	22.6	25.9	15.1	52.4	8.5	14.6	6.1	53.1
Total	**7.7**	**8.0**	**6.5**	**25.0**	**3.1**	**5.0**	**1.9**	**26.5**

Table CC-2: Income Effects by cash employee income quintile (% Share of income due to CC) [Relevance]

Cash Employee Income Quintile	Belgium		Denmark		Estonia		Finland		Ireland		Luxembourg		Norway		Sweden	
	Baseline Euro	% Change	Baseline Euro	% Change	Baseline Euro	% Change	Baseline Euro	% Change	Baseline Euro	% Change	Baseline Euro	% Change	Baseline Euro	% Change	Baseline Euro	% Change
1 (bottom)	9,457	0.04	15,388	0.12	1,264	1.20	10,172	0.53	5,851	0.12	10,811	0.24	8,431	0.11	5,355	0.83
2	20,073	0.15	28,826	0.12	2,464	1.60	19,827	0.41	15,311	0.06	22,552	0.41	24,241	0.11	17,347	0.44
3	26,192	0.29	34,934	0.10	3,565	1.81	24,513	0.46	22,673	0.14	32,855	0.42	34,222	0.16	24,236	0.34
4	33,001	0.29	41,943	0.28	5,202	2.18	30,236	0.81	32,206	0.53	47,663	0.27	42,337	0.29	29,801	0.54
5 (top)	51,863	0.66	61,427	1.44	10,010	2.47	46,735	2.39	56,165	0.68	83,216	0.93	64,704	1.01	45,836	2.34
Total	**28,108**	**0.39**	**36,500**	**0.60**	**4,499**	**2.13**	**26,295**	**1.22**	**26,402**	**0.45**	**39,258**	**0.59**	**34,780**	**0.50**	**24,513**	**1.17**

Company Cars (CC) = Income advantages from private use of company cars

Table CC-3: Inequality effects

Inequality indicator	Belgium		Denmark		Estonia		Finland		Ireland		Luxembourg		Norway		Sweden	
	Baseline Index	% Change	Baseline Index	% Change	Baseline Index	% Change	Baseline Index	% Change	Baseline Index	% Change	Baseline Index	% Change	Baseline Index	% Change	Baseline Index	% Change
Inequality																
Gini	0.297	0.39	0.247	1.29	0.386	1.25	0.272	1.76	0.378	0.45	0.369	0.41	0.320	0.73	0.324	1.31
Atkinson 0.5	0.081	0.65	0.058	2.18	0.123	2.41	0.066	3.15	0.123	0.80	0.113	0.81	0.099	1.10	0.108	1.65
Atkinson 1	0.177	0.52	0.128	1.66	0.242	2.12	0.141	2.44	0.260	0.60	0.231	0.65	0.226	0.77	0.263	0.88
Atkinson 1.5	0.302	0.39	0.221	1.20	0.362	1.80	0.232	1.81	0.413	0.42	0.354	0.52	0.392	0.49	0.501	0.23
Mean Log Dev.	0.195	0.58	0.137	1.79	0.277	2.45	0.153	2.64	0.301	0.70	0.263	0.75	0.256	0.87	0.305	1.03
Half SCV	0.156	1.05	0.107	4.07	0.305	3.42	0.131	5.83	0.253	1.69	0.242	1.58	0.174	2.47	0.179	4.23
Decile Ratio																
90 : 50	1.793	0.28	1.618	0.56	2.453	-0.69	1.737	1.38	2.259	0.35	2.277	0.31	1.706	0.59	1.726	1.10
90 : 10	4.496	0.40	3.414	0.76	6.077	1.74	3.969	1.71	8.615	0.34	7.044	1.02	7.276	0.69	8.434	1.02
50 : 10	2.506	0.25	2.110	0.21	2.475	2.54	2.283	0.46	3.817	0.00	3.096	0.62	4.274	0.00	4.878	0.00

Baseline Income Measure: Annual cash- and near-cash income from employment (gross, employees only); 1% top and bottom trimming. (EU-SILC-Variable name PY010G)

Income Measure in "Change" Model: Baseline model income PLUS "non-cash components" (in EU-SILC 2004, this encompasses only "private use of company cars"). (EU-SILC-Variable name PY020G)

Analysis population: Dependent employed individuals (=<65 years) with positive cash- and near cash employee income

Source: EU-SILC, survey year 2004.

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Self-Employment Incomes in the Italian EU-SILC: Measurement and International Comparability

Marco Di MARCO

chapter 3

eurostat

SELF-EMPLOYMENT INCOMES IN THE ITALIAN EU-SILC: MEASUREMENT AND INTERNATIONAL COMPARABILITY

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Abstract

In its first part, the paper proposes a definition of international comparability of income data and emphasises that welfare analyses require comparability at the micro level, *i.e.* of statistical units within and across countries (micro comparability). In the second part, the paper illustrates the methods adopted for the Italian EU SILC in order to minimise the underestimation of self-employment incomes. After the record linkage of the available administrative and survey data, disposable self-employment income is set as the maximum value between the net income reported in the survey and the net *taxable* income displayed in the tax return. If no individual over-reports her/his income, the rule minimises underestimation either in the administrative or in the survey data, depending on which of the two is larger. The linkage has increased substantially the number of percipients (+15,6 %) and the average self-employment income (+11,9 %).

The paper reflects the author's opinions and do not necessarily involve the responsibility of Istat.

1. International comparability: an outstanding challenge for the EU-SILC project

The Framework Regulation of the EU SILC project states, in its first article, that international comparability is a *fundamental aim*, to be pursued through *methodological studies*, carried out in close co-operation between Member States and Eurostat[1]. The Framework Regulation reflects the awareness of the insufficiency of the best practices relating to this important aspect. Therefore, the EU SILC project has been started with two ambitious purposes: (i) to provide a set of *harmonised* statistics on incomes and living conditions *following the best practices established by past experience* and (ii) to launch a *co-ordinated experiment in improving the state of the art* in the collection/measurement of incomes and living conditions. Given the general scope of the project, it is not surprising that international comparability stands out as one of its most important methodological challenges.

However, the concept of international comparability is not self-evident. According to Verma (2002), comparability of survey data: "[…] *may defy precise definition* […] *we mean that data (estimates) for different populations can be legitimately (i.e. in a statistical valid way) put together (aggregated), compared (differenced), and interpreted (given meaning) in relation to each other and/or against some common standard. Comparability is a relative concept: we can only have 'degrees of comparability', not absolute comparability'.*"

The explanation has the advantage of encompassing two crucial aspects of comparability. The first relates to the *multiple facets* of comparability ('what is comparability made of?'). Comparability is, at the same time, a property of the *data*, of the *statistics* used to aggregate the data and, finally, of the *interpretations* attached to the summary statistics taken from the data. The second important aspect of comparability is its *relativeness*: we should primarily seek for *ordinal* measures of comparability, based on assessments like: 'the dataset (the statistic, the interpretation) A is more suitable for international comparisons than B'. Such ordinal assessments are the only way to evaluate the success of the endeavours to produce datasets (indicators, analyses) *harmonised* at the international level, being comparability the ultimate aim of harmonisation.

This paper discusses some conceptual and empirical issues related to the international comparability of micro-data on incomes, being an exhaustive study of the subject beyond its scope[2]. In fact, the paper proposes a compact definition of comparability as '*meaningful accuracy*' at the micro level and, also, illustrates the methods adopted for the Italian EU SILC in order to minimise the underestimation of self-employment incomes. The latter problem is, by far, the most critical threat to the international comparability of the Italian income data[3]. The Italian experience may (hopefully) provide some useful insights on the definition and measurement of self-employment incomes when both survey and administrative data are available.

2. Comparability: what does it mean?

Whilst the concept of international comparability of survey *statistics* has been explored at length by Vijay Verma[4], the focus here will be on the comparability of income data collected from *statistical units* belonging to different countries

[1] The achievement of international comparability through methodological studies is now also endorsed as a leading principle in the European Statistics Code of Practice (EUROSTAT, 2005).

[2] The international comparability of the other non-monetary information encompassed in the EU SILC project (living conditions, deprivation indicators etc.), though important, is not addressed in this paper.

[3] A detailed analysis of the reasons for the underreporting of self-employment incomes in Italian households surveys may be found in Brandolini (1999).

[4] See, for example, Verma (2002, 2006).

(*micro* comparability). Comparability at the micro level, *i.e.* between the incomes of *any* couple of households/individuals each living in *any* of the countries, is a necessary condition for meaningful welfare comparisons at the aggregated level. When the international comparisons are made at the aggregated level, *e.g.* on the basis of National Accounts statistics, the comparability of statistical units may be somewhat overlooked (*i.e.* it does not necessarily play a central role). This practice may be accepted for those large-scale, broad-ranging overviews that consider each different country as a 'one consumer equivalent' economy. However, within such a stylized framework, nothing can be said about the inequality of incomes. In fact, distributional analyses require comparability between statistical units. A preliminary unavoidable step for the correct computation of most well-known inequality indexes consists in ranking the statistical units from the poorest to the richest (*Pen's Parade*). Clearly, in order to sort the statistical units of a given country in such a way, any couple of them must be comparable.

A distinction can be made between micro comparability '*within country*' ("any couple of statistical units of country A can be compared") and '*across countries*' ("any statistical unit of country A can be compared to any statistical unit of country B"). Both are required for the international comparability. Micro comparability within a country, as already noticed, is a necessary (though not always sufficient) condition for the international comparisons of national inequality indexes. Micro comparability across countries is required whenever a group of countries is compared against a common benchmark, such as a European Poverty Line.

In order to define comparability more precisely, it may be useful to distinguish between *data comparability*, on the one hand, and the comparability of summary statistics and interpretations (*welfare comparability*), on the other hand[5]. Whilst the former lies under the responsibility of data producers, the latter mainly concerns theoretical research and *ex-post* empirical investigations of the available data.

Obviously, aggregate income statistics from different countries (regions, sub-populations) can be meaningfully compared and interpreted when they are computed from comparable data. Therefore, the two aspects can be ordered hierarchically: data comparability may be regarded as a necessary condition for welfare comparability. However, the condition is not always sufficient. For example, even if monetary incomes were measured with no errors, there will still be problems in comparing the welfare levels of households (individuals) living in different countries. The purchasing power of monetary incomes in different countries depends on the price levels and, therefore, a suitable set of purchasing power parities is an important tool for the comparative analysis of the households' economic conditions. Nevertheless, for what concerns the domain of data production processes, the need of an appropriate set of PPP's does not imply departures from the basic requirement of accuracy in the measurement of monetary incomes. Similarly, the use of equivalence scales also entails comparability problems that, at least at first sight, do not immediately require a particular methodology in the measurement of incomes[6].

Conversely, under-estimation calls for improvements in measurement accuracy and the presence of non-monetary components of income (self-production, imputed rents, social transfers in kind) necessitate a more comprehensive definition of income. Finally, for what concerns the recent developments in the debate about the multidimensional nature of well-being, they do only need additional information about living conditions. Thus, it turns out that data comparability

5 The term 'welfare comparability' is used just to remind that a large amount of theoretical and empirical literature about the distribution of incomes is deeply rooted in the *welfarist* (or *utilitarian*) tradition. Despite its limitations, welfarism is still the underlying theoretical framework for the invention and interpretation of most measures of inequality. Within such a theoretical context, income is used as a *proxy* for utility. On the underpinnings of the welfarist approach for what concerns utility measurement and the interpersonal comparison of utilities see, *e.g.*, Sen (1979) and Atkinson (1999).

6 In presence of negative incomes, however, the equivalence scales cannot be applied and it may be advisable to recode the income variable to a low positive number (*bottom coding*).

may be also a sufficient condition for welfare comparability *on the condition that* the data production process (and/or external data) conveys all the information which is considered relevant to this end.

Together with accuracy, of course, what is needed for international comparability is the *semantic consistency* of the income definitions (*comprehensiveness* included). Another important requirement, already mentioned in the previous paragraph, is the comparability of statistical units (*micro* comparability). Yet, comparability is still missing a definition for its own. A tentative definition could be initially expressed as follows:

Comparability of income data is a *property* (a set of properties) of the data production processes (inputs, techniques and outputs) that permits *meaningful* comparisons, within and across countries (regions, sub-groups), between any couple of statistical units.

The proposed definition 'locates' comparability in the data production processes, as suggested by Verma (2006): *"In order to assess the degree to which different bodies of data are 'comparable', it is necessary to examine* […] *the methodology and implementation of the process of production of the data sets"*.

Nevertheless, the definition is circular, as it describes comparability in terms of (meaningful) *comparisons*. Thus, the term 'comparison' must be explained. In mathematics, comparability of a set of objects is the property that a given relation is defined (*i.e.* exists) between any pair of them. For example, the elements of a set are comparable if, for any couple of elements x and y of the set, there exist a relation R such that at least one of the two following statements is true:

$$x \, R \, y \qquad ; \qquad y \, R \, x$$

Each one of the preceding statements (as well as their logical union) is a comparison. For the income variable, an obvious choice for the relation is the 'greater than or equal' assessment, since it permits to rank the statistical units from the poorest to the richest. Thus, in the case of income, it turns out that accuracy lies at the conceptual core of data comparability. Furthermore, coupled with proper qualifications about the interpretation of the results ('which comparisons are *meaningful*?'), accuracy is all we need for welfare comparability, too. In its obviousness, it is an encouraging conclusion if it is considered that, at first sight, international comparability appears to be an elusive multidimensional concept. Incidentally, it may be noted that conceptual vagueness disappears as soon as *micro* comparability is considered.

The request of *meaningful* comparisons corresponds to the requirement of *semantic consistency* and sets a bridge from data comparability to welfare comparability: the comparisons may be correctly interpreted (*i.e.* are meaningful) if they are suitable for welfare analysis. To this end, the already mentioned principle of *comprehensiveness* may be stated again as:

For any couple of statistical units, the relation "≥" between their incomes can be correctly established if the definition of income is *comprehensive*, *i.e.* if it includes all the components relevant for welfare comparability.

For the sake of comprehensiveness, the possible *trade-offs* between the mere 'arithmetic' accuracy and welfare comparability should not be decided at the expense of welfare comparability, for this would lead to *meaningless accuracy*. In the light of the definition of comparability as 'meaningful accuracy', an even stronger argument can be made: no *trade-offs* may occur between meaningful accuracy and comparability, since they are essentially different ways to express the same concept. Arithmetic accuracy and comprehensiveness of the income definition should be simultaneously pursued.

The whole discussion about comparability of incomes may be condensed in a short proposition:

For what concerns the collection of income data from households and/or individuals, data comparability requires the comparability of statistical units within and across countries (micro comparability). Micro comparability, on its turn, essentially coincides with *meaningful* accuracy. That is to say, with arithmetical accuracy together with semantic consistency of the income definitions adopted in the various countries (regions, sub-groups). If an acceptable degree of meaningful accuracy is attained by the data production processes, micro comparability is also a sufficient condition for the *appropriate use* of income data in welfare comparisons (welfare comparability).

The last phrase in the proposition should not be understood as a claim for the sufficiency of the observed incomes for welfare analysis. What is meant is that the further possible corrections and additions needed for welfare comparisons (such as PPP's, equivalence scales, living conditions etc.) do not concern the collection of income data from households and/or individuals, which is the issue at hand. Thus, in order to assess (establish, improve) comparability of the income data, it is necessary and sufficient to take a closer look at the data production processes, looking for 'meaningful accuracy'[7].

In the following of this paper, the focus will be restricted on one of the most challenging methodological problems related to comparability, namely the underestimation of some income components, such as the revenues from self-employment. On the one hand, the inclusion of the underestimated income components reduces 'arithmetical' accuracy and, therefore, comparability. On the other hand, the exclusion of the underestimated incomes violates the principle of comprehensiveness and diminishes comparability, too. In principle, since it affects *anyway* comparability, underestimation of incomes should be tackled neither by altering the definition of income nor by tolerating less accurate measurements.

In practice, many researchers and data producers are doomed to accept a certain, usually unknown, degree of underestimation[8]. It is important to notice, at this stage of the argument, that the unspoken (also widespread?) belief that datasets affected by similar degrees of underestimation are 'somewhat' comparable is untenable, at least insofar as micro comparability is concerned. It may well be that some comparisons at the aggregated level can be made by applying suitable, or even approximate, correction factors. Unfortunately, being unreported income unevenly distributed among statistical units, an analogous simplified procedure cannot be applied at the micro level. Only if *all* the incomes in a country were underestimated by a known (or suitably estimated) parameter α, then there will be no problems for micro comparability[9]. This shows that underestimation is a major problem just because it hampers micro comparability and, as a consequence, welfare comparability, too. As difficult as it may be, underestimation should be minimised, setting in each country the true national income (at the micro level) as the *comparable benchmark*.

3. Self-employment incomes in the Italian EU-SILC[10]

To cope with the demanding aim of the EU SILC project, the Italian national statistical institute set up a mixed data collection strategy, based on a *paper and pencil* face-to-face interview and on the *linkage* of administrative with survey data. A first *semantic* issue concerns the definition of self-employment incomes. Economic, accounting and administrative definitions of self-employment incomes do not necessarily match and could raise problems of reliability and comparability. Moreover, the different definitions have an influence on the subjective understanding of the term 'income' by the respondents.

7 This is indeed the scope of two recent papers about the comparability of income surveys (Verma, 2006) and of business statistics (Struijs, 2006).

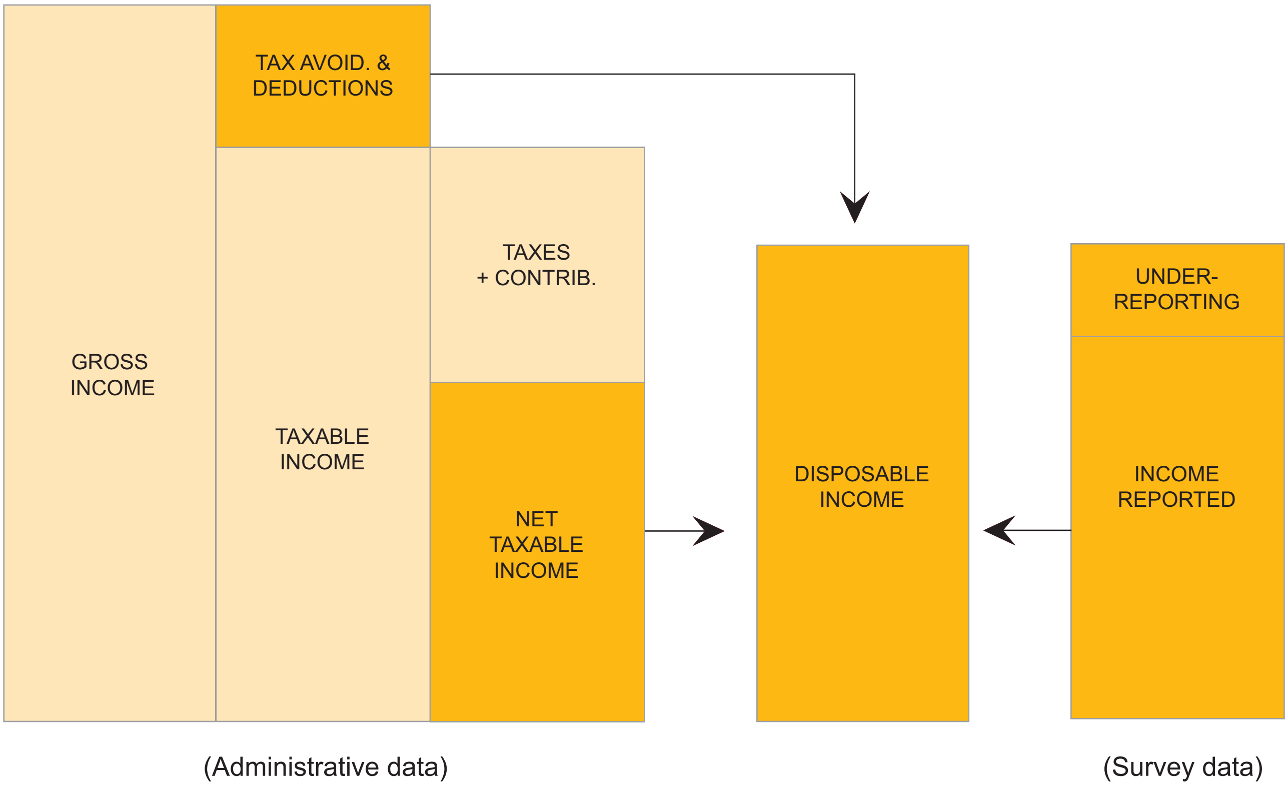
8 Two clear-cut statements, taken from the "Canberra Handbook", depict the state of the art for what concerns the measurement of self-employment incomes in household surveys: "*Income data for the self-employed are also generally regarded as unreliable as a guide to living standards*"; "*Household surveys are notoriously bad at measuring income from capital and self-employment income*" (Canberra Group, 2001).

9 The correction needed in such a hypothetical case would be exactly equivalent to the application of an exchange rate to the underestimated incomes, 'as if' they were measured with a different currency unit.

10 The present paragraph largely follows Consolini and al. (2006).

Figure 1 below shows, in a simplified sketch, the problem of collecting self-employment incomes when either survey or administrative data are available: the shaded areas correspond to the income available to an individual for his/her personal use.

Figure 1. Personal gross, taxable, reported and disposable income



The alternative sources of micro-data on earnings from self-employment may not contain the item 'disposable income' as such. Survey data may be affected by *underreporting*. Administrative data gathering the individual tax returns do not take account, of course, of illegal tax evasion and may not display all the authorized deductions allowed in the calculation of taxable income (tax avoidance)[11]. The accounting books, on their turn, usually report about the taxes paid by the company as a juridical entity and do not contain information on the personal taxes levied from the owners' profits. However, ignoring tax evasion, the accounting profits, net of company taxes, can be viewed as a measure of gross personal income. Nonetheless, they could still be different from personal taxable income. Indeed, the tax authorities may allow special deductions for the profits retained and invested in the business, stipulate departures from accounting rules for depreciation costs *etc.* Some categories of taxpayers (*e.g.* small family business, farmers, starting-up companies…) may be subject to a preferential tax regime that grants them special benefits.

Another controversial semantic issue concerns the allotment of self-employment earnings between the categories of labour and capital incomes. At this regard, the naming and accounting conventions encompassed in the tax laws are not necessarily the most suitable for economic analysis and, moreover, may also hamper international comparability. The System of National Accounts opportunely sums up both components in the concept of 'mixed income', a convention that

[11] This is in accordance with the conclusion reported in Byfuglien (2001), after a thorough analysis of the ECHP experience: "[…] *in no country administrative sources alone are sufficient for providing all necessary data for studying all specific spects of poverty and social exclusion. A linked survey can also be necessary* […] *to identify non taxable income* […].

permits to analyse them as rewards for independent labour, often assisted by the worker's capital[12]. The Canberra Group (2001) and the ILO resolution on income surveys (2003) recommend to exclude from self-employment income the profits of unincorporated businesses distributed to 'sleeping partners', an advice that clearly attaches more weight to the 'labour' component. Given the ambiguity of the definition of self-employment incomes in the tax laws, for the Italian EU SILC the tax source has been used with caution (substantially, to check and replace the underreported survey incomes). In fact, to avoid errors due to legal definitions, when the earnings of the self-employed have been reported in the tax data exclusively under the 'capital incomes' heading, the information has not been used (*i.e.* they have not been compared with the survey incomes, nor have they been loaded in the final dataset)[13].

In the EU SILC project, the standard procedure to measure net self-employment incomes requires to collect the amount of money drawn out of self-employment business only when the profit/loss from accounting books or the taxable self-employment income (net of corresponding taxes) are not available. For the Italian EU SILC, when both the administrative and the survey data sources report it, income from self-employment is set equal to the maximum value between: (i) the (net) self-employment income resulting from the tax return and: (ii) the (net) self-employment income reported by the interviewee. This departure from the standard definition is adopted in order to minimise either under-estimation due to tax avoidance/evasion in the administrative data or under-reporting in the survey data, depending on which of the two is larger. The procedure increases the degree of international comparability, under the assumption that self-employment income in the benchmark country is not under-estimated.

The two data sources do not perfectly overlap. In fact, some individuals report self-employment incomes in only one data source. This is the case of some individuals whose professional status at the time of the interview is different from that of the income reference period and of many percipients of small and/or secondary self-employment incomes. The survey data include as self-employment incomes those small compensations for minor and informal services that are frequently unnoticed for tax purposes (For example, the earnings of baby-sitters). On the other hand, some minor self-employment incomes shown in the tax returns may be disregarded during the interview to ease the response burden.

In the survey questionnaire for the Italian EU SILC, the amount of self-employment income is asked after a reminder question, requesting YES/NO replies to a list of possible personal uses of earnings (consumption and saving). This sequence has been devised in order to suggest to the interviewee an interpretation as close as possible to the 'money drawn out' concept. In effect, for some self-employed the literal translation into Italian of the question "Have you drawn out money from business for your personal use?" may evoke the idea of a deceitful behaviour like, for example, to withdraw money from the cash account without taking note in the books of the corresponding revenues (tax evasion).

For what concerns the amount of self-employment incomes, the instructions to the interviewers advise them to explain that "*self-employment activity has led to*:

- ***earnings*** *if the individual or her/his family has got from it an amount of money that has been used for personal/household expenses, saved, invested in the business or in financial activities, dwellings and other real estates.*
- ***a loss*** *if he/she has not obtained from it any money to pay for personal/household expenses or to save/invest and, also, has used incomes from other sources, borrowed money or sold assets to pay for the costs of the self-employment activity.*

[12] Some self-employed (*e.g.* subcontractors) do *not* use their own capital in production.

[13] In these cases, the survey income is retained in the final dataset as it is.

The reason for such a definition is quite simple: if positive earnings are 'money drawn out' from business, then losses should be understood as 'money put into' it.

During the pilot tests of the EU SILC questionnaire, most self-employed have proved to be much more confident with the simple logic of the preceding definition than with the concept of income entailed by the accounting rules (to say nothing of the complex computation of taxable income, a task which is usually left to tax consultants).

It was expected that, though the interviewees may show a certain degree of reticence, in the Italian context survey underreporting should have a more limited extent with respect to tax avoidance and evasion, as the answers to the survey questionnaire do not entail tax consequences[14]. Moreover, to minimise the percentage of missing answers to the income question, for those respondents who do not remember the exact amount of their self-employment income, a supplementary question asks for an approximate amount, to be selected out of a predetermined list.

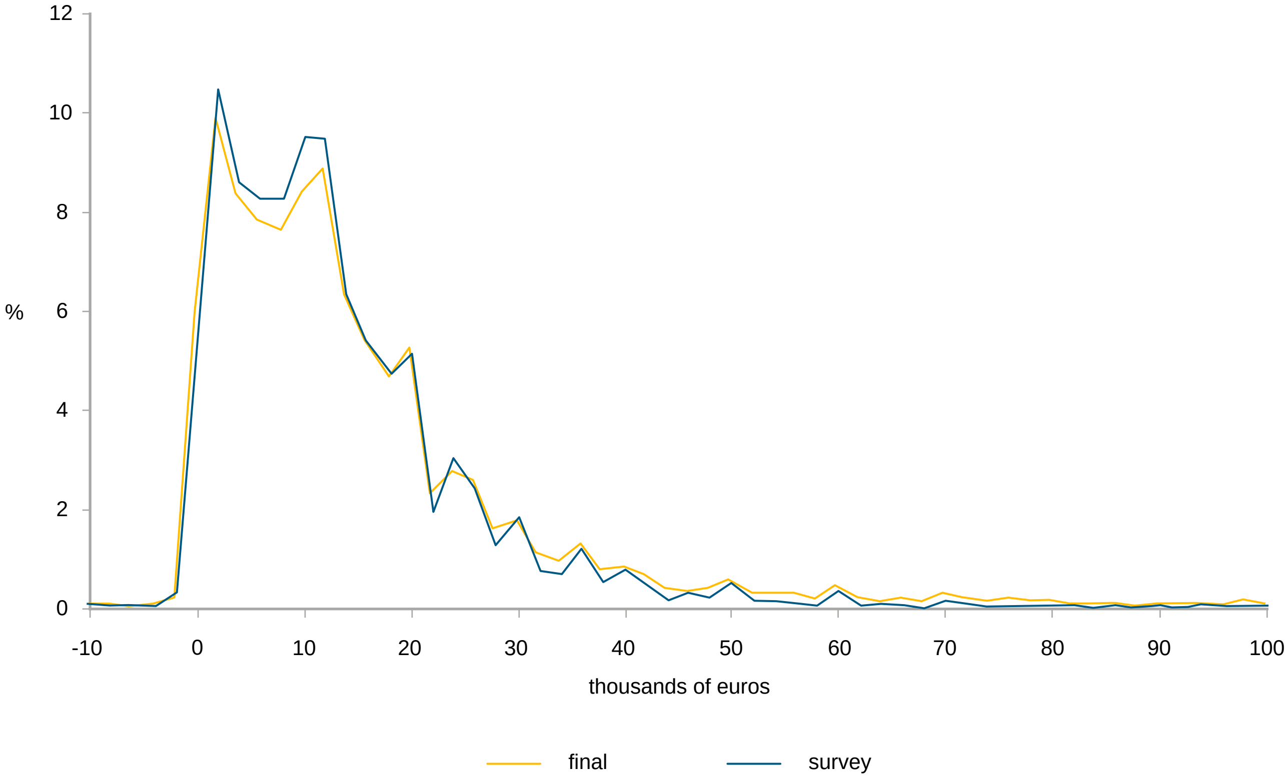
The interviewers were repeatedly advised not to compel persons visibly embarrassed or bothered, as they could provide false answers. As a general principle, missing answers were always preferred to false ones. In addition, interviewers were also asked to directly provide their own assessment, after the interview, of the reliability of the reported incomes. The whole approach to the collection of self-employment incomes through personal interviews aims at minimising reporting errors and, at the same time, at devising suitable imputation procedures for the missing values. The setup of the imputation procedures has been eased, on the one hand, by the rich qualitative information available in the survey and, on the other hand, by the reduction of the bias due to the unreliable answers retained among the valid cases. These latter have been minimised by the systematic preference for missing with respect to false answers and by the removal of the unreliable amounts.

With respect to the exclusive use of survey data, the linkage with administrative data has increased substantially the number of percipients (+15,6 %) and the average self-employment income (+11,9 %). Among the individuals for which both sources contain self-employment incomes, the record linkage reveals that under-estimation is more frequently observed in the tax data than in the survey data[15]. The use of administrative data has also slightly changed the distribution of self-employment incomes (Figure 2). Indeed, with respect to the survey data, the final (*i.e.* integrated) dataset contains a lower percentage of self-employment incomes in the range 2,000 - 12,000 euros per year and a higher proportion of percipients with incomes greater than 20,000 euros.

[14] Needless to say, a special effort has been made to persuade the interviewees that, according to the Italian laws, their answers are collected solely for statistical purposes and will never be transmitted to the tax authorities.

[15] A similar result for what seems to be an Italian peculiarity, would be obtained by comparing the aggregate amounts of administrative self-employment incomes with the corresponding statistics computed from the Bank of Italy Survey on Household Incomes and Wealth (Brandolini, 1999).

Figure 2. Distribution of self-employment incomes in the survey and in the final dataset *(all percipients)*



The concentration of self-employment income is different, too (Table 1). The Gini index shows that survey data are characterised by much less inequality (0.48) than the tax data (0.59). In the final dataset the Gini measure of inequality of self-employment incomes amounts to 0.50. The decomposition of the Gini index by sub-groups of percipients, precisely by their professional status at the time of the interview, reveals that the final data encompass a higher degree of inequality 'between groups' than the two data sources taken separately. Moreover, after the integration, the 'between groups' component has a higher importance in explaining overall inequality.

Table 1. Gini index decomposed by subgroups of percipients of self-employment income [a]

(All the self-employment incomes available in each source)

	SURVEY DATA			TAX DATA			FINAL DATA		
Overall Gini	0.48	100%		0.59	100%		0.50	100%	
- between groups	0.17	36%		0.18	30%		0.21	41%	
- within groups	0.10	22%		0.12	21%		0.09	18%	
- crossover	0.20	42%		0.28	49%		0.21	41%	
	group specific Gini	share of popula-tion	share of income	group specific Gini	share of popula-tion	share of income	group specific Gini	share of popula-tion	share of income
Employees	0.59	4.6%	2.4%	0.69	11.6%	7.7%	0.61	9.6%	5.6%
Enterpreneurs	0.45	7.8%	12.2%	0.60	6.0%	9.5%	0.46	6.7%	11.6%
Professionals	0.43	16.4%	24.8%	0.54	17.5%	27.4%	0.45	14.2%	23.4%
Artisans/shopkeepers...	0.43	42.8%	40.3%	0.52	40.4%	38.0%	0.41	37.1%	37.4%
Co-helpers	0.49	7.7%	5.8%	0.52	4.6%	3.8%	0.48	6.7%	5.1%
Coop. stockholders	0.41	2.5%	2.3%	0.53	1.1%	0.9%	0.42	2.2%	1.9%
Co.co.co.	0.47	12.8%	9.2%	0.61	2.6%	2.1%	0.47	11.1%	7.6%
Unemployeds	0.64	1.4%	0.7%	0.67	2.5%	1.0%	0.57	2.2%	1.0%
Other inactive	0.59	4.0%	2.4%	0.63	13.8%	9.6%	0.60	10.2%	6.4%

[a] The Co.co.co. are temporary subcontractors.

In fact, with respect to the survey data, the tax file includes a higher proportion of percipients of secondary ('employees') and of marginal/temporary ('unemployed', 'other inactive') self-employment incomes, as well as larger shares of the corresponding incomes. Furthermore, in both sources (and in the final data as well), these sub-groups are the ones with the highest degree of inequality. In the final data, the majority of retained records for these sub-groups made of 'employees', 'unemployed' and 'other inactive' come from the tax data source, while the opposite is true for all the other categories of percipients, namely for those who are self-employed at the time of the interview (Table 2). More generally, the self-employment incomes of all the sub-groups of percipients are more unequally distributed in the tax data source than in the survey.

Table 2. Sources of self-employment incomes in the final dataset, by subgroups of percipients

(All the percipients of self-employment incomes in the final dataset)

	survey	tax	all
Employees	36.4	63.6	100.0
Enterpreneurs	79.3	20.7	100.0
Professionals	71.2	28.8	100.0
Artisans/shopkeepers...	73.9	26.1	100.0
Co-helpers	84.6	15.4	100.0
Coop. stockholders	88.0	12.0	100.0
Co.co.co.	94.3	5.7	100.0
Unemployeds	44.7	55.3	100.0
Other inactive	28.3	71.7	100.0
All	68.2	31.8	100.0

A closer look at the results permits to conclude that both data sources miss a substantial amount of information. Of all the percipients of self-employment incomes in the integrated dataset, the 40.9% would have been ignored (or misclassified as percipients of pure capital incomes) by using exclusively the available tax records. At the same time, the 13.5% do not reveal themselves as percipients of self-employment incomes in the survey (Table 3).

Table 3. Percipients of self-employment incomes in the integrated dataset, by content of the two data sources

(All percipients in the final dataset [a])

	TAX DATA		SURVEY DATA			FINAL DATA
	reported	not reported	observed	missing (imputed)	NO to S.E. question	
Employees	71.0	29.0	26.9	14.5	58.6	100.0
Enterpreneurs	53.0	47.0	79.8	20.2	none	100.0
Professionals	73.1	26.9	80.0	20.0	none	100.0
Artisans/shopkeepers...	64.3	35.7	76.1	23.9	0.1	100.0
Co-helpers	40.3	59.7	49.6	50.4	none	100.0
Coop. stockholders	28.8	71.2	54.5	45.5	none	100.0
Co.co.co.	14.1	85.9	50.3	49.4	0.3	100.0
Unemployeds	66.0	34.0	32.5	21.3	46.2	100.0
Other inactive	79.5	20.5	21.8	11.8	66.4	100.0
All	**59.1**	**40.9**	**60.5**	**26.0**	**13.5**	**100.0**

[a] In the panel for survey data, the first two columns regard persons who answered ‘YES’ to the question about self-employment.

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Income in EU-SILC – Net/Gross Conversion Techniques for Building and Using EU-SILC Databases

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chapter 4

INCOME IN EU-SILC – NET/GROSS CONVERSION TECHNIQUES FOR BUILDING AND USING EU-SILC DATABASES

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Abstract

This paper discusses the micro-simulation methodology required to model net-gross conversion of Portuguese incomes presented in EU-SILC. Although based in one country experience the methodology issues discussed in this paper could be of interest for other countries facing similar problems. This methodology could be used both as a process to produce and improve some of the variables of the EU-SILC database and as a main block in micro-simulation models to evaluate income distribution changes and the impact of some redistributive policies. The previous experience of the Euromod Model and of the Siena Micro-Simulation Model is taken into account in developing the net-gross simulation.

1. Introduction

This paper illustrates some of the problems involving the conversion from net to gross incomes and, reversely, from gross to net using the Portuguese EU-SILC dataset.

This question is relevant both at the stage of constructing the final EU-SILC datasets (the UDB database) and to its use by researchers in trying to use the final information as a base for micro-simulation models of the fiscal policy.

One of the basic requirements of the EU-SILC, and also for a large number of micro-simulation models, is to have detailed information on gross income components at household and personal level. However, the information about the Portuguese incomes in the first wave of the EU-SILC only contains net incomes. The aim of this paper is to contribute to a discussion about the adequate procedures to modelling net to gross transformation using the Portuguese data and to build the EU-SILC income target variables. Although based in one country experience the methodological issues presented in this paper could be of interest to other countries with similar systems.

The discussion and suggestions that emerge from this paper take into account the contributions of the Euromod and the Siena Micro-Simulation Model in formulating a more general framework to analyse the net to gross problem.

2. The Portuguese tax system and EU-SILC variables

The Portuguese tax-system is mainly characterized by a system of taxes withholding at source with an adjustment to the final tax amount to be made in the following fiscal year. The main features of the system are:

- Regular income from employment, self-employment, pensions and property income is pooled together and taxed at tax-unit level;
- Employment income and pensions are subject to retention at source of insurance contributions and/or tax. The withholding tax that are based on individual income but the applicable tax take into account the tax payer marital status, the number of children, and if the partner also has income from the same source;
- Self-employment income is subject to withholding tax at flat rate;
- Employment income is subject to Social Insurance Contributions at a fixed rate. Self-employment income social contributions depend of the amount of the income from self-employment and from employment income. Pensions are not subject to social insurance contributions;
- The composition of the tax-unit could depend (marginally) on gross incomes. It includes dependent children and/or dependent parents[1];
- Capital Income is subject to an individual withholding tax at flat rate and is not taken into account at tax-unit level;
- Social benefits other than pensions are exempt from taxes and social contributions.

The following table shows the main income components, taking as reference the EU-SILC income variables, and how they are considered by the Portuguese tax-system.

[1] Note that the dependence of the composition of the tax-unit from the amounts of certain categories of gross incomes could introduce an additional problem in the net to gross process.

Table 1. EU-SILC Income components and the Portuguese Tax-system

Tax-unit level			
1 – Employee income	PY010 / PY020	Retention at source Social Insurance Contrib.	**Net to Gross Model**
2 – Self-employment income	PY050	Retention at source at flat rate Social Insurance Contrib.(-)	
3 – Pensions	PY100/ PY110/ PY120/ PY130	Retention at source	
4 – Property Income	HY040	Retention at source	
Flat rate taxed withholding at individual level			
5 – Capital Income	HY090		**G/N**
Tax exempt			
6 – Unemployment benefits	PY090		**GROSS = NET**
7 – Education related benefits	HY050/PY140		
8 – Housing allowances	HY070		
9 – Social exclusion	HY060		
10 – Private transfer	HY080/ HY130		
11 – Income received from children	HY110		

From the results in the table above all the process of Net/Gross/Net conversion is reduced to the five first categories of income but the last one is an automatic procedure. The net to gross model reduces to the first four income components.

3. The “Standard” Model

3.1. The Gross-to-Net Model

The standard tax model of Portugal could be described by Figure 1. We begin with the Gross amount G_1 received for each individual in the four income components included in the tax model[2]. This vector of gross incomes could also affect the composition of the tax unit because its magnitude could determine the inclusion or not of some dependent children and/or dependent parents.

The amount of social insurance paid by employees is component specific with a common rate (11%) applicable to all employees.

The social insurance paid by self-employed workers is determined not only by the level of G_2 but also by the amounts received as G_1 and G_3. If an individual received pensions, has an employee income higher than the minimum wage (MW) or if his self employment income is lower than six times the minimum wage he doesn’t pay any contribution. The amount of contributions to paid is independent of G2 and is a fix percentage of the national minimum wage. Pensions and property

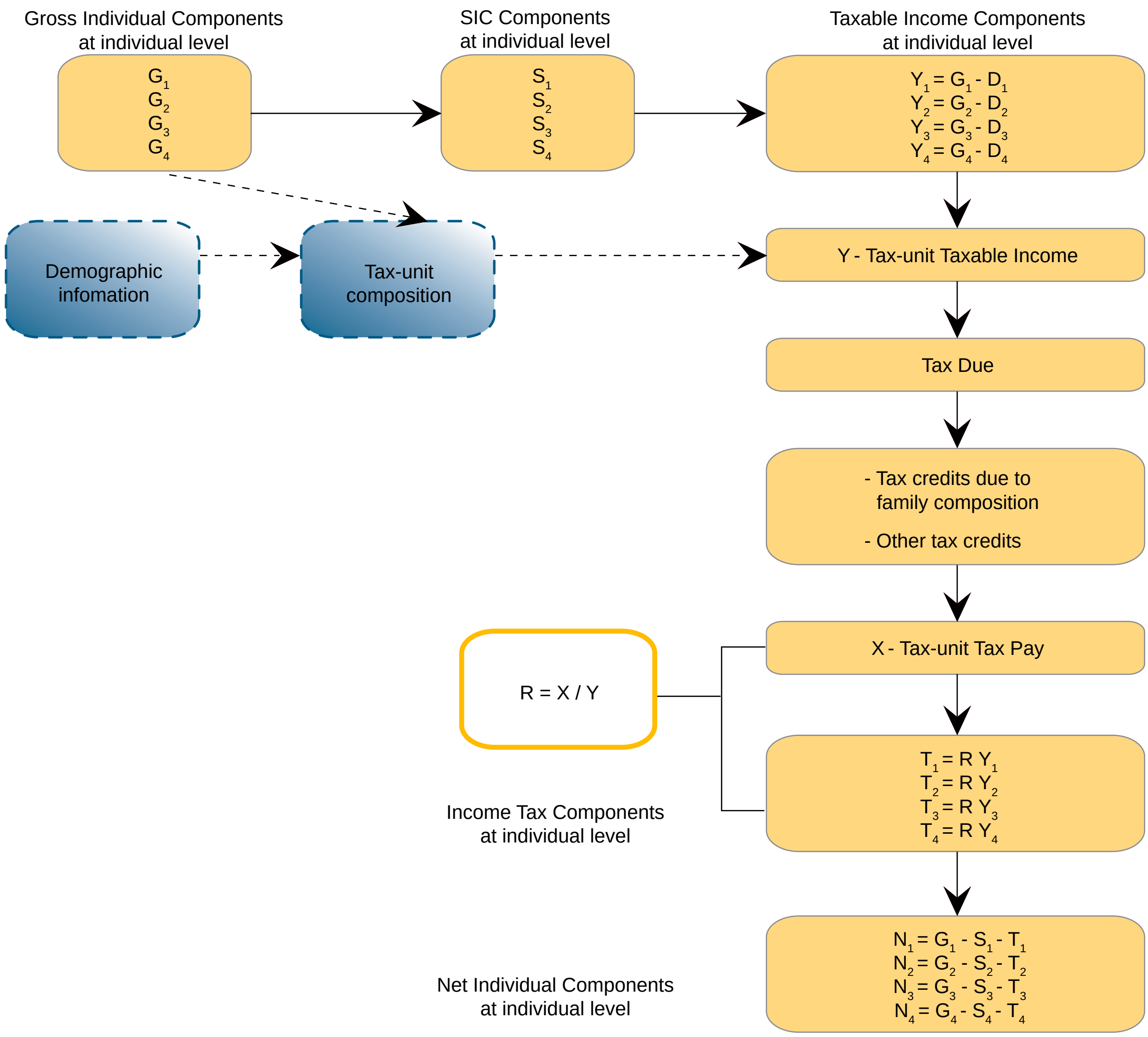
[2] The information about property income is collected in EU-SILC at household level. However it’s possible to affect it to articular household member, for example the one with high individual income, without serious consequences in the tax-model.

income don't pay any social security contributions. The general system of social insurance contributions to be paid can be summarized as follows:

$$
\begin{aligned}
&S_1 = S_1(G_1) = 0.11\,G_1 \\
&S_2 = S_2(G_2, G_1, G_3, MW) = \alpha\; MW \\
&\qquad with\ \alpha = 0\ if\ G_2 < 6\,MW\ or\ G_1 > MW\ or\ G_3 > 0 \\
&\qquad\qquad \alpha = 0.254\ in\ all\ other\ situations \\
&S_3 = 0 \\
&S_4 = 0
\end{aligned}
$$

Taxable Income at individual level (Y_i) is obtained by subtracting from gross taxable income specific deductions D_i.

Figure 1. Gross to net model



The specific deduction on employee's income (D_1) depends not only on G_1 and S_1, but also on the value of the minimum income. Its amount can be obtained as:

$$\begin{aligned} D_1 &= D_1\left(G_1; S_1\left(G_1\right); MW\right) \\ &= Max\left(S_1\,; \left[\min\left(0.72\,G_1\,; 0.72\,MW\right)\right]\right) \end{aligned}$$

Self-employment income deductions can be obtained by different systems. However for most of the self-employed workers the deductions are a fixed percentage (35%) of G_2.

The specific deduction for pensioners (D_3) is a fix amount established each year by the Government ($MaxD_3$) and can be computed as:

$$D_3 = D_3\left(G_3\right) = \min\left(G_3; MaxD_3\right)$$

There are no specific deductions on property income (D_4=0).

Taxable Income at tax-unit level (Y) is obtained by pooling all the individual taxable incomes in a tax-unit. A tax-unit can be composed by: i) Both spouses and their dependents; ii) Each spouse or ex-spouse and any dependent in charge; iii) Unmarried father or mother and dependents in charge; iv) Unmarried adopting father or mother and dependents in charge. The amount of tax due at tax-unit level is calculated according to the following tax schedule:

Table 2. Description of the personal income tax schedule, 2003

Income brackets per year	Rate	
	Marginal	Deduct
Up to 4 182,12 €	12%	0
Over 4 812,13 € up to 6 325,45 €	14%	83,64 €
Over 6 325,46 € up to 15 682,96 €	24%	716,19 €
Over 15 682,97 € up to 36 070,79 €	34%	2 284,49 €
Over 36 070,80 € up to 52 276,51€	38%	3 727,30 €
Over 52 276,51 €	40%	4 772,85 €

Note: The income of the spouses and their dependents is aggregated and the tax is determined according to the splitting system (division by 2). In Azores and Madeira the marginal tax rates are lower than in Mainland.

The amount of tax due is normally reduced by two types of Tax Credits. The first one are based on the characteristics of the tax-unit (family composition, single parents, etc) and second one are given in compensation for particular expenses (education, medical, etc) or as income tax incentives (for example deposits into retirement/educational-savings plans).

The final amount of tax to be paid by the tax-unit (X) is obtained by deducting the value of the tax credits from the amount of tax due. One of the crucial issues implicit in the gross to net model is how to obtain the different components of net incomes at tax-unit and at individual level. From the above model it is clear that all the elements of a tax unit are taxed at the same rate. The total taxes paid by the tax-unit (X) result from a pooling of the different types of income of all the members of the tax unit.

We can define the **tax-unit tax rate (R)** as the ratio of the total amount of tax to be paid to the gross taxable income:

$$R = \frac{X}{Y}$$

This tax rate shows the real tax rate applied to all gross taxable incomes of the members of the tax unit and take into account all the features of the tax system, namely the level of incomes, the composition of the tax unit, the interaction between components of income and between the incomes from different persons in the tax unit and all the tax credits obtained.

The tax applied to each component of income at individual level can then be obtained, for each member of the tax-unit, as $T_i = R\, Y_i$ and the net by component at individual level as:

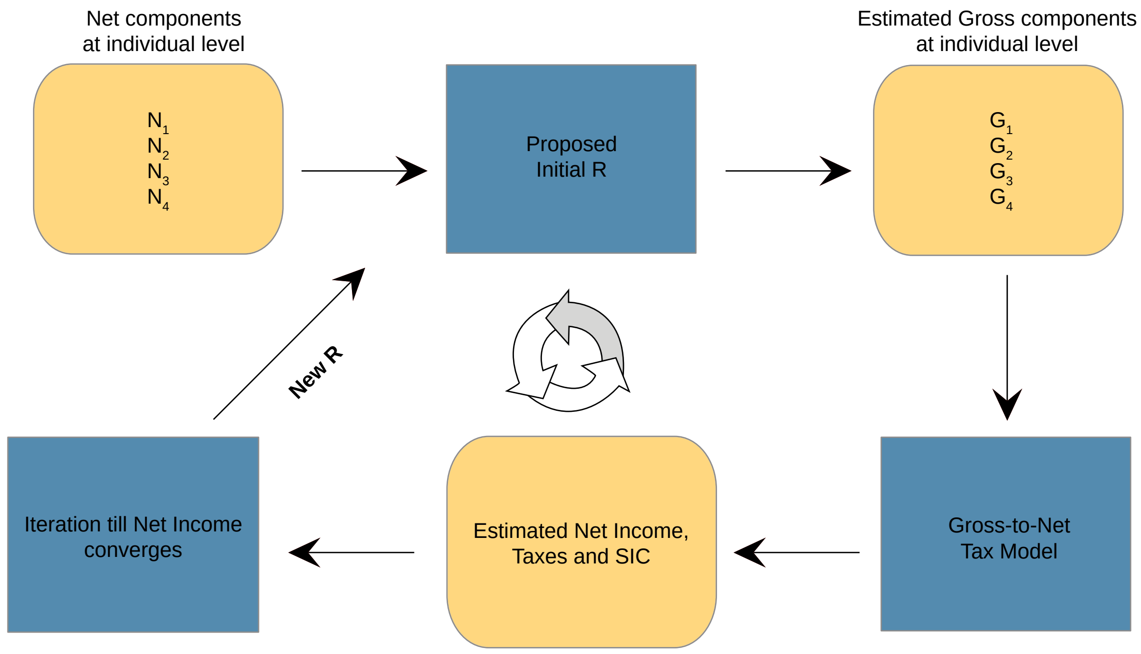
$$N_i = G_i - S_i - T_i\,.$$

Each component of net income reflects the effect of the tax system as a whole over the components of gross income (G_i).

3.2. The Net-to-Gross Model

The usual approach to obtain the gross components from the net values is to reverse the previous gross to net model by an iterative procedure. That's the method used for constructing the Portuguese dataset of the Euromod model from ECHP, and can be illustrated by the diagram in Figure 2.

Figure 2. Net gross to Gross model



The procedures to revert the initial model are very well documented, namely in the Euromod's publications[3].

4. "Net at source" and "Mix incomes".

The two models previously presented assume that we have all the relevant information about gross components or about net components of income taken from the data survey.

However in certain countries like Portugal the income initially received by individuals is subject to retention at source of tax and/or social insurance contributions and what people declare as net income is not the final net income but gross income deducted by the social security contributions and by the amount of taxes paid at source. As we will illustrate in this section this wrong definition of "net income" could introduce real problems in the tax-system model but could also, if we can clearly identify what people are really declaring, simplify the process of converting from gross to net.

A second problem results from the possibility that one household, or a particular individual in it, could declare a mix of net and gross incomes. If we have in the same tax unit both net components and gross components of income none of the previous models can deal easily with it easily.

Assuming as "real net income" the declared values of net incomes that are actually only net of taxation and social insurance deducted at source could introduce significant bias in the evaluation of the effects of the tax-system and generate an over/underestimate of the total taxes and of the household's net income.

An example from the Portuguese tax system in 2003 could illustrate this situation. Assume a couple with two children that only eamed income from work. The gross income from one of them is 3000€/month and the other eamed 500€ month. The total of annual taxes that they pay as deduction at source is 10815€. However, the final taxes applicable to this household are only 8830€. This means that assuming as final net the value they received from their jobs represents an underestimation of their net income by more than 6%. This gap between taxes collected at source and final taxes depends mainly on the differences in magnitude of the incomes received by the different members of the tax-unit, the mix of different components of income and the importance of tax credits obtained as compensation for particular expenses or tax incentives.

In order to understand how the Portuguese tax-system of taxes withholding at source works lets look to each of the four components of income that constitutes the core of the net to gross model.

Income from employment is subject to retention at source of both social insurance and taxes. The employee's income effectively received from their jobs is computed as:

$$\begin{aligned}\overline{N_1} &= G_1 - S_1(G_1) - T_1(G_1, D) \\ &= G_1 - \beta_{11}\, G_1 - \beta_{12}\, G_1\end{aligned}$$

Employment income net of taxation and social insurance deduction at source ($\overline{N_1}$) depends on both gross income (G_1) and some demographic characteristics (D). The amount of social insurance is a fixed percentage of gross income; this

[3] See, for example, Immervoll,H. and O'Donoghue,C. (2001) and Rodrigues,C.F, Albuquerque,J and Fernandes,R. (2006).

means that β_{11} is a flat rate common to all workers. The tax rate used to compute taxes at source (β_{12}) is published each year by the Government and is a function of the gross income. However, this tax rate is different according to the tax payer's marital status, number of children, and whether the partner also has income from employment.

Knowing the family composition of the tax payer's, and whether her/his partner has incomes from work, is possible to modify this tax rate in order to obtain it as a function of declared net income, that is:

$$\beta_{12}\left(G_1, D\right) \Rightarrow \beta_{12}\left(\overline{N_1}, D\right)$$

The real value of gross income can be obtained by[4]

$$G_1 = \frac{\overline{N_1}}{1 - \beta_{11} - \beta_{12}}$$

The previous result shows that if we know the employment income net of taxation and social insurance deduction at source, and the demographic characteristics of the family, we can convert directly ($\overline{N_1}$) to (G_1) without the need to take into account other income components or the definition of the tax unit. The self-employment income declared is, in most of the cases, the gross value net of taxes deducted at source and social insurance contributions ($\overline{N_2}$). This amount corresponds to:

$$\begin{aligned}\overline{N_2} &= G_2 - S_2 - T_2\left(G_2\right)\\ &= G_2 - \beta_{21}\, MW - \beta_{22}\, G_2\end{aligned}$$

S_2 doesn't depend directly on G_2. β_{21} is a binary variable that assumes the value 0.254 if the individual pays social insurance contributions and 0 if he/she doesn't. In the first case the amount is a fixed proportion of the minimum wage. β_{22} is also a flat rate applicable at all self-employment incomes so we can easily obtain G_2 as:

$$G_2 = \left(\overline{N_2} / \left(1 - \beta_{22}\right)\right) - S_2 .$$

In the case of pensions the process of going from declared values to gross amounts is very similar to the one exposed to employment income but without social insurance contributions. Assume that the declared amount of pensions is net of taxes retained at source ($\overline{N_3}$). The pensions effectively received are calculated as:

$$\begin{aligned}\overline{N_3} &= G_3 - T_3\left(G_3, D\right)\\ &= G_3 - \beta_{32}\, G_3\end{aligned}$$

The tax rate used to compute taxes at source (β_{32}) is also published each year by the Government and is a function of the gross income. However, this tax rate is different according to the tax payer's marital status and whether the partner also receives a pensions.

[4] In fact β_{12} also depends on the region where the tax payer lives because the tax rate is different in Portugal, Mainland, Azores and Madeira.

In a similar way it is possible to modify this tax rate in order to obtain it as a function of declared net income, that is:

$$\beta_{32}\left(G_3, D\right) \Rightarrow \beta_{32}\left(\overline{N_3}, D\right)$$

The real value of gross pensions can then be obtained as:

$$G_3 = \frac{\overline{N_3}}{1-\beta_{32}}$$

The forth component of income (property income) is, in most of the cases, subject to taxes deducted at source (T_4):

$$\begin{aligned}\overline{N_4} &= G_4 - T_4\left(G_4\right)\\ &= G_4 - \beta_{42}\, G_4\end{aligned}$$

β_{42} is also a flat rate applicable to all property incomes so we can obtain G_4 easily as

$$G_4 = \left(\overline{N_4} / \left(1-\beta_{42}\right)\right).$$

The previously analysis of how to move from income net of taxation and social insurance deducted at source to gross incomes highlights the possibility of some simplification in the "standard" net to gross model presented in the section 3.

If all income variables of a household that are relevant to the net to gross procedure are recorded net of contributions and taxes retain at source then it's not necessary a full model to obtain the gross components of income. It's possible to obtain each gross income component in a "stand alone" process which is not directly influenced by other components of income.

If recorded incomes are a mixture of "net at source" and "final net" or gross and "final net" we can still simplify the net to gross procedure. The gross components of income, both originally recorded as gross or resulting from the transformation of "net at source", can be used as an input to the model described in Figure 1.

5. EU-SILC income target variables in Portugal

In the first wave of the user dataset of EU-SILC (2004) the Portuguese dataset only present net incomes variables. However, the detailed analysis of the flags associated with those variables, reveals that most of the households (56%) declared a mix of net and gross components of incomes, 37% declared all income components in net form and only 7% declared all income variables as gross. The observation of individual components of incomes shows that, for example, 89% of the recorded data on variable PY010 (Employee cash or near cash income) and 93% of the variable PY100 (Old-age benefits) are originally recorded as net of taxes and social insurance contributions at source.

The methodology followed by the Portuguese Statistical Office to convert all income variables to net was very similar to the one described in the gross to net model presented in section 3.

The main objective of this section is to develop the process of construction of EU-SILC target variables on income in gross and net forms, from the data collected in different forms. At present, we use only the information contained in the user-database disseminated by Eurostat[5]. Clearly the approach can be improved if the methodology of conversion from net to gross will be implemented at a higher level of desegregation of the income variables, using all the relevant information collected in the Portuguese EU-SILC questionnaire.

The process of constructing the target income variables, in both net and gross forms, can be summarized in the following steps:

i. Conversion of all the net incomes in the user-database to the originally registered incomes (net or gross) using the information of the correspondent flags and imputation factors;
ii. Conversion of all individual net recorded incomes into gross incomes using the methodology described in section 4;
iii. Simulation, at individual level, of the social insurance contributions paid by employees, employers and by self-employed;
iv. Construction of the tax-units using all the relevant information from demographic and income variables;
v. Use of the gross to net model presented in section 3 to obtain, for each tax-unit, the tax-unit taxable income, the amount of taxes paid by each tax-unit and the tax-unit tax rate (R);
vi. Simulation of the taxes correspondent to each individual income component using, for all individuals in a tax-unit, the tax-unit tax rate;
vii. Construction of all individual net incomes.

Table 2 presents the main results of the construction of the EU-SILC target income variables. It reports gross and net amounts of all relevant income components and the net-to-gross ratio. It also shows the distribution of income (net and gross) by component.

[5] The only additional information used is the region (NUTs 1) of each household obtained directly in the Portuguese Statistical Office. This information is crucial to the "net-to-gross" model because taxes rates are different in Mainland, Azores and Madeira.

Table 2. EU-SILC target variables: distribution of household income by component

	Mean Income		Ratio net/ gross	% distribution	
	Gross	Net		Gross	Net
Income from work	**17481**	**11335**	**64.8**	**78.0**	**71.0**
PY010 – Employee cash or near cash income	11135	9518	85.5	49.7	59.6
Employer's SI contributions	2972			13.3	
Employee's SI contributions	1376			6.1	
PY020 – Non-cash employee income	66	66	100.0	0.3	0.4
PY050 – Cash benefits or losses from self-employment	1917	1751	91.4	8.6	11.0
Self-employed SI Contributions	16			0.1	
Property Income	**354**	**289**	**81.4**	**1.6**	**1.8**
HY090 – Interest, dividends, profits	98	78	80.0	0.4	0.5
HY040 – Income from rental of a property or land	257	210	82.0	1.1	1.3
Taxable benefits	**3960**	**3735**	**94.3**	**17.7**	**23.4**
PY100 – Old-age benefits	3236	3034	93.8	14.4	19.0
PY110 – Survivor benefits	424	404	95.2	1.9	2.5
PY120 – Sickness benefits	65	64	98.5	0.3	0.4
PY130 – Disability benefits	235	233	99.0	1.1	1.5
Tax-exempt social transfers	**607**	**607**	**100.0**	**2.7**	**3.8**
PY090 – Unemployment benefits	293	293	100.0	1.3	1.8
PY140 – Education-related allowances	34	34	100.0	0.2	0.2
HY050 – Family/children related allowances	211	211	100.0	0.9	1.3
HY060 – Social exclusion	27	27	100.0	0.1	0.2
HY070 – Housing allowances	67	67	100.0	0.3	0.4
HY080 – Regular inter-household cash transfer received	105	105	100.0	0.5	0.7
HY110 – Income received by people aged under 16	8	8	100.0	0.0	0.1
HY120 – Regular taxes on wealth	-68	-68	100.0	-0.3	-0.4
HY130 – Regular inter-household cash transfer paid	-70	-70	100.0	-0.3	-0.4
Total	**22402**	**19564**	**71.3**	**100.0**	**100.0**

Portugal EU-SILC 2004 user-database. Values in euros.

The overall ratio of net to gross income is approximately 71%. The ratio of taxable income varies between 65% for income from work to 94% to taxable benefits. Those differences in the net/gross ratio are reflected in the resulting distribution of net and gross incomes. For example, while gross income from work accounts for nearly 78% of total gross income, it accounts for only 71% when net amounts are considered. In the opposite direction the taxable benefits (mainly pensions) account for a bigger share of total income when we consider net rather than gross amounts.

The figures in the previous table seem quite plausible, though there is no external data available to validate the net to gross ratio at the different components of income. In order to evaluate the impact of tax and social contributions on the income distribution we estimate the shares of gross and net equivalised income by deciles of the distribution. In table 3 incomes are equalised using the modified OECD scale and the deciles are defined using equivalised gross income:

Table 3. Share of total income by decile of income distribution

Decile	Gross equivalised income		Net equivalised income		Net to gross
	Mean	Share	Mean	Share	Ratio
1	2086	1.7	1961	2.2	0.94
2	4113	3.3	3737	4.3	0.91
3	5374	4.3	4618	5.3	0.86
4	6757	5.5	5559	6.3	0.82
5	8143	6.6	6518	7.4	0.80
6	9791	7.9	7499	8.5	0.77
7	11771	9.5	8738	10.0	0.74
8	14644	11.8	10482	12.0	0.72
9	20012	16.2	13817	15.8	0.69
10	40949	33.2	24630	28.2	0.60
Total	**12369**	**100.0**	**8759**	**100.0**	**0.71**

The net to gross ratio varied between 0.94 for the bottom decile and 0.60 for the richest decile. The analysis of the gross and net shares clearly shows the redistributive impact of the tax/social insurance contribution system. The average net to gross ratio, as we have seen in table 2, is approximately 71%.

Table 4 shows the breakdown of gross income into tax and social insurance contributions and net income. For main categories of net income are also presented: income from work; property income; pensions and other transfers. The values are all eqivalised income and the deciles are, as in the previous table, defined using equivalised gross income.

Table 4. Decomposition of gross income by decile of income distribution

Decile	Gross Income	Tax + SICs	Net Income	Income from Work	Property Income	Pensions	Other transfers
	Mean value	Mean value	Mean value	Mean value	Mean value	Mean value	Mean value
1	2086	125	1961	677	41	1035	208
2	4113	375	3737	1297	75	2072	294
3	5374	756	4618	2413	49	1717	439
4	6757	1198	5559	3463	88	1593	415
5	8143	1625	6518	4585	98	1346	490
6	9791	2292	7499	5679	103	1303	414
7	11771	3032	8738	6784	88	1402	465
8	14644	4162	10482	8500	161	1430	391
9	20012	6196	13817	10573	324	2599	321
10	40949	16319	24630	20200	450	3780	200
Total	**12369**	**3610**	**8759**	**6420**	**148**	**1828**	**364**
	%	%	%	%	%	%	%
1	100.0	6.0	94.0	32.4	2.0	49.6	10.0
2	100.0	9.1	90.9	31.5	1.8	50.4	7.1
3	100.0	14.1	85.9	44.9	0.9	31.9	8.2
4	100.0	17.7	82.3	51.3	1.3	23.6	6.1
5	100.0	20.0	80.0	56.3	1.2	16.5	6.0
6	100.0	23.4	76.6	58.0	1.0	13.3	4.2
7	100.0	25.8	74.2	57.6	0.7	11.9	3.9
8	100.0	28.4	71.6	58.0	1.1	9.8	2.7
9	100.0	31.0	69.0	52.8	1.6	13.0	1.6
10	100.0	39.9	60.1	49.3	1.1	9.2	0.5
Total	**100.0**	**29.2**	**70.8**	**51.9**	**1.2**	**14.8**	**2.9**

Transfers account for a major share of total income in the bottom deciles of the distribution. Net pensions account for approximately 15% of total gross income. However, for the 20% poorest part of the distribution they have a share of around 50%. Income from work represents roughly 52% of total gross income.

6. Concluding remarks

We have presented a procedure to create all target income variables in the EU-SILC database exploring the tax and social insurance contribution rules to convert net to gross incomes at component level. This methodology for the conversion between net and gross forms of income will allow the presentation of all income variables in net and gross form, both at individual and household level.

The problem that arises from people declaring "net income at source" as "net income" was discussed. It was demonstrated that although it can introduce real problems in the tax-system model, namely the under/overestimation of taxes/disposable income, if clearly identified the recorded income as "net at source" the process of converting from net to gross can be significantly simplified. If all income variables of a household that are relevant to the net to gross procedure are recorded net of contributions and taxes retained at source then it's not necessary a full model to obtain the gross components of income.

We use the proposed methodology to build all Portuguese income variables using the first wave of the EU-SILC user-database. However, the different procedures implemented could be improved if the net to gross algorithm could be done at a higher disagregation level using the entire information collected at national level.

Although the discussion and the approach followed are based only on the Portuguese data and tax-system rules the methodological issues presented in this paper could be of interest for other countries with similar tax-systems.

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Discussion

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DISCUSSION

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The papers

Once you have the data, what can you do?

- Van Kerm: extreme values at top and bottom
- Papers on weighting, imputation, design effects, etc. (not here)

Aspects of the data per se

- Törmälehto: income from property (rents, interest)
- Frick, Göbel, Grabka: imputed rent, company cars
- Di Marco: self-employment income (Italy)
- Rodrigues: net-gross conversion

Analysis accounting for extreme values

Extreme values can occur at top or bottom; may be 'dirt' or valid but outliers (but you can't usually tell which)

Theoretical literature on non-robustness, and whether even a single rogue observation can make results unreliable (Cowell & collaborators)

Many commonly-used inequality measures not robust (in this sense); poverty measures more robust

PVK paper illustrates these lessons in glorious and salutary detail (and witness skilful use of graphs as compact summary devices)

Clear evidence of prevalence of extreme values

Multiple variations on each of: trimming, Winsorizing, parametric models fit to tails, dropping dodgy sources/obs

Reassuring results:

- Rankings of countries fairly insensitive to choices (but cardinal differences across countries much more sensitive)
- Many of the Laeken indicators relatively robust (but not S80/S20)

More problematic:

- Non-robustness of many measures that academic researchers like (problems with higher order moments)
- Trimming most commonly used, but apparently not the best strategy
- Model fitting + OBRE works well … but hard to explain and implement routinely

Measures of income mobility and poverty dynamics raise similar issues; standard errors are another issue

Property income

Helpful setting out of the issues concerning what property income should actually comprise (cf. SNA93/ESA94, Canberra Group, ILO)

– What are V-MT's own views?

Large cross-country differences in prevalence of non-zero property income, and fraction of that made up of rents rather than interest and distributed profits

Data collection via registers versus surveys: mode effects?

But even among register data countries (Nordics), there are noticeable differences, e.g.:

– DK: large spike < 0, but because net interest not gross – FIN: large spike at €7

Large variation in item non-response rates is worrying: up to 70%, and countries implement own imputation methods

Unit non-response rate varies hugely (10% to 50%!), so returns to investing in weighting including calibration weighting ('raking')?

V-MT asks whether gains from over-sample of high income households to improve coverage, but not argues really feasible in SILC context (SPJ agrees)

Gains from more standardization (SPJ agrees)

Imputed rental income

Clear explanation of the 3 methods of deriving gross IR estimates

- 'rental equivalent' by hedonic regression or cell-based matching/imputation
- 'user cost'/ return on capital
- direct question to respondent

And how to estimate associated costs to convert gross to net Nice illustrations:

- 3 countries using 3 different methods!
  - DK (gross only), mixture of 2 methods
  - FIN (gross only), cell-based matching *but* social tenants' subsidized housing treated as social transfer income

  - FR (net), hedonic regression
- Germany (SOEP), comparing all 3 methods

3 country/method analysis underlines problems: “degree of harmonization achieved is in no way acceptable”!

Germany comparisons relatively reassuring in sense that (a) feasible) and (b) no huge differences in results across methods (equalization), though some small difference with capital market approach

How to achieve greater cross-national harmonisation, taking account of national contexts (e.g. size of unsubsidized private rental market) and data availability?

Should the proposed SILC 2007 implementation go ahead? (Practical problems versus principle)

Non-cash employee income (company car benefits)

Focus on individuals in work (not households)

Large variations in prevalence of such benefits (up to 20%-25% in N, S … but never accounts for > 2% of total compensation

Effects on the distribution small (slightly more unequal), and country inequality rankings unchanged

– Similarly small effect in UK

Self-employment income (Italy)

Interesting illustration of a country-specific approach to measuring a complex (the most complex?) data source

Combine data from tax administration records and survey data (and if obs appears in both, use maximum of the two reported)

- Administrative data link increases number of recipients (up 15.6%), and average value (up 11.9%)
- Greatest divergences between survey and admin arise with employees, “co.co.co”, and “other inactive” (Tables 1-3)
  - Explain definitions more, and elaborate why

More clarification concerning the relative qualities of the different data sets and their ‘comparability’

To what extent can the lessons be generalized beyond Italy?

Learn from these papers

The papers should be compulsory reading for anyone who wishes to do any form of income distribution analysis (especially many academics?)

- NB GiGo principle: data quality matters
- Difficulty of implementing conceptual definitions in practice, especially in cross-national context

- Practical issues of data collection e.g. mode effects
- Missing data (unit and item non-response), imputation and weighting
- Extreme values and other outliers; measurement errors

Beware of painting a picture of total disaster: clarify what can be said reliably (and note progress made)

NB similar issues for measures based on 'consumption'
- Data collection modes, lumpiness of purchases, durables, credit cards…etc.

And non-income measures such as 'deprivation'

Comparability for whom and of what?

For whom: *Eurostat / national statistical agencies* versus research community more generally?

Of what: *income as a LHS variable*, RHS variable, or inputs e.g. to tax-benefit microsimulation?

- The data sets are a major new contribution to the resources available to study income distribution and related issues from a cross-national comparative perspective
- Applaud the spirit of openness of access demonstrated so far, and support every effort to extend this further in future
- Release data sets containing as much 'raw' information as possible, with harmonised variables as subset
- Maximize scope for researchers to explore alternative assumptions

Comparability, from SILC perspective

Clear that best comparability standards not achieved yet in several respects with current EU-SILC-2004 release

Examples from the papers in this session

Unclear to this outsider what steps are in train to improve things

Is full output harmonization an unattainable Holy Grail in any case (and is full input harmonization too - cf. ECHP?)

If so, what can be done given the decisions already taken?

Improvements via …

Enforcement of standards e.g. production of gross or net etc., and

Coordination in development of post-survey adjustment procedures e.g. weighting and imputation methods

Other things?

See VJ Verma's paper for more extensive discussion

Non-income dimensions in EU-SILC

V

Unmeet need for health care in Europe

Xander KOOLMAN

chapter 1

UNMEET NEED FOR HEALTH CARE IN EUROPE

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Abstract

New data (EU-SILC) allows the study of subjective unmet need for examination or treatment. This paper presents new estimates of horizontal inequity in access to medical examination or treatment in fourteen European countries. This concept is closer too access than utilisation. We use a multiple regression approach to study systematic variations in unmet need. The results demonstrate great variation in unmet need during the last 12 months ranging from 1.3% for Denmark up to 13.1% in Sweden. The main reasons for unmet need are costs, waiting lists, watchful waiting and lack of time. Unmet need appeared to be systematically related to non-need characteristics. Income appeared to be most influential, followed by degree of urbanisation, education and being foreign to the country.

1. Introduction

Equitable access to health care is a core objective of most, if not all, western European health care systems. Despite having achieved close to universal coverage for a fairly comprehensive set of health services in most countries in the last decades, there is concern about mounting evidence of violations of these equity objectives. Previous research showed that not all individuals in equal need are using health care equally, and that violations in terms of both quality and quantity of health care are systematically associated with factors such as income, education and region of residence (e.g. Van Doorslaer et al., 2000; 2002, 2004, and 2006).

A striking difference was observed between the utilisation of GP visits and specialist visits, with the higher income groups consuming more of the latter given their health state (Van Doorslaer et al., 2006). This difference appeared to be mostly driven by the initial decision to see a specialist and less so by the decision to follow up. While these differences are often seen as evidence of inequitable treatment of the poor, they might also result from differences in preferences. If people with higher incomes and better education have a stronger preference for the use of specialist visits, then similar health care consumption patterns could result.

New data from the Community Statistics on Income and Living Conditions (EU-SILC) was collected to measure access to health care rather than utilisation. Access was conceptualised as a subjective concept of unmet need for medical examination or treatment during the last 12 months. For our analysis we need to use a subjective measure of access because objective measures might be due to the very differences in preferences that we wish to allow for.

Since the EU-SILC is a survey based on a standardized questionnaire for EU countries it allows a comparison of access between countries. If the respondent experienced unmet need, she was asked a second question about the cause. This second question allows a more detailed analysis of the pathways of unmet need for health care.

2. Concepts and methods

While the subjective unmet need is a comparatively uncommon measure, similar subjective questions have been used before by the Commonwealth Fund, e.g. in its International Survey of Adults' Experiences with Primary Care (C. Schoen et al., 2004). To evaluate whether inferences can be based upon this operationalisation of access we perform some construct validity tests. For these tests we use a priori expectations about relationships between unmet need and other variables. We expect (1) unmet need to be positively related to need and (2) unmet need caused by costs to be negatively related to income. For need we use self assessed health, health limitations age and sex as proxies. Both expectations were testes using logistic regression models.

To achieve horizontal equity in health care, resources should be allocated according to health (Van Doorslaer and Wagstaff, 1993; Wagstaff and Van Doorslaer, 2000). Personal characteristics unrelated to health, such as income, education, degree of urbanisation and being foreign to the country of residence should not affect such allocation. In terms of medical examinations and treatment, this implies that individuals in equal health, but unequal in unrelated or 'irrelevant' characteristics, have unequal probabilities in 'unmet need' for health care.

To test whether the distribution of unmet need was unrelated to these irrelevant characteristics - and equity was achieved - we standardised for health differences. We used sample weighted logit regression, where the dependent variable y equals one if the respondent indicated that she had experienced unmet need, and zero otherwise:

- y = 1 if y* > 0
- y = 0 otherwise

where:

$$y^* = \alpha + \chi^{'} AS + \delta^{'} L + \eta^{'} H + \beta^1 i + \beta^2 e + \beta^3 u + \beta^4 a + \varepsilon^{'} \quad (1)$$

and AS, L and H are the vectors of age-sex interactions, health limitations and self assessed health, i, e, u and a equal the inverse fractional rank of income, education, degree of urbanisation and being foreign to the country of residence, and an error term that is assumed to have a standard logistic distribution. The fractional rank for income is computed using

$$i_i = \tfrac{1}{n}\sum_{1}^{i-1} w_i + \tfrac{1}{2} w_i \quad (2)$$

where w indicates the population weight of individual i. Fractional ranks are thus bounded between 0 and 1. Fractional ranks for group variables are computed similarly using group rather than individual weights.

The advantage of this model specification is that the association of one ‘irrelevant’ variable is evaluated conditional upon need indicators and other irrelevant factors. This prevents irrelevant variables that have no effect on unmet need, to return effects through their correlation with irrelevant variables, and consequently double counting.

We present both relative and absolute differences. Relative differences are presented in odds-ratio’s (OR). The OR of the worst over the best off in society is related to another measure of inequity: the Concentration Index (Koolman and Van Doorslaer 2004; Koolman and Kunst, 2006). The interpretation of the OR for income is the odds of the person with the lowest income indicating unmet need divided by the odds of the person with the highest income. Because the prevalence of unmet need is on average 5% it is acceptable to interpret most of these odds-ratios as relative risks: the risk of the lowest income person indicating unmet need divided over the risk of the highest income person indicating unmet need. Furthermore, the OR is insensitive to the choice of positive or negative outcomes, i.e. inequality in unmet need or inequality in met need. It may also be insensitive to the implicit choice of cut-point/threshold value applied by the respondent if the proportional odds/parallel regression assumption holds (Koolman & Kunst, 2006). The latter can, however, not be tested with the EU-SILC. The slope index of inequality (SII) indicates the absolute difference in indicating unmet need of the highest income person minus that of the lowest income person.

Absolute differences are presented in terms of the Slope Index of Inequality (SII). The SII is computed like an average partial effect. The individual partial effect for income is,

$$\begin{aligned} PE_i &= \Delta P\left(y_i = 1 \mid AS_i, L_i, H_i, i_i, e_i, u_i, a_i\right) / \Delta i_i \\ &= \frac{\exp\left(\alpha + \chi^{'} AS + \delta^{'} L + \eta^{'} H + \beta^1 + \beta^2 e + \beta^3 u + \beta^4 a\right)}{1 + \exp\left(\alpha + \chi^{'} AS + \delta^{'} L + \eta^{'} H + \beta^1 + \beta^2 e + \beta^3 u + \beta^4 a\right)} \\ &- \frac{\exp\left(\alpha + \chi^{'} AS + \delta^{'} L + \eta^{'} H + \beta^2 e + \beta^3 u + \beta^4 a\right)}{1 + \exp\left(\alpha + \chi^{'} AS + \delta^{'} L + \eta^{'} H + \beta^2 e + \beta^3 u + \beta^4 a\right)} \end{aligned} \quad (3)$$

Then the SII for income is given by the sample weighted mean of all partial effects

$$SII = \frac{1}{n}\sum_i \Delta P\left(y_i = 1 \mid AS_i, L_i, H_i, i_i, e_i, u_i, a_i\right) / \Delta i_i$$
$$= \frac{1}{n}\sum_i w_i \left\{ \frac{\exp\left(\alpha + \chi' AS + \delta' L + \eta' H + \beta^1 + \beta^2 e + \beta^3 u + \beta^4 a\right)}{1 + \exp\left(\alpha + \chi' AS + \delta' L + \eta' H + \beta^1 + \beta^2 e + \beta^3 u + \beta^4 a\right)} - \frac{\exp\left(\alpha + \chi' AS + \delta' L + \eta' H + \beta^2 e + \beta^3 u + \beta^4 a\right)}{1 + \exp\left(\alpha + \chi' AS + \delta' L + \eta' H + \beta^2 e + \beta^3 u + \beta^4 a\right)} \right\} \quad (4)$$

For non-parametric statistical inference we bootstrapped both OR's and SII's and constructed percentile based confidence intervals, for which we used 2000 replications based on 2000 resamples of the complete sample size (Efron and Tibshirani, 1994).

3. Data

The data was taken from the Community Statistics on Income and Living Conditions (EU-SILC) conducted by EUROSTAT. The EU-SILC is a survey based on a standardized questionnaire for EU countries and is an instrument aiming at collecting comparable cross sectional and longitudinal multidimensional micro data on income poverty and social exclusion. This instrument is anchored in the European Statistical System (ESS).

EU-SILC was launched in 2004 in 13 member states plus Estonia, Norway and Iceland. Every year, in a representative panel of households, all individuals aged 16 years or older are interviewed on their demographic characteristics, income, social exclusion, housing, education, labour market behaviour, health. We used cross sectional data from the first release of fourteen EU countries: Austria, Belgium, Denmark, Estonia, Finland, France, Greece, Ireland, Italy, Luxembourg, Norway, Portugal, Spain and Sweden (E-14).

Access to health care was measured using the concept of unmet need for medical examination or treatment during the last 12 months. There were two answer categories possible: yes, there was at least one occasion when the respondent really needed examination or treatment but did not receive it; no, there was no occasion when the respondent really needed examination or treatment but did not receive it. If the respondent indicated that her need was unmet then the respondent was asked to indicate the reason for this instance of unmet need by indicating one of the following categories: could not afford to (too expensive); waiting list; could not take time because of work, care for children or for others; too far to travel/no means of transportation; fear of doctor/hospitals/examination/ treatment; wanted to wait and see if problem got better on its own; didn't know any good doctor or specialist; other reasons.

We selected four non health care need variables, which we labelled irrelevant variables. These variables were: income, education, degree of urbanisation and being foreign to the country of residence. For income we used aggregated household income that was equivalised for household composition using the modified OECD equivalisation scale. Education was measured using the six category 1997 ISCED scale: pre-primary education primary education, lower secondary education, (upper) secondary education, post-secondary non tertiary education, first stage of tertiary education (not leading directly to an advanced research qualification) and second stage of tertiary education (leading to an advanced research qualification) (UNESCO, 1997). For the construction of the fractional rank we used all categories. Degree of urbanisation is measured using the Labour force survey (LFS) 1998 categories: densely populated area, intermediate area, thinly populated area. The variable foreign to the country of residence is constructed using country of birth information in three categories: born in same country, born in any European union country except country of residence and born in any other country.

4. Results

We tested construct validity by studying the relationship between unmet need and need and 'unmet need due to costs' and income. Unmet need appeared significantly related to need in all countries. 'Unmet need due to costs' was significantly and negatively related to income in all countries[1].

Table 1 presents the original sample size and the analysis sample size based on complete cases. For Denmark, Finland Norway and Sweden the total sample is constructed from two separate samples and health questions were not asked all respondents. Descriptive information about the non-need characteristics is based upon the analysis sample that was sample weighted to make it more representative for the population.

For income we list the average equivalised household income in euros. These vary more than a tenfold between Luxembourg (€ 31417) and Estonia (€ 3074), but purchasing powers are likely to vary much less. Gini estimates vary between 0.23 for Denmark and Sweden to 0.38 for Portugal. The European member states are also show substantial variability in average educational attainment with 0 percent of the Danish and 60 percent of the Portuguese people indicating primary or lower secondary level education only. Similarly, we observe great differences in the population shares living in thinly populated areas. The vast majority of people in most EU member states are born in the country of residence. Two exceptions are notable: Estonia with a relatively large share of Russians and Luxembourg with a large share of people from other member states.

Table 1. Descriptives

			Income		Education			Urbanisation			Birth country		
	N	N analysis	Mean	Gini	Pri mary	Secon dary	Higher	Thinly	Inter Medi ate	Den sely	Out EU	EU born	Local
Belgium	10146	9962	16924	0.27	0.22	0.49	0.29	0.04	0.42	0.54	0.06	0.05	0.89
Denmark	13584	6369	24774	0.23	0.00	0.78	0.22	0.37	0.29	0.34	0.04	0.02	0.95
Greece	13996	13996	9824	0.34	0.39	0.41	0.20	0.17	0.17	0.65	0.06	0.02	0.92
Spain	31368	30222	11317	0.32	0.31	0.47	0.22	0.28	0.21	0.51	0.03	0.01	0.95
Estonia	8906	8588	3074	0.35	0.06	0.62	0.31	0.52	0.00	0.48	0.20	0.00	0.80
France	19315	19239	18155	0.29	0.33	0.48	0.19	0.17	0.35	0.48	0.08	0.04	0.87
Ireland	11006	10902	20176	0.32	0.25	0.46	0.29	0.38	0.27	0.35	0.02	0.07	0.91
Italy	51911	51901	15488	0.32	0.30	0.59	0.12	0.19	0.40	0.42	0.04	0.01	0.95
Luxembourg	7603	7477	31479	0.26	0.31	0.48	0.21	0.20	0.33	0.48	0.07	0.30	0.63
Norway	12110	6028	30041	0.26	0.02	0.72	0.26	0.32	0.18	0.50	0.04	0.03	0.93
Austria	9263	9157	19192	0.26	0.09	0.68	0.23	0.40	0.25	0.36	0.07	0.07	0.86
Portugal	11698	11698	8487	0.38	0.60	0.29	0.10	0.25	0.31	0.43	0.05	0.02	0.94
Finland	22754	10806	20067	0.29	0.23	0.51	0.26	0.53	0.18	0.30	0.01	0.01	0.97
Sweden	11373	5572	18691	0.23	0.15	0.53	0.31	0.64	0.14	0.22	0.06	0.05	0.89

All estimates are population weighted except for Gini.

[1] Detailed results can be obtained through the author.

Table 2 shows the estimated percentage of people in each country that experienced unmet need during the last 12 months preceding the interview. The average percentage of unmet need in each of the EU-14 countries is 5.2 percent. The figures vary between member states from 1.3 percent for Denmark to 13.1 percent fro Sweden. Reasons for unmet need are listed on the right hand side of "Unmet need". The figures show the percentage contribution of each of the causes to unmet need. Cost appeared to be the most important cause on average while waiting lists, lack of time, and watchful waiting also cause a large share of the unmet need.

Table 2. Unmet need for medical examination or treatment; percentages and percentage contribution of each cause

	Unmet need	Too expensive	Waiting list	No time	Too far	Fear	Watchful waiting	No good doctor	Other
Belgium	1.97	64	1	13	0	4	13	1	5
Denmark	1.32	16	11	4	0	0	18	2	49
Greece	5.26	58	7	7	10	5	9	0	2
Spain	6.76	7	32	28	4	3	11	2	12
Estonia	10.67	34	27	5	6	2	5	8	14
France	4.69	31	5	18	1	12	23	1	9
Ireland	2.37	50	24	5	2	2	9	0	7
Italy	7.66	47	20	3	1	4	10	1	13
Luxembourg	5.03	6	2	12	1	8	23	2	45
Norway	2.63	23	3	0	35	2	3	5	28
Austria	1.95	19	10	25	2	5	15	1	21
Portugal	5.39	64	17	8	1	3	4	1	3
Finland	4.56	30	38	0	1	0	3	0	27
Sweden	13.09	5	14	9	1	2	45	4	20

Systematic variations in unmet need with non-need characteristics are presented in Table 3. The SII's report the difference in probability of reporting unmet need between the individual with the highest en the individual with the lowest income. The SII's for income are all negative – except for Norway - indicating that the lower income groups have a higher probability of reporting unmet need. The majority of countries – 9 out of 14 - showed significant SII's for income and Estonia and Italy shows the highest income related difference in unmet need. The OR's for income show the odds of the lowest income person indicating unmet need over the odds of the highest income person indicating unmet need. Belgium appeared to have the greatest relative inequality. Education and country of birth do not pick up significant variation in most countries.

Table 3. Systematic variation in unmet need

	Income		Education		Degree urbanisation		Country of birth	
	SII	OR	SII	OR	SII	OR	SII	OR
Belgium	-0.03	5.25	-0.01	1.58	-0.01	1.33	0.00	1.01
Denmark	-0.01	2.67	0.00	1.30	0.01	0.37	0.02	0.23
Greece	-0.06	3.63	0.00	1.06	0.03	0.57	-0.01	1.35
Spain	-0.01	1.14	0.00	1.06	0.03	0.62	-0.03	1.55
Estonia	-0.10	2.91	0.02	0.83	0.07	0.45	0.00	0.95
France	-0.05	2.99	0.00	1.07	0.03	0.56	-0.01	1.22
Ireland	-0.01	1.85	0.00	1.25	0.01	0.57	-0.02	2.28
Italy	-0.08	3.43	0.00	1.07	0.03	0.67	0.00	1.05
Luxembourg	-0.02	1.52	0.03	0.52	-0.04	2.41	-0.01	1.25
Norway	0.01	0.69	0.01	0.74	-0.01	1.56	-0.05	6.92
Austria	-0.01	1.98	0.00	0.93	0.01	0.47	0.01	0.76
Portugal	-0.04	2.51	-0.05	3.06	0.00	0.93	-0.02	1.46
Finland	-0.04	3.03	-0.01	1.38	0.02	0.66	-0.01	1.16
Sweden	-0.03	1.36	0.03	0.74	-0.01	1.10	-0.13	3.54

Bold fonts indicate statistical significance (p>.05)
OR: odds ratio of fractional rank
SII: slope index of inequality or average partial effect of fractional rank
These results are corrected for age, sex, self assessed health and health related limitations.

Educational inequalities are smaller than their income counterparts and not statistically significant, except for Portugal. In that country the lowest educated person is 5% more likely to report unmet need compared to the highest educated person. The SII for degree of urbanization shows that people in more urban areas are more likely to report unmet need in for 11 countries. However, results were statistically significant in only six of these countries. For country of birth results are mostly insignificant. The exceptions are Norway and Sweden, where citizens born out of the EU had a significant and comparatively large greater probability of reporting unmet need compared to natives.

5. Discussion

Unmet need for examination or treatment in the EU-SILC is measured subjectively. This makes the measure more attractive as an operationalisation of access because it allows for differences in preferences. While the results from our limited construct validity tests are conform expectations, surprisingly consistent across countries and thus supportive, they should not be taken for evidence of inter country comparability of the observed levels of unmet need.

Previous studies into inequity in access often used utilisation as a proxy for access (Van Doorslaer et al., 2000; 2004; 2006). The use of utilisation may have resulted in biased estimates, because health care preferences may vary systematically with factors included in the study. This paper presents new estimates of horizontal inequity in access based on new European data. The new Community Statistics on Income and Living Conditions (EU-SILC) allows the study of subjective unmet need for medical examination or treatment. This concept is much closer to access than utilisation, and may therefore provide more valid measurements of inequity in access.

We found that 5.2% op the people in the sample countries claim unmet need for medical examination or treatment during the last 12 months. Unmet need for medical examination or treatment during the last 12 months varied between 1.3% of the population for Denmark and 13.1% of the population for Sweden. Costs of care were the most important reason provided for unmet need, followed by waiting lists, not enough time and watchful waiting.

While unmet need in itself could indicate problematic access, it is often qualified as inequitable if it is concentrated among particular groups in society. We therefore focussed on the relationship between unmet need and a selection of non-need factors: income, education, degree of urbanisation and being foreign to the country of residence. Unmet need is for all countries (strongly) concentrated among the lower income households and to a lower degree explained by degree of urbanisation, income and being a foreigner. Based on the results from the RAND health insurance experiment (Newhouse, et al., 1993) it is likely that these obstacles to access have adverse consequences for the health of the poor with chronic conditions. However, as the causes for inequity vary dramatically from country to country, policies to address these inequities may well be equally diverse.

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“Material deprivation and poor housing”

What can be learned from the EU-SILC 2004 data?
How can EU-SILC be improved in this matter?

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chapter 2

eurostat

"MATERIAL DEPRIVATION AND POOR HOUSING"

WHAT CAN BE LEARNED FROM THE EU-SILC 2004 DATA?

HOW CAN EU-SILC BE IMPROVED IN THIS MATTER?

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Abstract

European Union (EU) Heads of State and Government endorsed common statistical indicators of social exclusion, that are an essential element in the Open Method of Co-ordination to monitor progress of Member States in the fight against poverty and social exclusion. This list of common indicators has a primary focus on indicators of relative income poverty.

This paper aims to compare poverty picture that can be drawn on the basis on this relative monetary approach, with an alternative view based on material deprivation measures, more "absolute" and multidimensional. Material deprivation is defined as the enforced lack of a combination of items depicting material living conditions, such as housing conditions, possession of durables, capacity to afford basic requirements. It is worth highlighting that the proposed indicators are not indices of social exclusion that take account of all the dimensions of the phenomenon (i.e. health, education, social participation, etc). They are simply intended to offer synthetic information on material living conditions in an enlarged Union. The use of such complementary measures is indeed particularly meaningful in the context of the enlarged union as questions are raised concerning the ability of the existing portfolio of common indicators to satisfactorily reflect the situation in New Member States, Acceding and Candidate countries, as well as differences between them and the 'old' Member states.

This paper discusses the methodological options for the construction of this type of indicators, drawing from the existing literature, and presents some results on the basis on the new harmonised micro data 2004 EU-SILC. Furthermore, a methodology to assess the EU-SILC target variables on material deprivation will be proposed in order to make survey variables able to give a better overview on material deprivation in the enlarged Europe.

1. A new source on Income, Poverty and Social Exclusion…

During the reference period 1994-2001 the European Community Household Panel (ECHP)[1] has traditionally been the primary source of data used for the calculation of these indicators in the field of Income, Poverty & Social Exclusion. Given the need to update the content of the ECHP in order to satisfy new political demands, to reflect evolving best practice and to improve operational quality, i.e. mainly the timely publication of the data which is produced, it was decided to replace the ECHP and to introduce a legal act for its replacement, the EU-SILC (Community Statistics on Income and living Conditions, see annex C). The EU-SILC project was launched in 2003 on the basis of a 'gentleman's agreement' in six Member States (Belgium, Denmark, Greece, Ireland, Luxembourg, and Austria) as well as in Norway. The starting date for the EU-SILC instrument under the Framework Regulation of the European Parliament and of the Council was 2004 for the EU-15 (with the exception of Germany, Netherlands and the UK who have derogations until 2005) as well as for Estonia, Norway. The New Member States with the exception of Estonia are allowed to start in 2005[2].

This means that, for the first time, SILC-2004 is available on a larger basis (13 Member States + Norway) and makes it possible to test whether the results on poverty and deprivation that were previously highlighted on the ECHP data are confirmed by the new instrument. Furthermore, for the first time, comparable and harmonised data are available for one of the new Members States (Estonia) and will permit to study and compare living conditions information with the information usually presented for EU15 Member States.

2. What can be learned from material deprivation measures?

At the Laeken European Council in December 2001, European Union (EU) Heads of State and Government endorsed a first set of 18 common statistical indicators of social exclusion and poverty that were later refined by the Indicators Sub-Group of the Social Protection Committee. These indicators are an essential element in the Open Method of Co-ordination to monitor progress of Member States in the fight against poverty and social exclusion.

In the current list of common (EU) indicators of poverty and social exclusion to be used in the context of the Open Method of Coordination on social inclusion, there is a primary focus on indicators of relative income poverty, defined in relation to the distribution of income within each country. "An absolute notion is considered as less relevant for the EU for two basic reasons. First, the key challenge for Europe is to make the whole population share the benefits of high average prosperity, and not to reach basic standards of living, as in less developed parts of the world. Secondly, what is regarded as minimal acceptable living standards depends largely on the general level of social and economic development, which tends to vary considerably across countries"[3].

Nonetheless, questions are raised concerning the ability of the existing portfolio of indicators to satisfactorily reflect the situation in New Member States, Acceding and Candidate countries, as well as differences between them and the 'old' Member states. When comparing national situations in an enlarged Union, the performance in terms of exposure to relative monetary poverty is very similar between old and new Member States even though standards of living are extremely different, as can be seen for example from a comparison of the levels of the national at-risk-of poverty threshold values. An illustration of this diversity of living conditions can also be given by some partial evidence available about

1 See annex A1.

2 The implications of this means that the first set of micro data and cross-sectional indicators from EU-SILC which covers all the EU25 Member States will only be available in December 2006.

3 European Commission (2004).

material deprivation in the New Member States and the Acceding and Candidate Countries[4]. Around 30% of people would like to have a car but cannot afford it (referred below as 'enforced lack') in most of the New Member States and Acceding and Candidate Countries, except in the Czech Republic (19%) and Cyprus, Malta, Slovenia that are close to the EU15 average (5%). The diversity of deprivation across the EU25 is even more striking in the access to basic necessities, as the proportion of people that cannot afford a meal with meat, chicken or fish every second day (if they so wished) is close or above 30% in five out of the ten New Member States and is even more widespread in the Acceding and Candidate Countries (the EU15 average being 4%). The proportion of people lacking an indoor flushing toilet is around 20% in Baltic Countries, i.e. more than 4 times the most deprived EU15 country (Portugal).

These figures highlight the need to complement the information provided by indicators of relative monetary poverty, in order to give a more complete picture of the living conditions of people in different national contexts, but this is not the only reason. Even at national level, it is now well recognized that different approaches to poverty measurement, including the material deprivation one, are useful to take into account the different aspects of poverty.

It could be argued that figures concerning material living conditions solely reflect differential access to resources and/or subjective consumer tastes and preferences – and that monetary income measures are consequently a better proxy for measuring living standards, while being easier to collect. However, income and resources, whilst clearly linked, are not the same thing: other individual resources matter in addition to income (eg. assets/debts, previous labour positions or non-cash transfers). In addition, it is not always possible to measure income accurately, especially for some groups of the population like for example the self-employed or for people working in the grey economy. In this case, the joint analysis of relative income poverty measures and material deprivation indicators can be useful. Furthermore, in the (current) absence of longitudinal data on income (due to the launch of a new survey), lack of essential durables or difficulties in payments provides a good proxy of persistent poverty since they reflect absence of sufficient (permanent) resources rather than of adequate current income.

This paper discusses the methodological options for the construction of this type of indicators, drawing from the existing literature, and presents some results on the basis on the new harmonised micro data 2004 EU-SILC. Furthermore, a methodology to assess the EU-SILC target variables on material deprivation will be proposed in order to make survey variables able to give a better overview on material deprivation in the enlarged Europe.

The development and use of material deprivation indicators is currently being discussed by the Indicators Sub-Group of the Social Protection Committee, with a view to further refining and consolidating the original list of common indicators adopted at Laeken. No clear agreement has yet been reached on them although a lot of progress has been made.

3. How to define material deprivation?

In this paper, material deprivation is defined as the *enforced lack* of a combination of items depicting material living conditions, such as housing conditions, possession of durables, and capacity to afford basic requirements. It is worth highlighting that the proposed indicators are not indices of social exclusion that take account of all the dimensions of the phenomenon (i.e., access to the labour market, health, education, social participation, etc). They are simply intended to offer synthetic information on *material* living conditions in an enlarged Union.

[4] Data from European Quality of Life Survey, 2003 (European Foundation for the improvement of living and working conditions).

To be chosen as a 'lifestyle deprivation' item, an item should ideally meet the following requirements[5]:

(1) it reflects the lack of an ordinary living pattern common to a majority or large part of the population in the European Union and most of its Member States;

(2) it allows international comparisons (i.e., it should have the same information value in the various countries, and not relate specifically to a 'national' context);

(3) it allows comparisons over time

(4) it is responsive to changes in the level of living of people.

Obviously, the availability and quality of the data is another important constraint that needs to be taken into account.

The first criterion relates to the degree of penetration of the item in the society. Townsend (1979) defined deprivation as the lack of socially-perceived necessities. Ideally, information on social perceptions about which items are considered as essential by the majority of the population should guide our choice. In the absence of such information, frequency controls on existing data that inform us about the degree of penetration of the items within a given country are taken as an indication of that country's preferences and social values.

The second criterion relating to comparability between countries is key to our methodological choices, as it can be applied more or less stringently. It can be argued that comparison of deprivation between countries does not require that each item has the same social value in each country. We could even imagine that different items are chosen in each country, as far as the information value contained globally in the basket of retained items measures the same thing, as is done in temporal consumer price indices[6]. However, the use of a harmonised database with a limited set of variables prevents the feasibility of this approach. A country-specific weighting applied to the same set of items allows taking into account specific national hierarchy between items and specific behaviours or situations (see below).

The question of the temporal adequacy of the choices of the items is an essential one and can be linked to the fourth criterion as well. It is important to have in mind that the list of material deprivation items will need to be assessed regularly in order to ensure that they are representative of up-to-date consumption patterns in all Member States. On the occasion of the next revision of the EU-SILC regulation, there will be an opportunity to review some of the target variables and thus to adjust the list of deprivation items.

4. What can be learned on material deprivation from the EU-SILC 2004 data?

On the basis of items available in EU-SILC, and applying as far as possible, the criteria explained in the previous section, a list of items was chosen in order to illustrate material deprivation and poor housing in EU (see Figure 1).

Once this list of items chosen, a detailed presentation of deprivation shares for each single item could be considered as illustrative (see in statistical appendix Table A) but remains too detailed, making it hard to draw a comprehensive picture of deprivation in each country. To simplify the interpretation of the information available in the list of items and also to highlight any different patterns of deprivation determinants in different countries, it is useful to cluster the items in a limited number of dimensions of lifestyle deprivation. The logic of this approach is that the items should be used as indicative of their underlying dimension, more than measures of themselves. The information will therefore be aggregated

[5] These criteria are a revised version of those proposed in Eurostat (2000). Some of them show clear filiations with the seminal work on material deprivation of Townsend (1979) and Mack and Lansley (1985).

[6] This approach is for example followed in INSEE (2005).

by dimension, but the aggregation process will be stopped at the dimension level, as the construction of one single composite multidimensional indicator would lack transparency and homogeneity.

To do so, some technical choices have to be made. We can group items together according to the 'meaning' of their underlying characteristics on the basis of subjective criteria (for example all housing items together) or empirically through data analysis. Factor analysis is one technique that can be used to regroup a wide range of variables into a smaller number of dimensions. However, this technique is sometimes criticised (see for example McKay and Collard, 2003) as there is a certain degree of arbitrariness in the choice of items and the number of factors. Furthermore, as it is data driven, different solutions can be obtained from different samples or from the same sample over time. Despite such limitations, factor analysis remains a useful tool for exploring the underlying structure of data and was widely used, for example in ECHP data.

A first advantage of having access to the results of the new survey (EU-SILC) for 12 EU-15 Member States (plus Estonia and Norway) is to check the consistency of the results obtained through factor analysis between the new survey and the old one (ECHP). This can be done through confirmatory factor analysis (CFA) on the SILC-2004 data.

In an exploratory factor analysis (EFA), the structure of the latent factor model or the underlying theory is not specified a priori; rather data are used to reveal the structure of the factors. This technique was used to explore ECHP data and to highlight the dimension structure used in different ECHP publications[7]. In CFA, on the other hand, the precise structure of the factor model is assumed and tested. At this stage, the confirmatory approach is far more powerful than the exploratory one, as it allows for hypothesis testing of the factor structure adequacy that is planned to be used in the deprivation domain at the EU-level. A confirmatory factor analysis was then performed on available EU-SILC data and showed the consistency of the dimension structure highlighted on the ECHP. Following the dimension structure highlighted through factor analysis, the items are grouped in three dimensions, relating to 'economic strain', enforced lack of durables and housing, as presented in Figure 1.

Note also that factor analysis is usually based on Pearson correlations. However, there may be problems with using the Pearson correlations, for these assume that the variables are continuous and normally distributed. If the variables are discrete and even dichotomous, important categorization errors can result (see Dekkers (2003), page 6). Tetrachoric correlations could be more adapted to the binary nature of data used. To evaluate the sensitivity of our results to the correlations used, we followed Dekkers (2003) and used the matrix of tetrachoric correlations as the input for the CFA[8]. Results appeared to be robust. Table D, in annex, presents the fit statistics of the CFA, which are reasonably high and confirm that a structure in 3 dimensions can be accepted by the data, either when the CFA is performed country by country or on the pooled data. Oblique rotation was applied, implying the hypothesis that the dimensions are correlated. Table E, in annex, presents the covariance between dimensions, showing that being deprived in one dimension is positively correlated with deprivation in other dimensions. The highest correlation is between the economic strain and durables dimensions (0,8).

As also presented in Annex D, information on economic strain and durables could also be combined with little loss of information and gain in simplicity[9]. This solution can not be rejected by the data analysis and offers the advantage in an EU context of presenting only two aggregations, one based on a larger set of commodities and activities whose access is

7 The approach adopted here builds upon earlier work; see for example Callan, Nolan, Whelan (1993); Whelan, Layte, Maitre (2001); Eurostat (2003), Guio (2005b).

8 It has to be noted that estimators will be consistent, although the standard errors as well as the chi-square tests will be inconsistent.

9 As proposed in Atkinson, Cantillon, Marlier, Nolan (2005).

linked to the financial strain encountered by the household, the other depicting the housing conditions (housing comfort and housing facilities). The two- and three-factors solutions are alternatively used in this document.

Figure 1. Dimension structure

Items	Dimension	
Could not afford (if wanted to): - One week annual holiday away from home - Arrears (mortgage or rent, utility bills or hire purchase instalments) - Afford a meal with meat, chicken or fish every second day - Afford to keep home adequately warm - Capacity to face unexpected expenses	Dimension 1 Economic strain	Strain + Durables
Enforced lack of: - Colour TV - Telephone - Personal car - Washing machine	Dimension 2 Durables	
Characteristics of dwelling: - Leaking roof, damp walls/floors/foundations, or rot in window frames or floor - Accommodation too dark - Bath or shower in dwelling - Indoor flushing toilet for sole use of the household	Dimension 3 Housing	

Notes: Similar items are not fully identical between the ECHP and EU-SILC. For example, the housing conditions items (Leaking roof or damp walls/floors/foundations or rot in window frames or floor) initially surveyed in three separate questions in the ECHP are now surveyed in a single question. The questions in difficulties of payments are surveyed in 3 questions in EU-SILC instead of 4 in the ECHP. The enforced lack of a telephone takes into account the mobile phone in EU-SILC.

Note that the dimension structure is not directly comparable to the one used in Guio (2005), due to the inclusion of two new EU-SILC variables (Capacity to face unexpected expenses and washing machine).

The *economic strain dimension* focuses mainly on affordability of some aspects of living standards (meal, home warm and holidays). Note specifically that, even if it can be discussed whether the enforced lack of holidays has to be considered as a social necessity in Europe, this item is highly correlated with the other constitutive items of the 'economic strain' dimension and appears as a good proxy of financial constraints. The items relating to the affordability to keep the home adequately warm is not perfectly comparable between countries in the 2004 survey. Some countries focused more on the *capacity* to keep the home warm instead of the *affordability* to do so.

For *durables*, the surveys permit to distinguish between lack of items (due to choice) or *enforced* lack of items (people would like to possess the items but cannot afford them). Only this latter group was considered as reflecting "deprivation", in order to exclude lifestyle preferences from the concept of deprivation. In doing so, we focus on items whose absence is attributed to limited resources rather than differences in taste and constraints such as ill health, location etc. It must however be kept in mind that individuals' expectations as to their material well-being tend to increase with income and to decrease with long term poverty (the so-called "adaptive preferences") and as a consequence poor people may declare not to need the goods they lack more often than wealthier individuals. Furthermore, people may not want to admit not being able to afford buying certain items. Therefore, it cannot be excluded that psychological phenomena or measurement issues introduce 'noise' in the measure of enforced lack of item. However, when possible, restricting our analysis to the enforced lack of items appeared crucial to focus on material deprivation. These questions are related to the more general question of choices and preferences. It cannot be excluded that people might choose in priority a pattern of consumption not considered as essential by the analysis and can not afford the list of items retained[10].

Some items available in the surveys are based on *subjective information* of the respondent. On the one hand, subjective questions can be culturally influenced and require caution in international comparison; and the aforementioned "adaptive preferences" also need to be kept in mind. On the other hand, social exclusion influences and is influenced by the perceptions of people, not only by "objective" rules or external judgement on a person's situation. Dropping the subjective items, as a choice of principle, might lead to a measure disconnected with the reality as lived and perceived by people. This could especially be the case if the list of "concrete" items that we think people should be able to afford is not well adapted to the social preferences of the society and their evolution.

The potential criticisms of including subjective items holds true, to a certain extent, for the majority of deprivation items presented in this paper, but the subjective element is probably predominant in some variable like the subjective assessment of the people own economic situation (as the item related to the ability "to make ends meet"). It was therefore decided not to use such item, but to test the inclusion of a new EU-SILC variable on the "Capacity of the household to face unexpected required expenses" (as this variable does not depend on the consumption goals, even in case of adaptive preferences, and is only weakly influenced by the psychological state and the cultural background of individuals).

From SILC 2005, this variable is based on a harmonised definition, however, the adequate definition could not be applied from 2004. Specially, in Estonia, for the first survey year, instead of defining the amount of the unexpected expense as the monthly poverty threshold (1600 kroons), a lower amount (1000 kroons) was chosen as a reference. This therefore underestimates the proportion of people deprived in Estonia and will be corrected in next data collections.

A shortage of space item was constructed on the basis of the ratio between the number of people in the household and the number of rooms in the dwelling. As in the ECHP, the factor analysis shows that this item is poorly correlated with the other items in the list (and tends to be weakly loaded to the economic strain dimension). This item is therefore not included in the set of housing items discussed in this paper but will eventually be included in the next versions of the indicators, as most of the Member States consider this information as a crucial one.

Among deprivation items available in the database, *environmental* information (like reports of vandalism, crime or pollution) could have been integrated in the analysis. The factor analysis showed clearly that these items are grouped together in one separate dimension, not mixed with the housing one. However, data analysis revealed no systematic relationship between poverty and these items or between other dimensions and the environmental one, as such problems can reflect urban social problems that can affect the whole society rather than just the poorest groups.

4.1. Some simple results

On the basis of deprivation proportions (see Table A and B in statistical appendix), we can consider a person as deprived in each dimension if he/she lacks at least a minimal number of items. Although arbitrary, this approach permits the computation of deprivation rates in each dimension. This type of indicator has the advantage of transparency and furthermore takes into account the accumulation of deprivations at individual level. Note also that the value of these measures depends on the total number of items taken into account in the dimension. The larger the number of items, the higher the probability to be deprived.

[10] See for example INSEE (2005) and Willitts M. (2006).

Table 1 presents the share of the population affected by at least 2 problems in the economic strain dimension, lacking at least 1 durable, suffering from at least 2 problems in the combined strain/durables dimension and from at least one housing problems[11].

Table 1. Share of people affected by material deprivation in each dimension

People lacking:	AT	BE	DK	EE	ES	FI	FR	GR	IE	IT	LU	NO	PT	SE
Economic strain (at least 2 out of 5 items)	16	22	11	28	32	18	33	39	16	27	8	10	44	11
Durables (at least 1 out of 4 items)	6	9	10	34	7	10	11	13	11	5	1	6	16	6
Econ. Str. + dur. (at least 2 out of 9 items)	17	24	14	44	33	21	34	42	19	28	9	12	46	13
Housing (at least 1 out of 4 items)	14	23	12	46	29	9	22	24	17	27	20	11	39	9

Source: Eurostat, EU-SILC survey year 2004. Reference population: people aged 0+. Figures are rounded.

The figures presented in Table 1 show large variations across countries in terms of the share of people affected by problems of material deprivation, depending on the dimension.

In the economic strain dimension, around 10% of the population suffers from at least two problems in Denmark, Luxembourg, Norway and Sweden, whereas the share is much higher –40% and over - in Portugal or Greece.

In the durables dimension, the enforced lack affects a smaller proportion of the population ranges from 1% in Luxembourg to 34% in Estonia. The deprivation in the durables dimension is mainly influenced by the enforced lack of a car (see Table A in statistical appendix).

In terms of housing deprivation, the proportion of people facing at least one housing problems ranges from 9% (FI, SE) to 46% in Estonia; it is 39% in Portugal.

4.2. Comparison between income poverty and material deprivation

In order to illustrate analysis that can be performed on the basis of deprivation indicators, Figure 2 compares the proportion of people deprived in the combined strain/durables dimension, with the monetary poverty risk, by country[12].

In the least deprived countries (LU, NO, SE, DK, AT), the deprivation rate is comparable to the poverty risk rate and conversely, the most deprived countries (PT, EE, GR, FR[13], ES, IT) face deprivation far higher than their poverty risk levels. This would mean that measuring poverty and social exclusion through material deprivation indicators based on a common set of items independently of their distribution across the population (contrarily to a relative measure) shows a much greater diversity of national situations than would be inferred on the basis of the relative poverty risk indicator.

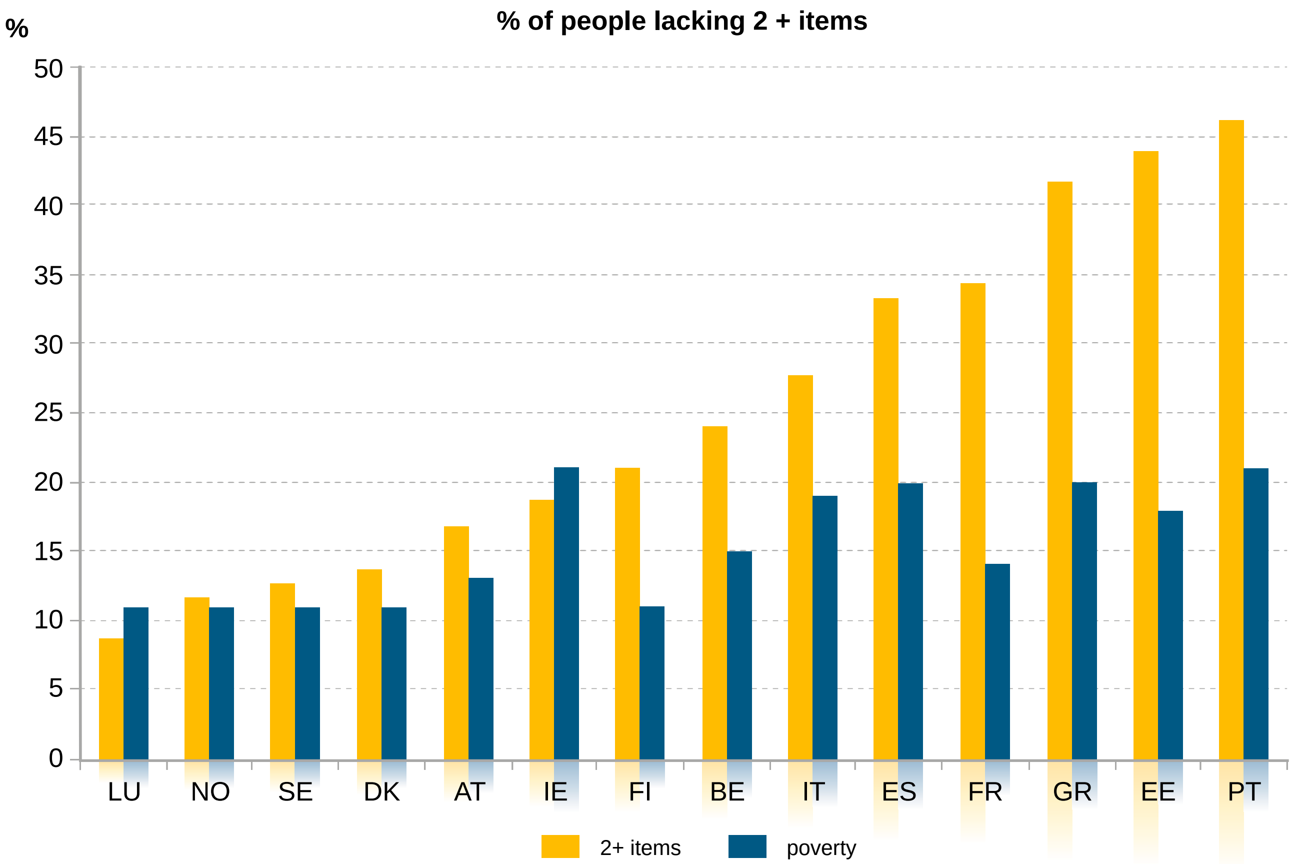
[11] Note that these figures are not directly comparable to the one presented in Guio (2005b), due to the inclusion of the two new EU-SILC variables (Capacity to face unexpected expenses and washing machine).

[12] Estonian microdata were only validated in February 2006 and were not used to produce official indicators for Open Method of Coordination (still based on national HBS).

[13] For EE and FR, see notes below Table A in annex.

In Figure 2, note also the case of Ireland where the deprivation level (this is true for all the dimensions, see Table 1) is lower than could be expected on the basis on the poverty risk rate. This would tend to confirm that the economic situation in Ireland impacts positively on the material living conditions of people, even if, in relative terms, the income situation of some individuals has not kept up with the overall rapid growth in the country and is still below the at-risk of poverty threshold.The countries ranking according to the two approaches also differ for France, Finland and Belgium (where there is more deprivation than monetary poverty).

Figure 2: % of people lacking at least two items in the economic strain + durables dimension, compared to the proportion of people at risk of poverty



Source: Eurostat, EU-SILC survey year 2004. Reference population: people aged 0+.

The overlap between poverty and deprivation can also be deepened through consistent poverty measures, i.e. by focusing on people facing deprivation and relative income poverty (intersection approach). This could help to exclude from the "poor" population those people for whom there are deprivation or income mis-measurements, people receiving low income but avoiding deprivation or people facing deprivation but receiving income above the threshold. Table 2 presents these figures, as well as the at-risk-of poverty rate of the people considered as 'deprived', and the deprivation rate of 'poor' people (these two figures can be easily deducted by the ratio between the consistent poverty rate and either the poverty rate or the deprivation rate).

Table 2. Proportion of the population ‘poor’, lacking at least 2 items in the strain + durables dimension, and suffering from both problem, %

	AT	BE	DK	EE	ES	FI	FR	GR	IE	IT	LU	NO	PT	SE
Consistent poverty	5	8	3	13	11	5	9	14	8	11	4	3	14	3
Poverty rate among the ‘deprived’	31	32	24	30	34	26	27	33	45	40	45	28	32	24
Deprivation rate among the ‘poor’	41	53	31	67	56	50	69	68	41	59	35	31	69	31

Source: Eurostat, EU-SILC survey year 2004. Reference population: people aged 0+.

The consistent poverty share (consistent poverty in proportion of poverty rate) varies between 30% (in DK, SE, NO) to more than 60% (PT, EE, GR). This means that in the most deprived countries, the majority of the ‘poor’ are also ‘deprived’. However, the opposite is far from being true. A non negligible proportion of the population deprived is not ‘consistently poor’. Indeed, in proportion of the deprivation rate, the consistent poverty share attains around 20-30%, except in Ireland, Luxembourg or Italy (40% or more). In the other New Member States, one can expect that the consistent poverty approach would also focus on only a limited subset of the population facing deprivation, as the level of relative monetary poverty is close to the EU average in these countries. However, in the enlarged Union, the figures show that the deprivation level is far from being comparable between countries, with even the ‘poorest’ in ‘rich’ countries facing a lower deprivation level than the ‘richest’ in ‘poor’ countries[14]. Therefore, restricting the use of a deprivation measure by combining it with a monetary relative criterion risks to hide the diversity of social and economic development levels among EU25 Countries. It seems therefore preferable, at this stage, to present the monetary and non-monetary measures separately.

4.3. A focus on children: are they more at-risk of deprivation than the total population?

Table 3. Deprivation rate, in each dimension, children and total population

		AT		BE		DK		EE		ES		FI		FR		GR		IE		IT		LU		NO		PT		SE	
Economic strain		ALL	0-15	ALL	0-15	ALL	0-15	ALL	0-15	ALL	0-15	ALL	0-15	ALL	0-15	ALL	0-15	ALL	0-15	ALL	0-15	ALL	0-15	ALL	0-15	ALL	0-15	ALL	0-15
	2+	15	17	22	29	11	13	28	31	32	30	18	24	32	37	39	33	16	22	27	28	9	13	10	13	42	44	12	15
Durables	1+	6	6	9	10	10	9	34	31	7	7	10	6	11	13	13	9	12	12	5	5	1	1	6	5	16	17	6	7
Housing	1+	14	14	23	23	12	13	47	48	29	28	9	9	22	22	24	20	17	17	27	27	20	23	11	13	39	37	9	9
Poverty		13	15	15	17	11	9	18	20	20	24	11	10	14	14	20	20	21	22	19	26	11	18	11	8	21	23	11	11

Source: Eurostat, EU-SILC survey year 2004. Reference population: people aged 0+ and aged 0-15.

On the basis of the indicators breakdowns, it can also be evaluated whether deprivation and monetary relative poverty offer a similar diagnosis on the relative position of different risk groups. An example is provided in Table 3 where figures for children and the total population are compared. On this basis, it seems that the different approaches may offer a different assessment on children relative risk, depending on the country and the dimension (the three dimensions structure is used in order to eventually highlight different age patterns in the durables and strain dimensions). Significant difference between children and the total population are coloured (confidence intervals were computed by linearization

[14] This is confirmed by data presented in European Foundation for the Improvement of Living and Working Conditions (2004).

of the difference between the deprivation/poverty rates by age). The darker colour highlights differences at the children advantage.

In the strain dimension, children are generally more at risk than the total population (except in Greece and Spain), indicating that the presence of children in the household can increase financial constraints. Not only have children higher probability of deprivation, but they often also have higher probability of cumulating these deprivations[15].

In the durables dimension, children tend to be equally or even less deprived (EE, FI, GR) than the total population. In the housing dimension, differences are rarely significant, except in Greece and Portugal (where children face less deprivation than the total population) and in Luxembourg (and to a lesser extent in Denmark and Norway) where the reverse situation is true. This would mean that, despite potentially higher financial difficulties, households with children try to guard their family against housing discomfort and enforced lack of durables.

In terms of comparison of the children relative performance between deprivation and monetary approaches, Table 3 also indicates that:

- In Denmark, Finland, Ireland, Sweden and Norway the children are more deprived (at least in the strain dimension) than the whole population although they were considered as less or identically poor. In these countries, the deprivation approach therefore highlights children relative risks, which were not apparent in the relative monetary poverty approach.
- In Luxembourg, the higher risk faced by children is confirmed by the monetary poverty and the economic strain and housing deprivation.
- In Italy, Belgium, Austria, the gap is significant in the deprivation dimension and in the monetary approach.
- In Portugal, children slightly higher risk than the whole population in the economic strain and poverty dimension, but face better housing conditions.
- In Spain, although children have more probability of being monetarily poor than the whole population, they have slightly less risk of deprivation than the total population.
- In Greece, children face less deprivation risk than the whole population (whatever the dimension), although there are considered as equally poor. Note however that, even if Greek children face less risk than the whole population, one third of them live in family with at least two economic strain difficulties, against 13% in Denmark, Luxembourg or Norway.

4.4. Does each deprivation item have the same importance?

The above figures result from a simple count of the items of deprivation over the population. The main advantage of this approach is to facilitate the interpretation of the results and to avoid having to make decisions about which items are more relevant for measuring individuals' material deprivation. However, this makes the implicit assumption that each item has the same importance in terms of deprivation. This can be questioned, which is why the use of weights could be considered.

These weights could be established on the basis of social views on what is more desirable or even necessary, i.e. goods considered as necessary by a larger proportion of the population should receive greater weights. However such information is not easy to collect and is not always available in surveys.

15 See for similar conclusions Hussain M.A. (2002).

An alternative method for constructing weights is to weight each item by a function of the proportion of persons who do possess the item in the country[16]. The idea is that the higher the proportion of people who have the item, the more likely a person not being able to afford the item (but wanting it) will feel deprived.

This prevalence weighting approach can be summarized as follows: in each dimension, the deprivation score (u_j) for each individual (j) in the sample equals the sum over the items (X_{ij}) weighted with w_i, i.e. the ratio between the proportion of people having the item i (h_i) over the whole population and the sum of the proportion of "haves" for all items in the dimension (see formula 1).

Formula 1:

$$u_j = \sum_{i=1}^{I} w_i X_{ij}$$

$$\text{where} \qquad w_i = \frac{h_i}{\sum_{i=1}^{I} h_i}$$

$$\text{and} \qquad \sum_{i=1}^{I} w_i = 1$$

Different functions of weights were tested. First, weights were based on a linear function of the proportion of 'haves' (see formula 1) and secondly we tried to use a weighting structure which still varies positively with the proportion of "haves" as desired, but which gives higher weights to items with higher proportions of 'haves' and introduce higher variability between items (the weights are based on the coefficient of variation of each deprivation item)[17]. However, as both types of weights gave similar results, we preferred to use the simplest (non linear) form of weights, which give results more easily understandable.

Like for the indicator of relative monetary poverty, one important question is related to the choice of the reference population. We made the hypothesis that, in evaluating their material situation, respondents are influenced most by their perceptions of how they are doing compared to others in their own country, even if it might be argued that, in the European Union, comparisons would extend beyond national border lines[18]. The set of different weights is common to all individuals in the country (see annex F).

The question of weighting or not can also receive a different answer depending on whether we only focus on basic needs or on a larger set of items. It can be easily argued that access to some items has the same normative value, whatever the country and whatever the proportion of 'haves' in the country, if these items are considered as essential. For such items, the unweighted approach could be preferable. It could be argued, for example, that (most of) the items in the housing dimension are in this case[19].

[16] See for a similar approach: Tsakloglou and Papadapoulos (2001); Whelan et al. (2002); D'Ambrosio, Gradin (2003); Muffels, Fouarge (2004); Förster (2005).

[17] For proportion, the coefficient of variation is the square root of the ratio of proportion of "haves" and the proportion of "haves not". See Eurostat (2003) for a similar proposal.

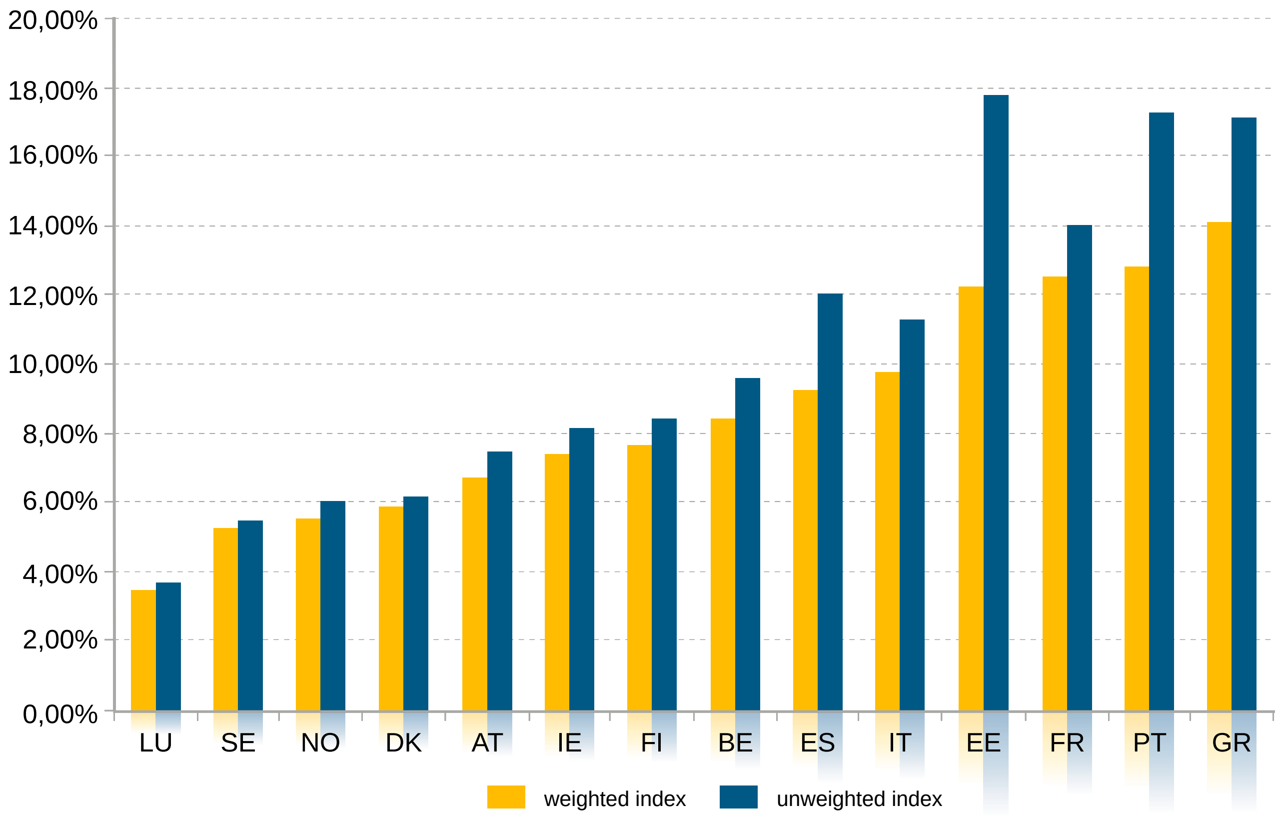
[18] Whelan C, Layte R, Maitre B, Nolan B (2001).

[19] As suggested for instance by Atkinson, Cantillon, Marlier, Nolan (2005).

Figure 3 presents the mean indices by country, either weighted or unweighted, for the economic strain dimension. Each mean index is constructed as a (simple/weighted) average of the deprivation shares in the dimension, normalised by one. The mean score can be interpreted as the mean percentage of deprivation suffered by people. The nearer the index is to 0, the less deprived people are (on average). The figures can be read as follows: in Portugal on average, people miss almost 17 percent of the 9 items of the strain+durables dimension. When we take into account the weights, the average weighted score indicates that people miss 13 percent of the weighted sum of items in the dimension.

The introduction of weights decreases the national values of the aggregated index for the most deprived countries. This is due to the fact that weights give less importance to the most frequently deprived items. The highest difference concerns Estonia, Greece and Portugal, where the importance of the less possessed items (not having a week holiday, not keeping the home adequately warm, the enforced lack of a car) is decreased a lot in the weighted approach, as a majority of people lack these items (see Annex F). The weighted approach can therefore modify the ranking order of the countries.

Figure 3. Mean weighted/unweighted composite index of the economic strain + durables dimension



Source: Eurostat, EU-SILC survey year 2004. Reference population: people aged 0+. Indexes were normalised to 1.

If we accept the assumption that expectations about how much an item constitutes a (social/national) "necessity" depends on the extent to which the item is possessed in the country, a weighted approach is the right way to take into account national differences in the hierarchy of items in the enlarged union. This attenuates the "absolute" aspect of the measures of deprivation used so far, by taking into account the national differences in the relative importance of items. It is however less transparent, more difficult to interpret than an 'absolute' un-weighted measure. Both measures could therefore be used jointly and offer useful information on both aspects ("absolute" and relative) of deprivation.

This interpretation is however not as transparent as the information provided by a headcount and is not easily communicable. This could however be the object of deepened punctual studies.

5. How can EU-SILC be improved to better measure material deprivation in the EU?

The current list of items in EU-SILC is mainly a (limited) subset of ECHP items[20], chosen by national statistician among items considered as better reflecting living conditions in Europe. This limited number of items available in SILC is the main constraint hampering the further development of indicators of material deprivation to be used at EU level. A too small number of items may lead to selecting which part of the deprived population will be monitored, and this selection might impact differently on results country by country. In addition, in the context of the EU enlargement, questions on the adequacy of the current list of EU-SILC variables to depict correctly material deprivation in the enlarged Europe are regularly put on the table. Therefore we would ideally need a choice of items for each dimension that is large enough and captures all key material deprivation situations that we want to monitor in a comparable way across countries. This selection of items might be partly based on a "reasoned" choice that would clarify the meaning of the dimensions identified through the factor analysis.

Such a reasoned choice, as opposed to a choice of items based on prevalence, could in particular draw on:

- the in-depth analysis (of the kind presented in the first part of the document) of the EU-SILC results for all EU Member States(available early 2007).
- a consensus survey run across all EU member States. Such a survey, run through the Eurobarometer tool, will inform us on what items are considered by EU citizens as necessities in their country (a Eurobarometer survey is planned for the beginning of 2007).
- Relevant national expertise, since it is necessary to assess the normative value of items in each national context. Such expertise could also usefully bring about the views of those EU citizens that have experienced poverty and/or social exclusion[21].

At its 23 October 2006 meeting, the Indicators Sub-Group of the Social Protection Committee (ISG) has validated such an approach and welcomes the Commission's proposal to set up a task force gathering both members of the Income and Living Conditions Statistics working group and of the ISG. The Task Force will:

- Propose an indicator for the "economic strain + durables" dimension based on the currently available items before the summer 2007 (for possible inclusion in the next OMC reporting exercise).
- Test the possibility to build an indicator using the current housing items available and make concrete proposals to better exploit the existing SILC information on housing (including data on housing costs and from the 2007 SILC module that will be available at the end of 2008).
- Propose a reasoned choice of deprivation items that will be tested in the SILC 2009 module on material deprivation (a draft list of variables should be ready by the end of 2007).
- Propose indicators based on this choice of items, and ways to regroup them by dimension. In that exercise the methodology presented in the first part of the paper could be very useful.
- Finally the Task Force might test the feasibility and impact on comparability of a different selection of items depending on the country. A common indicator could for instance be based on a corpus of common items

[20] Only two new items were introduced in the list (the affordability to possess a washing machine and the capacity to face unexpected expenses).

[21] The conclusions of the June 2006 Austrian presidency meeting: "Fifth European meeting of people experiencing poverty, Brussels, 12-13 May 2006: 'How do we cope with everyday life?"' could usefully feed into the reflection.

that would identify situations of deprivation across the whole EU, supplemented by a small number of items specific to each country.

The following issues will be addressed in particular:

5.1. The need to ensure maximal comparability in survey questions

The first thing that can be done to improve the measurement of material deprivation in SILC is to increase the comparability of the survey questions across countries. Eurostat is currently reviewing the actual phrasing of the questions used in the national questionnaire to collect the data for the target variables and has found divergences that are likely to affect the comparability of the results. Eurostat will work with MS in the coming months in order to clarify the definitions of the target variables and fix the main sources of discrepancies affecting comparability.

5.2. Are the current items considered as social necessities by the overall population?

The current choice of items available in SILC is based on experts' knowledge. This choice might usefully be confronted with information on social perceptions about which items are considered as essential by the majority of the population, i.e. a consensus control. So far, in the absence of such information, frequency controls on existing data that inform us about the degree of penetration of the items in a country were taken as an indication of social values. In order to assess the current list and test other items to eventually complement it with items better fit to reflect living patterns which are customary or at least widely encouraged in EU Member States, additional information is needed.

One way of collecting this additional information is to run consensus surveys in order to identify which deprivation items are actually directly associated with poverty and social exclusion in the perception of people in their country. This approach is in line with the EU definition of social exclusion that defines the poor and socially excluded as "those with resources (material, cultural and social) that are so limited as to exclude them from the minimum acceptable way of life in the Member States in which people live". In this definition, the standard is set in relation to the perception of the members of a given society. The reference to a "minimum acceptable way of life" can therefore in practice be translated into a list of items that are viewed as "necessities" by the society.

To do so, an EU wide Eurobarometer survey on the perception of poverty will be run in January or February 2007. The results will be available during the spring 2007 and analysed. The results will be used to select a number of deprivation items that will be tested in the SILC module 2009, on the basis of which a number of items will be proposed as additional variables in SILC. This will also be the occasion to fill important gaps in the background knowledge useful for to implement (or possibly adapt) the methodology presented in previous sections. Indeed, additional questions on whether the same basket of items has to be considered as social necessities in all EU Member States could also be addressed. A common indicator could for instance be based on a corpus of common items that would identify situations of deprivation across the whole EU, supplemented by a small number of items specific to each country.

The following principles have been applied to the design of the draft Eurobarometer questionnaire:

- The target population is the whole population aged 15 years and over.
- The survey should be designed to understand better what people have in mind when they think about what are the "necessities of life" with regards to different aspects of every day life.
- It should refer to situations in the reference country, and not about poverty as it can be experienced in other parts of the world.

- The survey will not cover the most extreme aspects of poverty, such as starvation, homelessness, but rather be restricted to situations that are less obvious.
- The survey should refer to the situation of individuals in the general population, but also cover some child specific items (see point 3 below).
- One of the assets of the material deprivation approach is that it can grasp better the multi-dimensionality of social exclusion. As mentioned above, the definition of poverty adopted by the EU, as long ago as 1984 is the following: "people are said to be living in poverty if their income and resources are so inadequate as to preclude them from having a standard of living considered acceptable in the Society in which they live". Because of their poverty they may experience multiple disadvantages through unemployment, low income, poor housing, inadequate health care and barriers to lifelong learning, culture, sport and recreation. They are often excluded and marginalised from participating in activities (economic, social and cultural) that are the norm for other people and their access to fundamental rights may be restricted. Following this definition, we should aim at covering a broad range of dimensions which can be described as follows: **financial stress**, **poor housing**, **enforced lack of durables**, **poor quality food and clothing**, **exclusion from essential social and leisure activities**.
- In an international perspective, we believe that we should leave out items relating to access to social services, and in particular access to health services and to education since these are too dependant on the way the welfare system is organised.

A copy of the current draft questionnaire that has been sent for consultation and is presented in annex G of the paper.

5.3. The need for child specific items

For the specific group of children, the use of deprivation indicators was so far exploratory and permitted to confront monetary results usually used to assess children specific risk with alternative indicators. One more reason can be advanced to use jointly monetary measures and material deprivation indicators for the children group. Indeed, it is well known that the equivalence scale used to compare income of different household types is not neutral in terms of composition of the poor population and of relative risk of families versus other households. This limitation particularly applies to the case of children since the use of a standard equivalence scale unevenly reflects the actual relative "cost" of a child within a household across all EU countries. The use of deprivation measures which are independent on any equivalence scale could give a different view of child poverty.

Finally, studies have highlighted that resources are not necessarily equally shared among members of a given household. In some families with a tight budget, the redistribution of resources could be in favour of the child, since the parents are trying to alleviate the impact of economic strain on the living standard of the child. In other cases, the household income can be unevenly spent on adult consumption (alcohol, gaming, etc). However, both income and material deprivation measures can not tackle the issues associated with the hypothesis of equal intra household sharing of resources. Both income and deprivation items used so far are based on household variables which are assigned to each household member, as specific items for children are not yet included in the EU-SILC variables.

Even if most of the items already available are relevant for the children group, as they can be considered as social necessities, in terms of access to adequate eating, comfortable housing, customary durables etc., it is very important that focused material deprivation measures depicting specific children conditions of life, which can be different from their parents, are included in the EU-SILC instrument. To do so, the Eurobarometer will include children items.

The Eurobarometer survey can only reflect the views of all adults concerning the situation of children, and probably the views of adults, in particular those adults with children, is relevant to determine what the society considers as a necessity for children. However, it cannot take into account of the fact that children's sense of full participation in society may refer to norms and values that are to a great extent determined by peers, e.g. the children themselves. In the Eurobarometer results, it might therefore be worth looking specifically at the results for the lower age groups e.g. 15-21 as a proxy for what would be important for teen-agers.

Finally it is worth noting that some Member States have experience in including children aged 11 or more in their household survey samples as a way to collect information that are child specific and that would be difficult to collect from the parents. The Task Force might learn from these examples.

5.4. A detailed focus on poor housing: what could we learn from the SILC module 2007

In the context the monitoring of the fight against poverty and social exclusion at EU level, indicators covering the housing dimension are still missing even though poor housing has been identified as one of the key dimension of social exclusion that most usefully complement the picture given by income poverty. The 2007 SILC module will provide an insight in housing conditions in Europe. Results will be available by the end of 2008 and could be used in the reflection on the choice of items for a possible indicator of housing deprivation. The areas covered by the module are: self-perceived shortage of space, adequacy of main facilities (electricity, water, heating, air conditioning), overall satisfaction with the dwelling, accessibility of basic services in the local area, and reasons for moving.

5.5. The need for a regular assessment

Even when the reworked list of items will be included in EU-SILC, it is important to keep in mind that this list will need to be assessed regularly in order to ensure that they continue to properly reflect consumption patterns in all Member States.

6. Preliminary conclusions

At EU level, the most frequently used commonly agreed indicators in the field of poverty and social exclusion are based on a monetary approach to poverty which is relative. Nonetheless, questions are raised concerning the ability of the existing portfolio of indicators to satisfactorily reflect the situation in New Member States, Acceding and Candidate countries, as well as differences between them and the 'old' Member states. The approach proposed in this paper aims at complementing the information summarised in the current list of indicators, by looking at more "absolute" material deprivation measures, in order to give a more complete picture of the living conditions of people in different national contexts. But this is not the only reason: even at national level, it is now well recognized that different approaches to poverty measurement, including the material deprivation one, are useful to take into account the other aspects of poverty.

The first part of the paper discusses the methodological options for the construction of this type of indicators. Drawing from the existing literature, it illustrates the potential of the new EU-SILC instrument in this field by using the 2004 harmonised micro-data for thirteen Member states (and Norway). Material deprivation is defined as the enforced lack of a combination of items depicting material living conditions in the EU, such as housing conditions, possession of durables, and capacity to afford basic requirements.

The main methodological questions that are raised in the paper relate to the choice of the constitutive items, their eventual regrouping in dimension and the aggregation of the information contained in each item in a composite index (weighted or not).

The second part of the paper proposes a short and mid-term approach to improve the material deprivation data that can be derived from EU-SILC. The main aims are to improve in the short term the comparability of the existing items and, ultimately, to dispose of an adequate and reasoned choice of items on the basis of which comparable indicators of material deprivation could be adopted for policy monitoring at EU level.

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Annex

eurostat

Annex A: proportion of people deprived, for each item, total population

Percentage of individuals deprived	AT	BE	DK	EE	ES	FI	FR	GR	IE	IT	LU	NO	PT	SE
Economic strain														
Has the household been unable:														
to pay scheduled rent, utility bills or hire purchase instalments?	3%	7%	5%	15%	7%	12%	13%	30%	9%	13%	5%	12%	8%	10%
Who cannot the household afford:														
paying for a week's annual holiday away from home?	25%	29%	9%	71%	44%	20%	33%	47%	23%	39%	12%	9%	61%	14%
keeping its home adequately warm?	2%	6%	10%	5%	9%	3%	24%	17%	3%	11%	1%	2%	41%	1%
eating meat, chicken or fish every second day, if wanted?	9%	4%	2%	16%	2%	4%	8%	8%	4%	7%	2%	3%	4%	3%
capacity to face unexpected expenses	20%	28%	18%	8%	38%	25%	34%	35%	21%	27%	13%	21%	20%	13%
Durables														
Enforcd lack of:														
colour TV	0%	1%	1%	2%	0%	1%	0%	1%	0%	0%	0%	1%	1%	0%
a telephone	1%	1%	0%	4%	1%	0%	1%	1%	1%	2%	0%	0%	4%	0%
a car or van (for private use)	5%	7%	9%	31%	6%	9%	4%	12%	11%	3%	1%	5%	12%	5%
washing machine	1%	2%	2%	7%	0%	2%	8%	2%	1%	1%	0%	0%	4%	2%
Housing conditions														
Does the dwelling have problems of:														
indoor flushing toilet?	2%	1%	1%	19%	0%	1%	1%	4%	1%	0%	0%	1%	4%	0%
bath or shower?	1%	1%	1%	21%	0%	1%	1%	2%	1%	1%	1%	0%	4%	0%
accomodation too dark	6%	11%	4%	9%	13%	3%	9%	7%	6%	10%	6%	4%	22%	3%
leaky roof, rot in window frames, damp walls, etc.?	10%	14%	8%	29%	20%	5%	15%	20%	14%	23%	16%	8%	23%	5%

Source: Eurostat, EU-SILC survey year 2004.

Notes: In France, the variable measuring the affordability to keep the home adequately warm is not comparable with the other EU countries as it focus on the capacity to keep the house warm instead on the affordability (this overestimates the deprivation rate in France). In Estonia, the variable about the capacity to face unexpected expenses could not be surveyed in 2004 according to the harmonised definition (defining the amount of the unexpected expense as the monthly poverty threshold). A lower amount (1000 instead of 1600 kroons) was chosen as a reference, this underestimates the proportion of people deprived.

Annex B : Share of people affected by material deprivation in each dimension, by number of deprivations

Number of deprivation	AT	BE	DK	EE	ES	FI	FR	GR	IE	IT	LU	NO	PT	SE
Economic strain														
0	64	59	72	26	46	64	46	39	67	52	80	70	31	75
1	20	19	17	46	22	17	22	21	17	21	12	20	25	13
2	9	14	7	18	21	11	16	17	9	14	6	6	27	7
3	5	7	3	7	9	6	10	11	5	8	2	3	13	3
4	1	2	1	2	2	1	5	5	2	4	0	1	4	1
5	0	0	0	1	0	0	1	5	1	2	0	0	0	0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Durables														
0	94	91	90	66	93	90	89	87	89	95	99	94	84	94
1	5	7	9	27	6	9	9	12	11	4	1	6	12	5
2	1	1	1	5	1	1	2	1	1	1	0	0	2	1
3	0	0	0	1	0	0	0	0	0	0	0	0	1	0
4	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Economic strain/Durables														
0	63	58	69	23	45	62	45	38	64	52	80	68	31	74
1	20	18	18	33	22	17	21	20	17	21	11	20	23	13
2	9	12	7	23	20	10	15	17	8	13	6	6	23	6
3	5	7	3	11	9	7	10	11	6	7	2	3	12	4
4	2	3	2	5	3	3	5	6	3	4	0	2	6	2
5	1	1	1	3	1	1	3	5	1	2	0	1	2	1
6	0	1	0	1	0	0	1	2	1	1	0	0	1	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Housing														
0	86	77	88	54	71	91	78	76	83	73	80	89	61	91
1	11	18	10	24	24	7	18	18	13	21	17	10	28	8
2	3	4	2	14	4	1	4	5	4	6	3	1	8	0
3	0	0	0	6	0	0	0	1	0	0	0	0	2	0
4	0	0	0	2	0	0	0	0	0	0		0	1	0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: Eurostat, EU-SILC survey year 2004. Reference population: people aged 0+. Figures are rounded.

Annex C: Database

During the period 1994-2001 the European Community Household Panel (ECHP) has traditionally been the primary source of data used for the calculation of these indicators in the field of Income, Poverty and Social Exclusion. The ECHP was a panel survey based on a standardised questionnaire that involved annual interviewing of a representative panel of households and individuals, covering a wide range of topics: income (including the various social benefits), health, education, housing, demographics and employment characteristics. It was developed by Eurostat (the statistical office of the European Communities) in association with Member States. For Germany, Luxemburg, Sweden and the United Kingdom, data from the national surveys were transformed into the ECHP format. Some non-monetary items were not surveyed in these national surveys and are therefore missing in the ECHP database. Furthermore, for one item related to the arrears, Finland had a very high proportion of missing values. Further information on the characteristics of the survey and availability of data issued from it can be found at the following address:

http://forum.europa.eu.int/irc/dsis/echpanel/info/data/information.html

The ECHP is being replaced by the EU Statistics on Income and living conditions (EU-SILC), which is to become the reference source for statistics on income and living conditions, and common indicators for social inclusion. While the ECHP was launched on the basis of a gentleman's agreement, EU-SILC is organised under a Framework Regulation of the European Parliament and the Council (N°1177/2003). Technical aspects of the instrument are defined by five Commission Implementation Regulations ('Sampling and tracing rules'; 'Definitions'; 'List of primary variables'; 'Fieldwork aspect and imputation procedures'; and 'Intermediate and final quality reports').

The EU-SILC project was launched in 2003 on the basis of a 'gentleman's agreement' in six Member States (Belgium, Denmark, Greece, Ireland, Luxembourg, and Austria) as well as in Norway. The starting date for the EU-SILC instrument under the aforementioned Framework Regulation was 2004 for the EU-15 (with the exception of Germany, Netherlands and the UK who have derogations until 2005) as well as for Estonia, Norway and Iceland. The New Member States with the exception of Estonia have started in 2005. Timetables for implementation in Acceding and Candidate Countries (Bulgaria, Croatia, Romania and Turkey) and in Switzerland are being discussed.

Similar items are not fully identical between the ECHP and EU-SILC. For example, the housing conditions items (Leaking roof or damp walls/floors/foundations or rot in window frames or floor) initially surveyed in three separate questions in the ECHP are now surveyed in a single question. The questions on difficulties of payments are surveyed in 3 questions in EU-SILC instead of 4 in the ECHP. The enforced lack of a telephone takes into account the mobile phone in EU-SILC.

Annex D: fit of the confirmatory factor analysis, pooled data[22]

Goodness of Fit Index (GFI)	0.9787
GFI Adjusted for Degrees of Freedom (AGFI)	0.9688
Root Mean Square Residual (RMRS)	0.0669
Parsimonious GFI (Mulaik, 1989)	0.7780

GFI, goodness of fit index, represents the amount of variances and covariances in the sample covariance matrix that are predicted by the model. Theoretically, its maximal value is 1. However, as GFI is affected by the sample size and the number of indicators, its upper bound can be lower than one, even in the case of perfect fit. One rule of thumb is that the GFI for good fitting model should be greater than 0.9.

AGFI, adjusted goodness of fit index, is the GFI adjusted for degrees of freedom. A value superior of 0.8 is more often used as a cut-off value to consider the model as good fitting.

RMSR, root mean square residual, is the square root of the average of the square of the residuals between the sample and modelised covariance matrix. The less is the fit between the model and the data, the larger the RMSR.

PGFI, Parsimonious goodness of fit index, is a modification of the GFI that takes the parsimony of the model into account.

Annex E: Covariance between factors, pooled data

	Economic strain	Durables	Housing
Economic strain	1	0,82	0,51
Durables	0,82	1	0,68
Housing	0,51	0,68	1

22 Following Knol and Berger (1991) quoted by Dekkers (2003), the optimisation process suggested in the case of tetratchoric correlations is the unweighted least square (ULS). The Fit of the confirmatory analysis performed country by country is available on demand.

Annex F: value of the weights, by dimension and by country

	Unwei-ghted	AT	BE	DK	EE	ES	FI	FR	GR	IE	IT	LU	NO	PT	SE
Economic strain															
scheduled rent, utility bills or hire purchase instalments	0,200	0,220	0,218	0,208	0,222	0,232	0,201	0,225	0,193	0,206	0,216	0,203	0,194	0,251	0,197
paying for a week's annual holiday away from home?	0,200	0,170	0,168	0,200	0,074	0,141	0,184	0,172	0,146	0,176	0,152	0,189	0,200	0,106	0,187
keeping its home adequately warm?	0,200	0,223	0,220	0,197	0,247	0,227	0,222	0,197	0,230	0,220	0,221	0,212	0,217	0,162	0,215
eating meat, chicken or fish every second day, if wanted?	0,200	0,206	0,225	0,215	0,217	0,245	0,221	0,237	0,253	0,219	0,230	0,209	0,214	0,261	0,211
capacity to face unexpected expenses	0,200	0,181	0,168	0,180	0,240	0,155	0,173	0,169	0,178	0,179	0,182	0,187	0,175	0,219	0,189
Durables															
colour TV	0,250	0,257	0,262	0,271	0,292	0,263	0,258	0,290	0,267	0,261	0,260	0,255	0,257	0,271	0,273
a telephone	0,250	0,261	0,264	0,278	0,280	0,257	0,265	0,293	0,266	0,262	0,249	0,256	0,262	0,258	0,276
a car or van (for private use)	0,250	0,226	0,224	0,219	0,166	0,218	0,224	0,261	0,209	0,221	0,230	0,238	0,224	0,212	0,236
washing machine	0,250	0,256	0,250	0,233	0,262	0,262	0,254	0,156	0,259	0,256	0,261	0,251	0,256	0,259	0,214
Housing															
indoor flushing toilet?	0,250	0,257	0,265	0,257	0,252	0,272	0,255	0,265	0,262	0,262	0,272	0,265	0,257	0,277	0,256
bath or shower?	0,250	0,259	0,265	0,256	0,246	0,272	0,253	0,265	0,266	0,261	0,271	0,264	0,258	0,276	0,255
accomodation too dark	0,250	0,248	0,238	0,250	0,283	0,237	0,248	0,243	0,253	0,248	0,247	0,248	0,248	0,226	0,248
leaky roof, rot in window frames, damp walls, etc.?	0,250	0,236	0,232	0,237	0,219	0,219	0,245	0,227	0,218	0,228	0,210	0,224	0,238	0,221	0,242

Note: The weights are normalised to 1 over items in each dimension.
Source: Eurostat, EU-SILC survey year 2004.

Annex G: Draft Eurobarometer questionnaire on material deprivation

Proposed drafting of the main question:

A. For each of the following living standards listed below I would like you to indicate whether
(A) this item is necessary, all adults should be able to afford and which they should not have to do without
(B) this item may be desirable but is not necessary

List of items

a. Financial stress

		Level of relevance (high/low /NR: not relevant)
A	To be able to pay mortgage or rent payments regularly (SILC)	
B	To be able to pay utility bills (electricity, water, gas) regularly (SILC)	
C	To be able to pay arrears on hire purchase instalments or other loan payments (non housing-related debts) regularly (SILC)	
D	Capacity to afford a meal with meat, chicken, fish (or vegetarian equivalent) every second day (SILC)	
E	Capacity to face unexpected financial expenses (SILC)	
F	Capacity to make regular savings, even if small amounts	
G	Capacity to make ends meet (SILC)	
H	Capacity to pay for all mandatory insurance	
I		

b. Poor housing, and environment

		Level of priority (high/low /NR: not relevant)
A	To afford a dwelling that is not too dark, with enough light (SILC)	
B	To afford a dwelling without too much noise from neighbours or noise from the street (traffic, business, factories, etc.) (SILC)	
C	To afford a dwelling without too much pollution, grime or other environmental problems in area caused by traffic or industry (SILC)	
D	To afford a dwelling without crime, violence or vandalism in the area (SILC)	
E	To afford a dwelling without a leaking roof, damp walls/floors/foundation, or rot in window frames or floor (SILC)	
F	Affordability to keep home adequately warm (SILC)	
G	Bath or shower in dwelling (SILC)	
H	Indoor flushing toilet for sole use of household (SILC)	
I	Afford to maintain/repair dwelling when paint goes of the walls and/or there are cracks in the walls	
J	Enough space to have children above 5 sleeping in a separate room from the parents	
K	Enough space and privacy to read or write, or..	
L	Hot water	
M	Public space and equipment (street lights, roads, road signs, bus stops) are not (well) maintained	
N	Enough space to invite friends or family for a drink or a meal at home at least once a month	
O		

c. Enforced lack of durables,

		Level of priority (high/low /NR: not relevant)
A	A telephone (SILC)	
B	To afford paying for the basic telephone fee	
C	Colour TV (SILC)	
D	To afford paying for the basic fee	
E	A computer (SILC)	
F	To afford paying for the internet connection	
G	Washing machine (SILC)	
H	A car (SILC)	
I	To afford paying for the car insurance	
J	A refrigerator	
K	To repair or replace major electrical goods such as refrigerator, or washing machine, when broken	
L	Furniture in good condition	
M	To replace worn out furniture	
N	A cooker adapted to the size of the family	
O	Bed and bedding for everyone in the family	
P		

d. poor quality food and clothing,

		Level of priority (high/low /NR: not relevant)
A	A warm coat for the winter	
B	2 pairs of all weather shoes (suited to climate)	
C	Some new, not second hand, clothes	
D	Appropriate clothes for job interviews or other special occasions	
E	Some clothes that are fashionable	
F	A meal with meat, chicken, fish (or vegetarian equivalent) at least once every 2 days	
G	Fresh fruits and vegetables once a day	
H	Go to the hair dresser regularly	
I		

e. Exclusion from essential social and leisure activities

		Level of priority (high/low /NR: not relevant)
A	Paying for one week annual holiday away from home (SILC)	
B	Buying presents for family or friends at least once a year	
C	Enough money to keep home decorated	
D	An evening out once a month (restaurant, cinema, disco, concert, etc.)	
E	Capacity to afford own home (owned or rented) past 30 years	
F	Inviting people for diner at home once a month	
G	A hobby or leisure activity	

f. Children specific items

		Level of priority (high/low /NR: not relevant)
A	A <u>family</u> holiday away from home for at least one week a year	
B	Enough space and privacy to study or do homework	
C	Basic leisure equipment (e.g. bicycle)	
D	Educational games and books at home	
E	3 meals a day	
F	Inviting friends at home	
G	Celebrations on special occasions (birthday, Xmas or other religious	
H	Fresh fruits and vegetables once a day	
I	A meal with meat, chicken, fish (or vegetarian equivalent) at least once a day	
J	An outdoor space where they can play safely	
K	New properly fitted shoes	
L	Some new, not second hand clothes	
M	Participating regularly in a leisure activity	
N	Participating in school trips	
O	A bed and bedding for her/himself	
P		

Annex H: 2007 EU SILC module on housing

AREAS AND LIST OF TARGET VARIABLES

	Module 2007	Housing Conditions
Variable name	Code	Target variable
		Shortage of space in dwelling
MH010		**Shortage of space in dwelling**
	1	Yes
	2	No
MH010_F	1	Variable is filled
	-1	Missing
		Dwelling installations and facilities
MH020		**Adequate electrical installations**
	1	Yes
	2	No
MH020_F	1	Variable is filled
	-1	Missing
	-2	na (No electricity/installations)
MH030		**Adequate plumbing/water installations**
	1	Yes
	2	No
MH030_F	1	Variable is filled
	-1	Missing
	-2	na (No running water/installations)
MH040		**Dwelling equipped with heating facilities**
	1	Yes – Central heating or similar
	2	Yes – Other fixed heating
	3	No – No fixed heating
MH040_F	1	Variable is filled
	-1	Missing
MH050		**Dwelling comfortably warm during winter time**
	1	Yes
	2	No
MH050_F	1	Variable is filled
	-1	Missing
MH060		**Dwelling equipped with air conditioning facilities**
	1	Yes

	2	No
MH060_F	1	Variable is filled
	-1	Missing
MH070		**Dwelling comfortably cool during summer time**
	1	Yes
	2	No
MH070_F	1	Variable is filled
	-1	Missing
Overall satisfaction with dwelling		
MH080		**Overall satisfaction with dwelling**
	1	Very dissatisfied
	2	Somewhat dissatisfied
	3	Satisfied
	4	Very satisfied
MH080_F	1	Variable is filled
	-1	Missing
Accessibility of Basic Services		
MH090		**Accessibility of grocery services**
	1	With great difficulty
	2	With some difficulty
	3	Easily
	4	Very easily
MH090_F	1	Variable is filled
	-1	Missing
	-2	na (Not used by household)
MH100		**Accessibility of banking services**
	1	With great difficulty
	2	With some difficulty
	3	Easily
	4	Very easily
MH100_F	1	Variable is filled
	-1	Missing
	-2	na (Not used by household)
MH110		**Accessibility of postal services**
	1	With great difficulty
	2	With some difficulty
	3	Easily
	4	Very easily

MH110_F	1	Variable is filled
	-1	Missing
	-2	na (Not used by household)
MH120		**Accessibility of public transport**
	1	With great difficulty
	2	With some difficulty
	3	Easily
	4	Very easily
MH120_F	1	Variable is filled
	-1	Missing
	-2	na (Not used by household)

Variable name	Code	Target variable
		Accessibility of basic services
MH130		**Accessibility of primary heath care services**
	1	With great difficulty
	2	With some difficulty
	3	Easily
	4	Very easily
MH130_F	1	Variable is filled
	-1	Missing
	-2	na (Not used by household)
MH140		**Accessibility of compulsory school**
	1	With great difficulty
	2	With some difficulty
	3	Easily
	4	Very easily
MH140_F	1	Variable is filled
	-1	Missing
	-2	na (No child in compulsory school)
		Change of dwelling
MH150		**Change of dwelling**
	1	Yes
	2	No
MH150_F	1	Variable is filled
	-1	Missing
MH160		**Main reason for change of dwelling**

	1	Family related reasons
	2	Employment related reasons
	3	Housing related reasons
	4	Eviction/distrain
	5	Landlord did not prolong the contract
	6	Financial reasons
	7	Other
MH160_F	1	Variable is filled
	-1	Missing
	-2	na (MH150 not = 1)

The differential access of women and men to employment and income: evidence from the EU-SILC

Terry WARD

chapter 3

THE DIFFERENTIAL ACCESS OF WOMEN AND MEN TO EMPLOYMENT AND INCOME: EVIDENCE FROM THE EU-SILC

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1. Introduction

The aim here to examine the information provided in the EU-SILC on differences in the access of women and men to employment, and accordingly to income from employment, and the effect which children have in this regard. The additional concern is to consider indicators which can potentially be derived from the data collected by the survey to throw light on the participation of women in the labour market relative to men and on the ease or difficulty which they have in reconciling childcare responsibilities with the pursuit of a working career. Such indicators are of increasing relevance given the growing policy emphasis on the need to get the most out of the EU's potential work force in the coming years in the context of a prospective decline in population of working age as well as of the ongoing importance of maintaining economic competitiveness.

The focus is on women aged 25-49 – ie of an age when women typically face the challenge of balancing the pursuit of a working career and having a young family – sharing a household with a spouse or male partner. These are divided into four groups: those with a child under 3, those whose youngest child is aged 3 to 5, those whose youngest child is aged 6 to 11 and those without a child under 12 (which, of course, includes those who have no children at all). These age divisions correspond with those which are usually distinguished when considering the need for childcare, given that pre-school, or nursery school, typically starts in EU countries at the age of 3 and (compulsory) primary school at the age of 6, while children of 12 and over are considered no longer to need close supervision. The two younger age groups, therefore, correspond with the so-called Barcelona targets adopted by the EU in 2002, which set the objective for policy in Member States of providing by 2010 childcare for at least 33% of children under 3 and for at least 90% of those aged 3 to compulsory school age.

To make the analysis manageable (or, at least, more manageable), no account is taken of the number of children which women might have in each age group. Having more children is clearly likely to increase the difficulty of arranging childcare and, perhaps more importantly, the cost, though arguably in most cases, it is the ability to arrange childcare for the youngest child which determines whether women – or more generally both parents – are able to work or not and, if so, the hours they can work. Accordingly, if the data indicate that the youngest child does not receive childcare then this constrains the ability of both parents to be in paid employment irrespective of whether older children receive care or not. (It does not, it should be noted, necessarily prevent both from working in the sense they may be able to stagger their working hours in such a way that one of them is able to look after their child – or children – at any given time. The extent to which this occurs in practice is not considered here but it could be examined from the SILC data.)

The analysis begins by examining the data collected for the first time at EU level on the use of childcare and attendance of children at pre-school and primary school, which although they are part of the education system provide, at the same time, childcare which might make it possible for women – or more generally parents of both sexes – to be in paid employment[1]. The concern is with the extent to which households with young children of different ages make use of childcare and how this varies between those above and below the poverty line , defined in the customary way, as well as between the countries for which data are available from the 2004 wave of the EU-SILC.

Secondly, it considers the division of paid employment between women and men in couple households – or more specifically in those in which the woman concerned is aged 25 to 49 – examining not only the extent to which the respective partners are working but also the hours which each of them works if they are employed.

Thirdly, it considers the income which each of the partners contributes to that of the household as a whole, focusing, in particular on earnings from employment, whether from a paid job or from a business. This is measured, so far as possible, in gross terms in order to leave out of account the vagaries of the tax system in different countries which, depending on how the tax levied on the income of couples is calculated – and on how the individuals concerned manage their tax affairs – might be an important determinant of the net income which each of them is recorded as generating.

Apart from the interest in this issue in its own right, the rationale is that this provides a basis for assessing how far the customary assumption made when analysing the distribution of income, that household income is divided equally between household members is justifiable. The specific interest, therefore, is in how far the practice of calculating equivalised income to allow for differences in the size of households and their composition and attributing the income so calculated equally to each household member might lead to misleading conclusions about the actual disposable income which women receive and the proportion of them falling below the poverty line.

2. The use of childcare

The EU-SILC contains a series of questions on the receipt of childcare by children, as well as on their attendance at pre-school and at compulsory school. With regard to the former, the questions distinguish between childcare at a day-care centre, from a centre-based service outside of school hours and from a professional child-minder as well as from a grandparent, another household member apart from the parents, a friend, relative or neighbour. In each case, respondents are asked to give the number of hours during a usual week for which school is attended or childcare is received by children, with '0' hours being included as an option to distinguish those who do not make use of childcare at all. While this is itself is important information for assessing the adequacy of care arrangements in respect of the support provided for parents wishing to work, especially if they wish to work full-time, it creates some problems of interpreting the answers given that no prior question is asked about whether children receive care or not.

It is, accordingly, difficult to interpret missing answers, since it is by no means clear whether respondents have simply not been able to answer the question – because, for example, they found it difficult to estimate how many hours of care their child usually received since it varies from week to week – or whether it signifies that they are not making use of childcare at all. Accordingly, there is no way of distinguishing 'genuine' missing answers or blanks from those who should

1 There is some debate in any case of how far pre-school, or nursery school, should be considered as part of the childcare rather than the education system and, indeed, how far there is any significant difference across countries between pre-schools and centres which are specifically labelled as caring for children. The two are regarded in the same way below as providing childcare, but the distinction between an education and a social support service can sometimes distort comparisons across countries.

have indicated 0 hours. Similar difficulties apply to the 'not applicable' responses, which in the case of attendance at pre-school, for example, are intended to mean that the child concerned is not eligible to attend because of their age but it might also mean that there is no pre-school available in the area. In the analysis below, missing values and 'not available' responses are both assumed to signify that children are not receiving childcare (in the sense that the denominator in the calculation of the proportions receiving care is the total of all couple households with the youngest child in the age group distinguished). This might, therefore, mean that the results understate the relative number of couples using childcare.

A further difficulty of interpretation arises over the way the answers to the survey as regards this set of questions are organised. They are, therefore, set up to provide an indication of the relative number of children receiving childcare and, accordingly, they represent a means of assessing progress towards meeting the Barcelona targets in the different Member States. Consequently, a separate set of weights is given for children (rather than households) for this purpose – or, more accurately, it is given for some of the countries since for 5 of the 14 countries covered, no weights for children are included.

The proportion of children receiving childcare, however, is not necessarily the most appropriate indicator of how far the services or facilities concerned are meeting the need for parents to work, since this in itself may give a misleading impression of the proportion of households, or parents, who are able to make use of childcare. This can be seen by taking a simple example of five children, three of whom live in the same household and receive care and two of whom live in two separate households and do not receive care. In this case, while 60% of children are recorded as receiving care, only a third of the households in fact have the possibility of having both parents in paid employment. While, therefore, defining objectives for childcare in terms of the proportion of children receiving care can be rationalised if the main – or, in the past, often the only – source of data relates to the provision of places, the availability of data from a household survey opens up the possibility of devising a more satisfactory indicator. In other words, while providers may not be able to distinguish children from the same household whom they care for, the EU-SILC is able to do so.)

Taking explicit account of this point and relating the receipt of childcare to households, or parents rather than children *per se* is, however, not straight-forward because in principle each child in the household needs to be considered individually to determine whether they receive care or not. Nevertheless, in practice, it should be sufficient to examine the childcare – or education – status of the youngest child in each household, since, as noted above, the ability to arrange childcare for these is likely to be the critical indicator of whether or not both parents are able to be in paid employment. Although it might be the case in some instances that it is more difficult to organise care for other children, the absence of care for these is still likely to be reflected in the youngest child not receiving care since the parents concerned are both unable to work anyway. If the youngest child is not receiving care, then from the perspective of both parents being able to work, it is likely to be immaterial whether an older child is receiving care or not, which is a further reason why the simple targets set by the Barcelona Council are not in themselves sufficient to assess how far the provision of childcare meets the potential need of parents to be able to pursue working careers. (In practice, as indicated below, the proportion of children receiving care tends to be higher, in some cases significantly so, than the proportion of couples making use of care.)

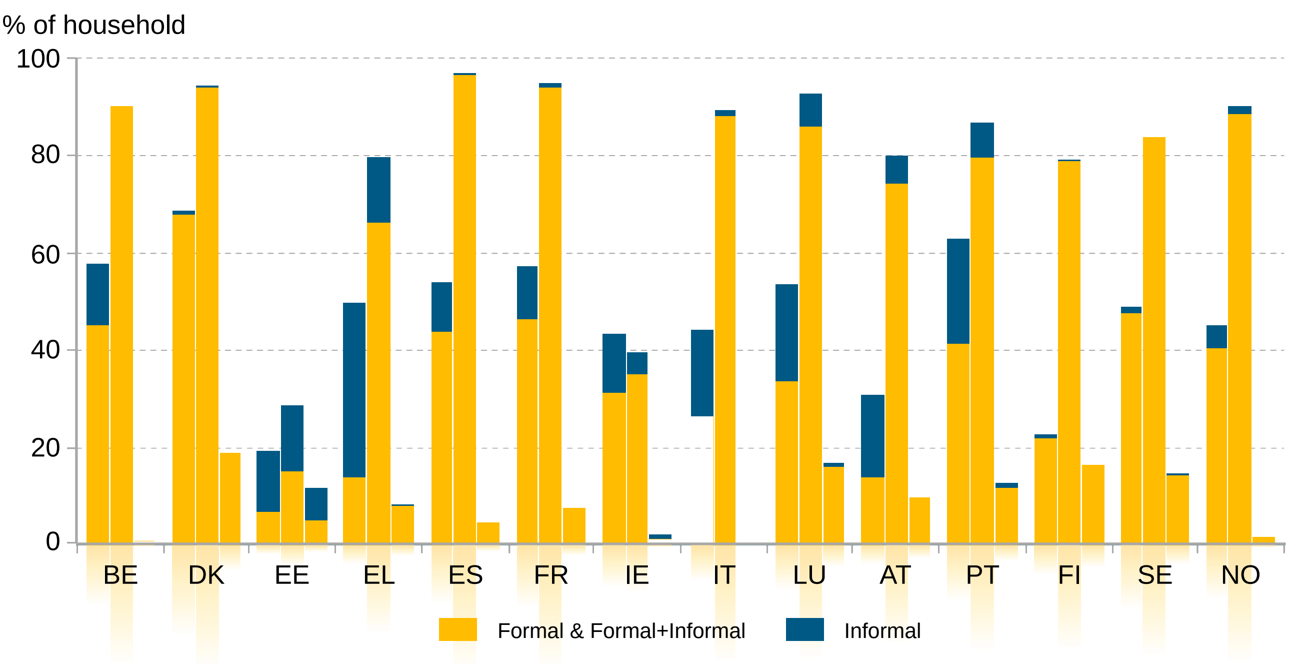
The approach adopted here, therefore, is to examine whether or not the youngest child in the couple households selected for analysis is receiving childcare. In order to simplify things, the analysis is limited to whether or not parents make use of childcare and no account is taken of the number of hours of care their youngest child receives. This is an important limitation – of the Barcelona targets as well as the analysis here – which needs to be removed if the results of the EU-SILC in this respect are to be fully exploited for monitoring the availability of childcare across the EU. (The hours of caring received are not considered here not so much because of the difficulty involved but mainly because of the additional effort required to add the hours provided by the different forms of care when more than one type is used and then to group the results for summary purposes. This additional step, though important in a general sense, is not critical to the concern here which is with a preliminary analysis of the data to examine their usefulness.)

2.1. Youngest child aged under 3

The results show that there is significant variation across countries in the use made of childcare, defining this to include attendance at pre-school as well as at day-care centres, after-school centres and so on. For couples with a child under 3, therefore, the proportion making use of childcare of some kind varies from almost 70% of couple households in Denmark and 63% in Portugal to 23% in Finland and 19% in Estonia (Figure 1 and Table 1). Apart from in the latter two countries and Austria (30%), the proportion of couple households making use of some form of childcare for children in this age group is 40% or more in all the countries from which data are available for 2004 from the EU-SILC.

This in the majority of countries is significantly higher than indicated by measures of childcare for this age group based on estimating the number of places provided by suppliers, which is the basis of the indicator used at EU level to monitor the pursuit of the Barcelona targets for children under 3. Estimates of this, harmonised so far as possible for differences in definitions, show a variation from around 55% in Denmark and Belgium to under 10% in Greece and Italy[2]. At the same time, the SILC data show a reasonably close correspondence with the provider -based estimates for Belgium, Ireland, Finland and Estonia (Figure 2).

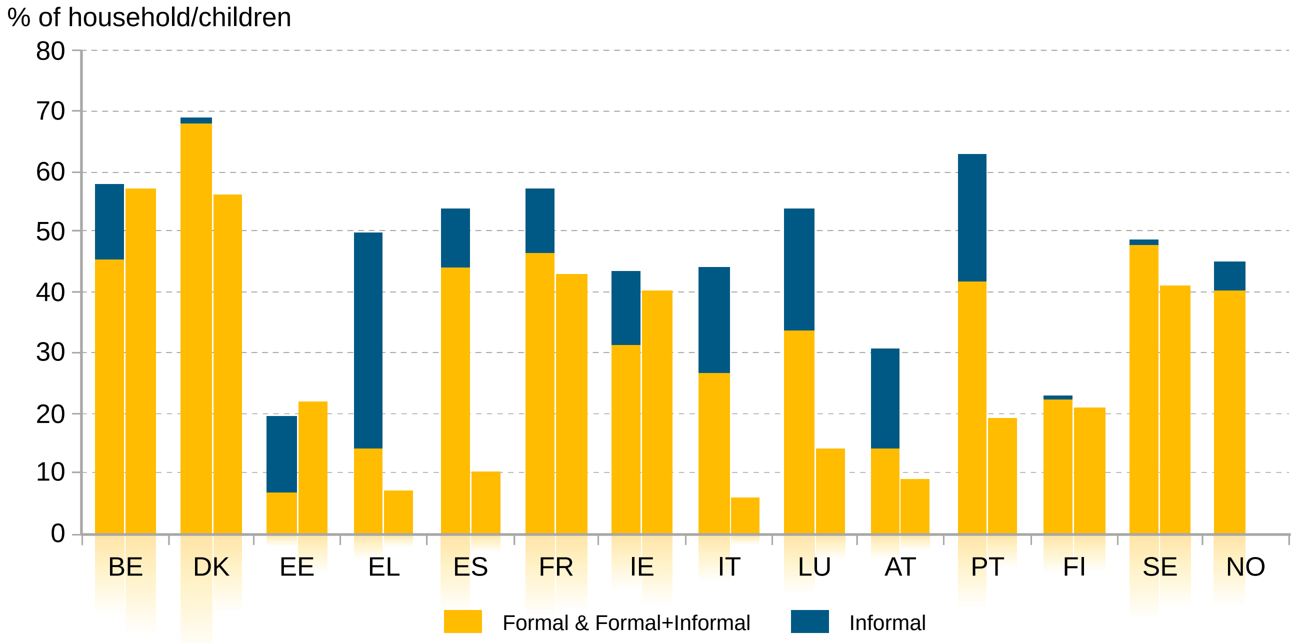
Figure 1. Couple households, woman aged 25 to 49, making use of childcare, 2004



From left to right: Age of youngest child 0-2, 3-5, 6-11
Source: EU-SILC XUDB 2004 - version of February 2006

[2] See *A target-based assessment study of the European Employment Guidelines*, Part 2, Provision of childcare, report produced by Alphametrics for DG Employment and Social Affairs and published at: http://ec.europa.eu/employment_social/incentive_measures/studies/assessm_eg_fin_rep_en.pdf

Figure 2. Couple households, woman aged 25 to 49, making use of childcare and children, aged 0 to 2, for whom childcare provided, 2004



Left bar: couple households; right bar: children
NO: no data available
Source: EU-SILC XUDB 2004 - version of February 2006

In the other countries, the difference is partly explicable in terms of the inclusion of informal care in the SILC and its exclusion from the provider-based estimates, as well as by the similar inclusion of care provided by professional child-minders, which also tends to be left out of account by the latter estimates. In most countries, informal care – provided by grandparents, other relatives, friends and so on – accounts for a significant proportion of the overall childcare received (10% or more) in all only countries except the three EU Nordic Member States, where it is of minimal importance (in Norway, more use is made of informal care than in these three, accounting for around 10% of the total). In Greece, in particular, over 70% of the care received is provided informally, so that excluding this, the proportion of children receiving care is reduced much closer to the provider-based figure (to around 16% for couple households). Similarly, in Estonia, over 65% of couples making use of childcare rely on informal arrangements, while in Austria, almost 55% do so, which again accounts for a major part of the difference between the figures presented here and those relating to official providers (couples using formal care amount to 15% of the total. The inclusion of informal care in the SILC data, as well as possibly child-minders, also explains much of the difference in France.

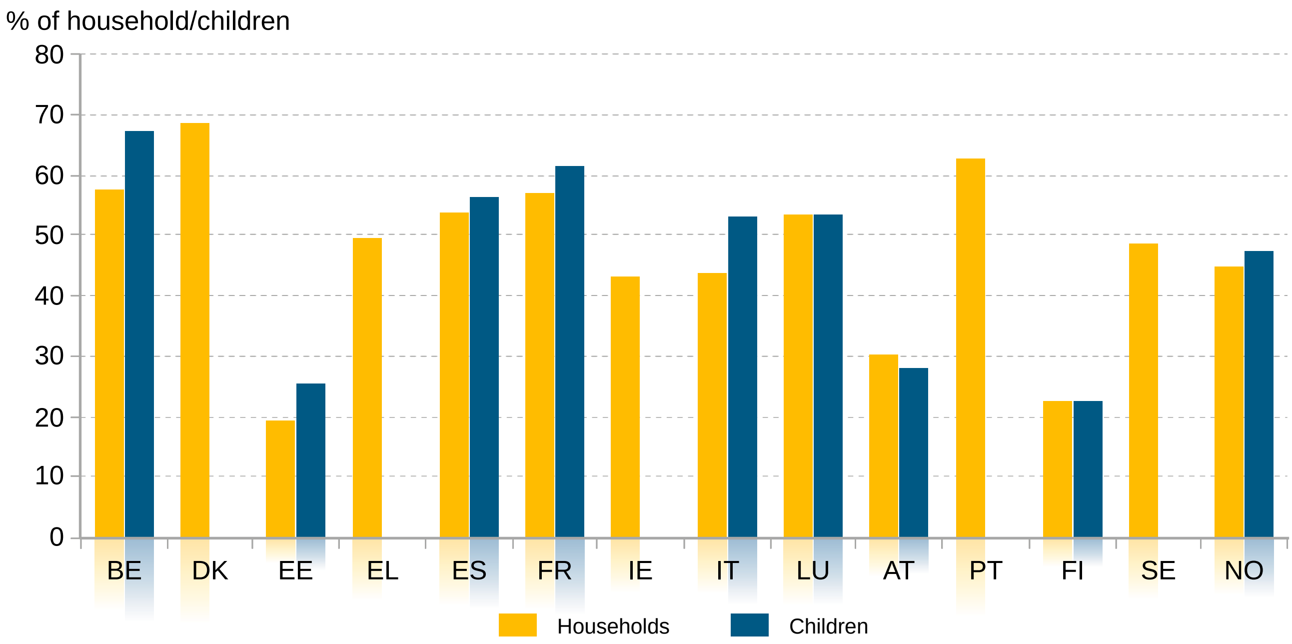
On the other hand, although informal care accounts for around a third of the total received in Portugal and Luxembourg and 40% in Italy, this still explains only part of the difference in the figures from the two sources and a wide gap between the two remains for all three countries (around 20-25% more couple households using childcare than indicated by the provider-based estimates).

It is not clear why this should be the case. It should be recognised, however, that estimates of childcare from the provider side are liable to give a misleading impression of the extent of care, both because they tend to count childcare places rather than the individual children cared for – and one place might accommodate more than one child at different times of the day – and because they tend to be incomplete (ie it is difficult to cover all providers, many of which may be very small). In other words, there is no reason why provider-based estimates of childcare should be more accurate than those derived from the EU-SILC. Indeed, the latter should be a more reliable source so long as the information reported, and recorded, is correct, which perhaps is only likely to become clear over successive surveys.

2.2. Comparison of couple-based and child-based indicators

The figures presented here for the proportion of couples with the youngest child under 3 who make use of childcare can be compared for 9 of the 14 countries with the proportion of children in this age group receiving care (as noted above, for 5 countries, weights for children are not included in the SILC microdata). This indicates that in most cases – the only exceptions are Luxembourg, Finland and Austria, in the first two of which, the figures are much the same and – the proportion of children receiving care is larger than the proportion of couples, in some cases significantly so. In Belgium and Italy, in particular, the proportion of children aged under 3 receiving care is around 9 percentage points more than the couples making use of childcare (Figure 3).

Figure 3. Couple households, woman aged 25 to 49, making use of children, aged 0 to 2 and living in this type of households, receiving care, 2004



DK, EL, IE, PT, SE: no data available
Source: EU-SILC XUDB 2004 - version of February 2006

2.3. Youngest child aged 3-5

The proportion of couples whose youngest child is aged 3 to 5 who make use of childcare varies much less between countries than for those with a child under 3, especially if Estonia, for which the data seem incomplete (no answers are recorded on attendance at school), is left to one side. In 7 of the 14 countries covered by the 2004 SILC, over 90% of couple households falling into this category make use of childcare – including pre-school under this heading – while in another 5, around 80% or more do so. This leave only Estonia, where only some 29% of couples are recorded as using childcare, and Ireland, where the figure is 52%. In the latter, however, where the reference week for childcare questions was not a current week around the interview like in other countries but a week at the end of the previous year, a further 28% of couples have children in primary school. This raises the proportion who are effectively receiving care to around 80%, more similar to that in other countries (it is around the same as in Greece, Finland and Austria).

These figures are also more similar to those indicated by estimates from provider-based sources. The main exception, apart from Estonia (where the provider-based data show a proportion of children being cared for of around 80%), is Greece, for which the provider-based estimates indicate a figure some 20 percentage points lower than that derived from the SILC data (60% as opposed to 80%). Much of this difference, however, can be explained by the inclusion of informal care arrangements in the latter, which are used by around 13% of couples together with the 2-3% who use professional child-minders. Elsewhere, apart from Estonia, informal care is less important, accounting for under 10% of care received in all countries, and under 2% in all but Ireland, Luxembourg, Austria and Portugal, in all of which it represents around 8-9% of the total.

2.4. Youngest child aged 6-11

Compulsory education starts at 6 in most EU countries, the exceptions among the countries covered by the SILC in 2004, apart from Luxembourg where it starts at 4, being the three Nordic Member States and Estonia, where it begins a year later. In most countries, therefore, primary school, as well as providing education, is also a source of childcare for parents wishing to work. This, however, is only the case within school hours, so that parents wanting to have full-time employment are likely to need to have recourse to childcare arrangements outside of school hours. The extent to which they make use of such arrangements varies markedly across countries, reflecting the differential availability of services of this kind.

The proportion of couples using formal care services out of school hours, therefore, ranges from 50% in Denmark, 35% in Sweden and around 30% or just under in Spain and Portugal to under 15% in Greece, Ireland, Luxembourg and Finland and only around 7% in France (no data are available for Estonia). In addition, some 20% of couples make use of informal care on a regular basis in Italy, as do around 16% in Belgium and 10-15% in Greece, France, Ireland, Luxembourg and Portugal, while hardly any couples do so in the three Nordic countries. The use of informal arrangements, therefore, raises the proportion of couples with children of this age receiving out-of-school childcare to around 40% in Belgium, Italy and Portugal and to around a third in Austria, but to only around 20% in France and around 11% in Finland.

2.5. The relationship between childcare and income

The inclusion of information on childcare in EU-SILC means that its use can be related to other aspects of household circumstances, in particular to disposable income as well as to the employment characteristics of household members. Relating the use of childcare to income indicates, perhaps not unexpectedly, that the proportion of couples receiving some form of childcare tends to be smaller among those with equivalised household income below the poverty line (60% of the median in the country concerned) than among those with income above this level. (A more detailed analysis of the relationship between childcare and income remains to be undertaken.) Perhaps surprisingly, however, the relative use made of informal care arrangements tends also to be lower among the former group than the latter.

In Belgium, Luxembourg and Portugal;, the proportion of couples with a child under 3 making use of childcare is around 30 percentage points higher for those with income above the poverty line than for those below and in Ireland, over 40 percentage points higher, while in most of the other countries, it was around 20 percentage points higher or more. The one exception to the norm is Sweden, where a larger share of couples with poverty-level income used childcare than those above.

This general pattern also applies to couples with a child aged 3 to. In all countries apart from Denmark and Luxembourg, a larger share of couples with a child of this age and with income above the poverty line receive childcare than those with income below. In Greece and Ireland, the difference is around 30 percentage points, in Estonia and Portugal, over 25 percentage points and in Finland and Sweden, around 20 percentage points.

Much the same is true of couples with a child aged 6 to 11. In all countries apart from Austria, proportionately more couples in this category with income above the poverty line make use of childcare than those below, the difference being some 20 percentage points or more in Belgium, Greece, Ireland and Portugal, as well as in Norway.

In all countries and for children in all three age groups, the proportion of couples with income above the poverty line with informal care arrangements is larger than for those with poverty-level income, in many cases significantly so.

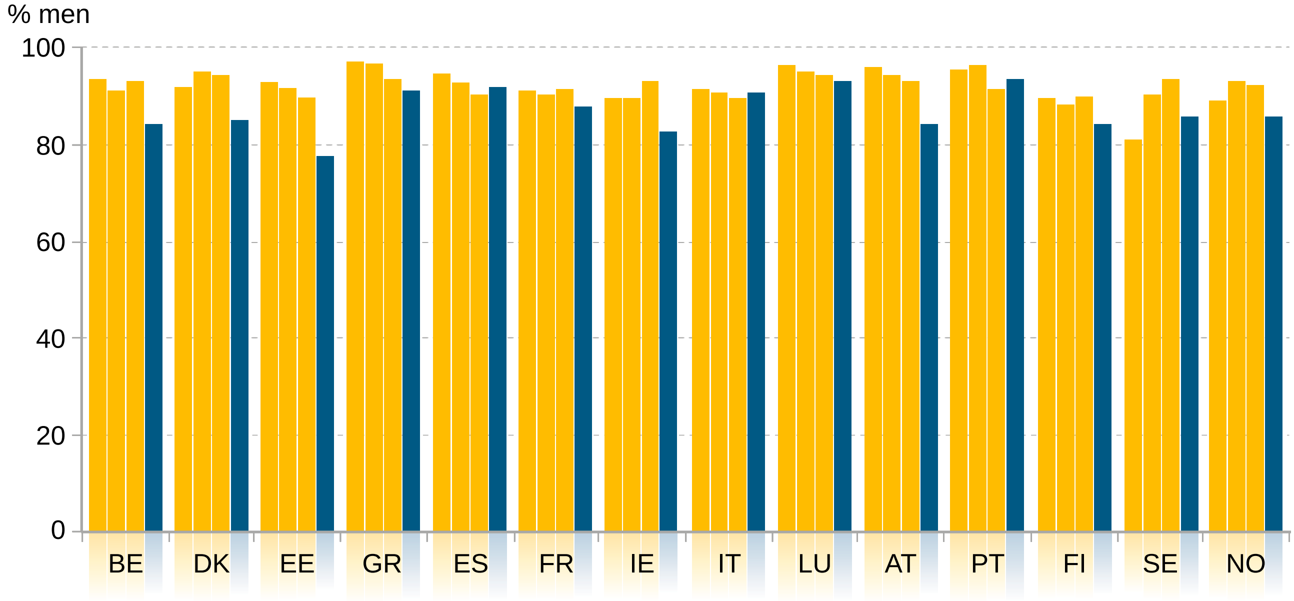
The factors underlying the apparent relationship between the use of childcare and household income, however, remain uncertain. In particular, it is by no means clear whether the direction of causation runs from the non-use of childcare to having income below the poverty line, in the sense that the need to look after a child prevents both of the parents from being in paid employment, or from having a low level of income to not being able to afford childcare. In practice, both are probably relevant, insofar as for those with relatively low earnings potential, there may be little to be gained from both partners working.

This raises a general point about the survey, in that the limitation of questions on childcare to the number of hours of care used means that it is not possible to conclude very much about these underlying factors. In particular, there is an absence of questions on the reasons for not using care as well as on the cost of care and its accessibility – in terms of location in addition to the price. Although questions on cost, in particular, might be difficult to frame and interpret, given, for example, problems of taking explicit account of government subsidies or tax concessions, the lack of information on this diminishes the value of the data collected by the survey. Moreover, problems of framing the questions to be included in the survey on these aspects do not extend to questions on why those not making use of childcare do not do so – whether because they choose not to or because they cannot afford to – which, in principle at least, would give an insight into affordability and accessibility issues.

3. The division of employment between mean and women

In practice, as data from the EU-SILC show clearly, it is women rather than men who in the great majority of households bear the main burden of caring for children and who face the challenge of reconciling this with the pursuit of a working career. Despite the relatively widespread use of childcare as described above, therefore, a significantly smaller proportion of women in couple households with children are in paid employment than men throughout the EU. In all the countries covered, with the sole exception of Sweden, around 90% of men in such households were recorded as being in work in 2004, almost all of them in full-time employment. Moreover, this proportion varies hardly at all with the age of the youngest child. In Sweden, however, only around 80% of men with a child aged under 3 were in paid employment and almost 20% were not working, whereas for those with children older than this, the proportion in work was much the same as in other countries ((Figure 4 and Table 2 which shows the employment status of women in couple households according to the employment status of men in the same households).

Figure 4. Men living a couple household with a partner aged 25 to 49, employed in full-time/ part-time job, 2004



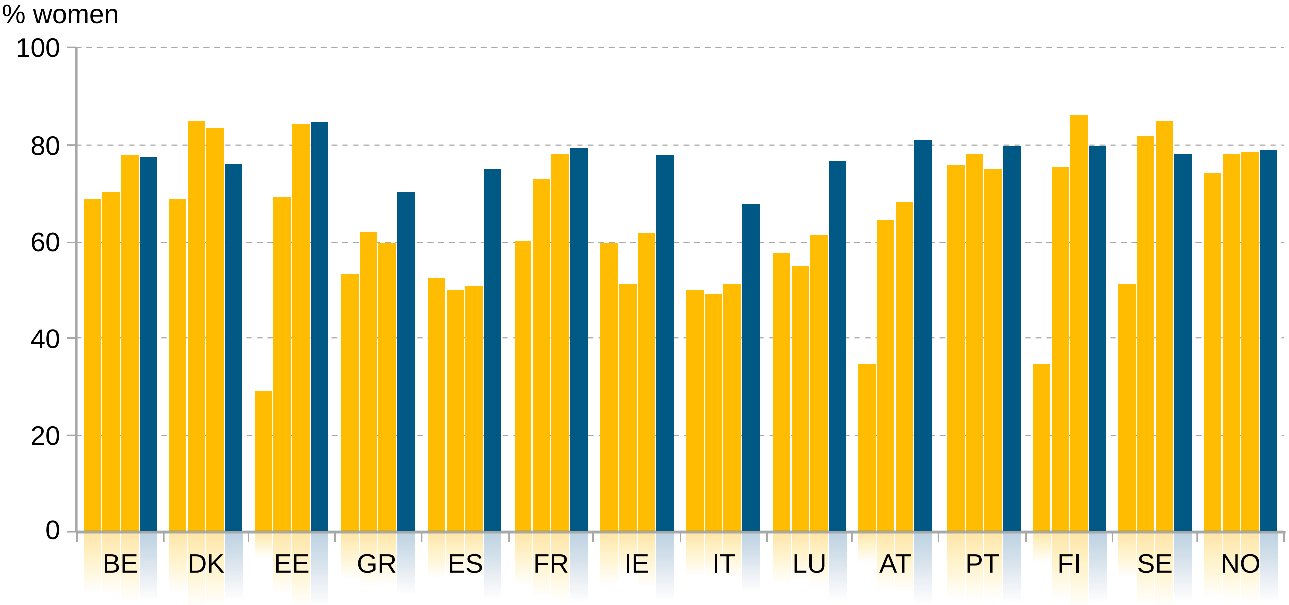
From left to right: Age of youngest child 0-2, 3-5, 6-11; No child
Source: EU-SILC XUDB 2004 - version of February 2006

In addition, in the majority of the countries – though not in the four southern EU Member States, France and Luxembourg – a large proportion of men with children were in employment than those without. (It should be noted that employment here is defined in terms of whether or not respondents consider themselves to be employed as opposed to being unemployed or inactive, instead of in terms of the ILO standard definition under which someone is regarded as employed if they work at least one hour a week.)

For women, however, having a child markedly reduces the likelihood of being in paid employment in almost all countries, especially in the early years, and equally reduces the chances of being in a full-time rather than a part-time job if they are in employment. At the same time, again in nearly all the countries, women aged 25 to 49 are less likely than men to be employed even if they do not have a child under 12. This difference is particularly pronounced in Greece and Italy, where the proportion of women in work in couple households without children was around 25 percentage points less than for men in the same households (Figure 5).

In both countries, having a child under 3 reduces the proportion of women in employment by around a further 20 percentage points, as it does in Spain, France, Ireland and Luxembourg, while in Sweden, it reduces it by some 25 percentage points, in Austria and Finland, by over 45 percentage points and in Estonia, by 55 percentage points. On the other hand, the reduction is under 10 percentage points in Belgium and Denmark, and under 5 percentage points in Portugal and Norway.

Figure 5. Women, aged 25 o 49, living in a couple household, employed in full-tome/part-time job, 2004



From left to right: Age of youngest child 0-2, 3-5, 6-11; No child
Source: EU-SILC XUDB 2004 - version of February 2006

These figures bear some relationship to the relative number of couples with children of this age receiving care, which is particularly small in Austria, Finland and Estonia.

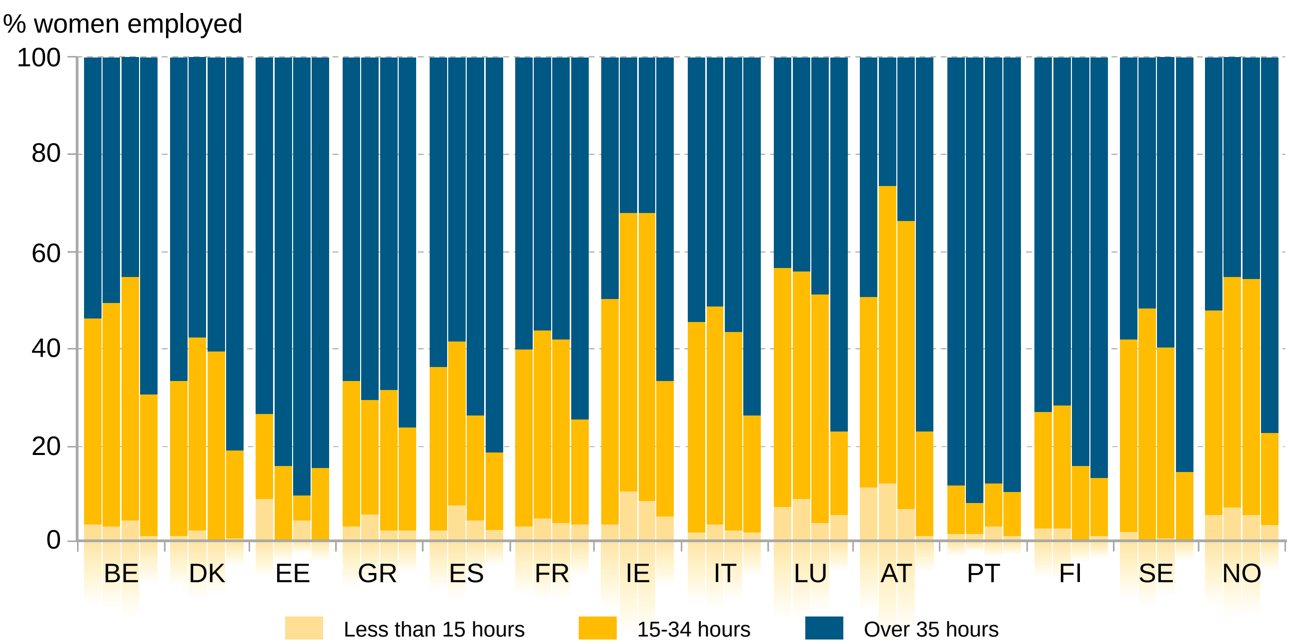
In all three of these countries, the proportion of women in work with a child aged 3 to 5 is markedly higher (65-75%), though in both Estonia and Austria, it is still some 15 percentage points less than for women without children. (For Estonia, it is difficult to reconcile this with the relatively small share of couples making use of childcare.) The proportion of women in employment is also significantly higher in Denmark and Sweden and, to a lesser extent, in France. In the other countries, however, there is relatively little difference between the employment rate of women in a couple with a child of this age and the rate for those with a child under 3. Indeed, in Spain, Ireland, Italy and Luxembourg, the proportion of women in work with a child aged 3 to 5 is actually lower and, in the first three, only around 50% (in Luxembourg, 55%). Given the results of the analysis of childcare above, there seems to be little relationship between the proportion of women in work and the relative number of couples with children of this age receiving care (in three of the four countries – all except Ireland – over 90% of couples received childcare).

While, therefore, the use of childcare might be a necessary condition for a woman to be in paid employment, it is clearly not a sufficient condition. In other words, there are other reasons for parents to send their children to pre-school or a day-care centre than being able to work.

In both Spain and Italy, moreover – as in Greece – the employment rate of women in couple households with a child aged 6 to 11 is also much the same as that for those with a child under 6 (and, therefore, only around 50%), while in Luxembourg, it is only slightly higher. In Ireland, on the other hand, it is some 10 percentage points higher, which still means, however, that it is well below the rate for women without children. The same is the case in Austria, but in the other countries, there is little or no difference between the proportion of women employed with child of 6 to 11 and that of women with no children.

Nevertheless, in most of these countries, a substantial share of the women with a child of this age work part-time rather than full-time, the exceptions being Portugal and Finland as well as Estonia, in the first of which only 12% of women work part-time and in the second, 15%, while in Estonia, the figure is under 10% (Figure 6 and Table 3 which shows the average usual hours a week worked by women aged 25 to 49 in couple households who are employed by the usual hours worked by men). In Portugal, this is reflected in a relatively large proportion of couples with a child of 6 to 11 using childcare outside of school hours, but not so in Finland, where the proportion is relatively small, and even less so in Estonia, where only 12% are recorded as making use of care.

Figure 6. Women, aged 25 to 49, living in a couple household, employed in different number of hours, 2004



From left to right: Age of youngest child 0-2, 3-5, 6-11; No child
Source: EU-SILC XUDB 2004 - version of February 2006

In Belgium as well as Norway, around 55% of women in a couple household with a child aged 6 to 11 work part-time, while in Denmark and Sweden, the figure is some 40%, in all cases considerably less than the proportion of women without children employed part-time (though in Belgium, the figure for the latter is still around 30%.). In Ireland and Austria, the proportion of women with children working part-time is even higher, at around two-thirds, which in the former, at least, is arguably a reflection of the relatively small number making use of childcare outside of school hours. In Austria, however, the number is relatively large.

Overall, therefore, there seems to be only a tenuous relationship between women's employment and the number of hours they work and the use made of childcare, as recorded by the EU-SILC. This does not mean, of course, that access to childcare is not essential for women to be able to pursue a working career but only that, as noted above, there are other reasons for using care services. But it is clearly the case that in all countries women in couple households with children are much less likely to be in employment than men and, if they are employed, much more likely to work shorter hours.

A further point to note is that there is no evidence of any greater tendency for women in couple households to be in paid employment when men are not working. On the contrary, women are less likely to be employed when their partner is not working than when he is. This is especially so in households without young children – in all of the countries, the proportion of women in employment being significant lower if their partner is not employed than he is in work – but it is also the case in most countries in households where there are young children. In Belgium, for example, only 34% of women with a child aged 3 to5 were in work in 2004 in households where their partner was not employed, whereas 73% were working in households where their partner was in full-time employment. A similar difference, though not necessarily on the same scale, is evident for couples with children in this age group in all of the countries except Luxembourg and Austria and for those with children under 3, in all countries apart from Austria again and Greece.

This suggests that there are comparatively few cases of men taking over childcare responsibilities to enable women to work and reinforces the conclusion reached above that it is women rather than men who ultimately face the challenge of reconciling the pursuit of a working career and having children.

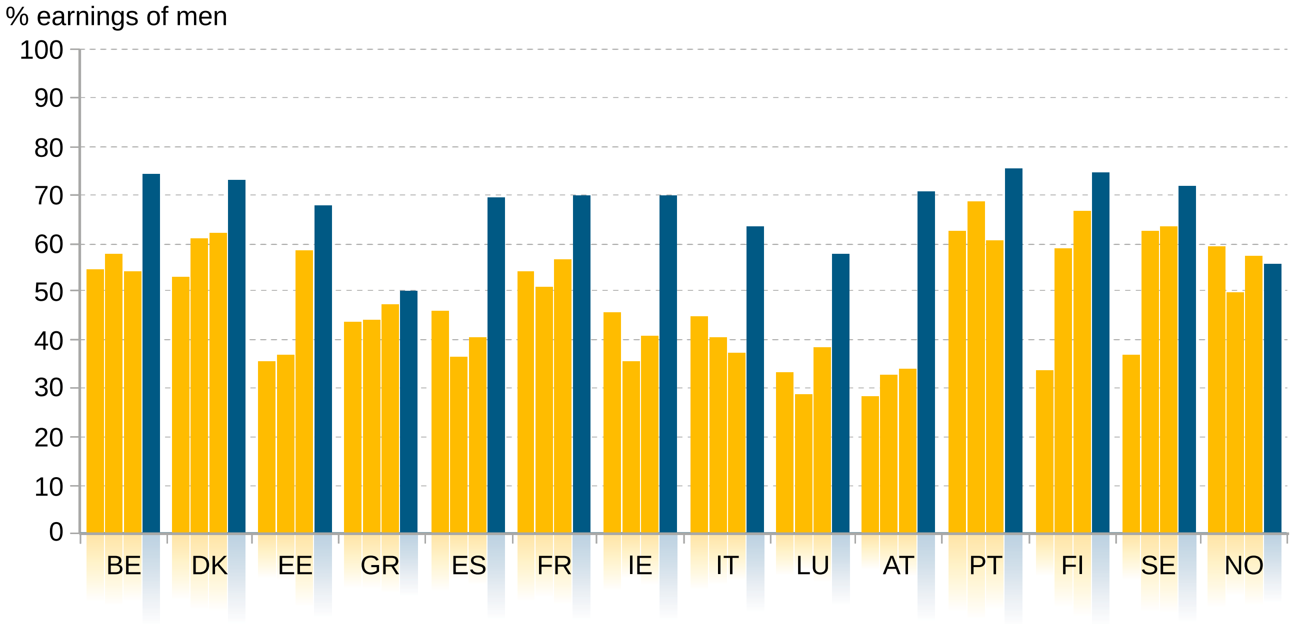
4. Women's earnings relative to men's in couple households

The smaller proportion of women in couple households in employment relative to men and the shorter hours they tend to work on average when they are employed is reflected in women contributing less in terms of earnings to household income than men. This is particularly the case in couples with young children, but it is equally evident in those without children, even if in general the extent of the difference is smaller.

This can be seen if the personal income of women aged 25 to 49 living with their spouse or partner recorded by the EU-SILC is compared with that of men in the same households. The focus here is on earnings from employment in particular which in most of such households is by far the major source of income. More specifically, the analysis is based on comparing, where possible, the gross monthly earnings of women and men in the same households, together with any gross cash profits from self-employment, adjusted to a monthly basis. In practice, gross monthly earnings data are not available for many of the countries – Denmark, Estonia, France, Luxembourg, Finland and Sweden. In these cases, 'cash or near cash employee income' is used instead, again measured in gross terms. This tends to give a slightly higher figure (when adjusted to a monthly basis) than the gross monthly earnings series in countries where the two can be compared, but ought not to affect the comparison between men's and women's earnings significantly. (It should be noted that it might give a higher figure because it includes occasional income, such as bonuses, which is not part of normal monthly earnings.) Where gross figures are not available for the income of the self-employed – as is the case in each of the four southern Member States – net figures are used instead, which has an uncertain effect on the comparisons.

These data indicate that the average earnings from employment of women in couple households without children under 12 ranged from a high of around 75% of those of men in the same households in Portugal and Finland, 73-74% in Belgium and Denmark and 70-72% in Spain, France, Ireland, Austria and Sweden to around 58% in Luxembourg, 56% in Norway and only just over 50% in Greece (Figure 7 and Table 4). This gap in earnings is partly attributable to the greater prevalence of part-time working among women than among men, though this does not account for all of the difference.

Figure 7. Women's earnings relative to men's by age of child - all couple households, 2004



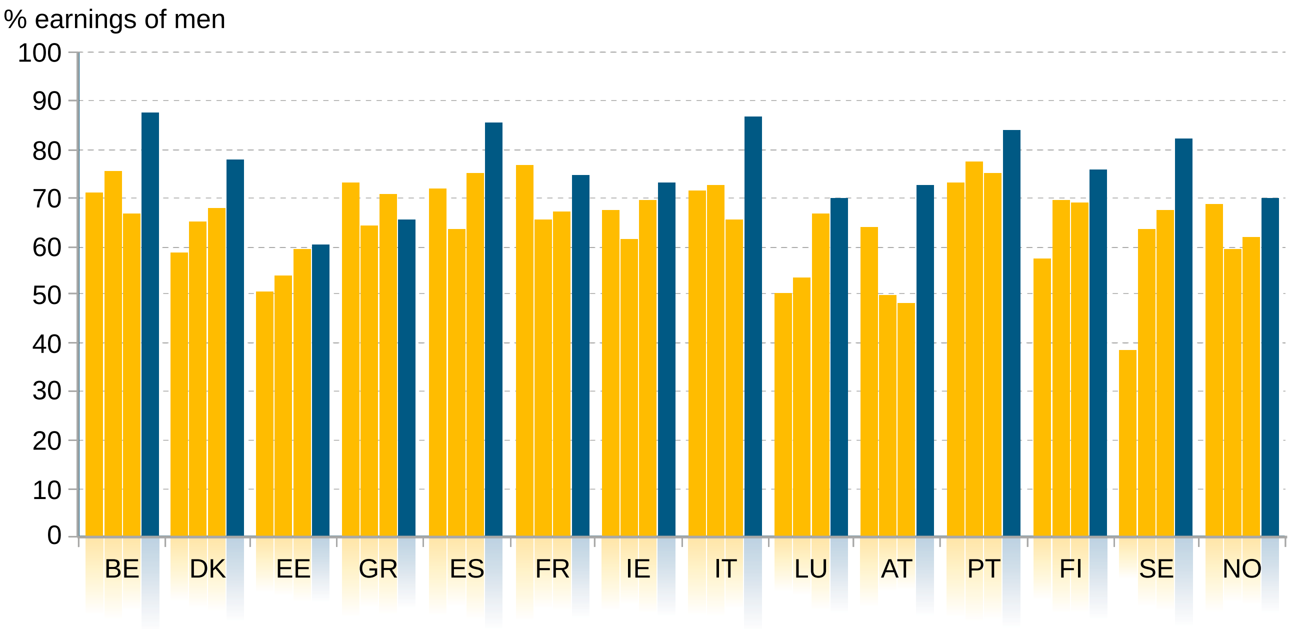
From left to right: Age of youngest child 0-2, 3-5, 6-11; No child
Source: EU-SILC XUDB 2004 - version of February 2006

In all the countries, therefore, a gap remains even after allowing for differences in working time. The extent of this gap, however, varies markedly between them, the excess of men's average earnings over those of women ranging from 7% in Italy and 9-10% in Spain and Portugal to around 40% in Greece and around 60% in Estonia (and around 55% in Norway). (It should be noted that these figures are approximate only insofar as they are based on dividing working time between broad groups of hours rather than on the specific hours usually worked by the men and women concerned. They also take no account in most cases of differences in the average number of months worked during the year, though they do to some extent - implicitly – in the countries for which annual data on employee income have been used rather than gross monthly earnings.)

For couples with young children, the gap between men's earnings and those of women is, in all countries, with the partial exception of Norway, wider still. This again partly reflects the relatively large number of women who work part-time instead of full-time as well as the smaller proportion of women than men in paid employment at all. But again, these two factors explain only part of the gap. Moreover, contrary to what might be expected, in many of the countries, the contribution of women to household income, according to the SILC data, is not closely related to the age of their youngest child, which partly reflects the fact, noted above, that in a number of countries, the employment rate of women does not seem to vary with this.

The average gross earnings of women in couple households with a child under 3, therefore, varies from around 63% of that of their male partner in Portugal, around 60% in Norway and just under 55% in Belgium, Denmark and France, to only just over 35% in Estonia and Sweden, around a third in Luxembourg and Finland and under 30% in Austria. Some of this is explicable in terms of a significant proportion of women in such circumstances not being in work but caring for their child instead. But even allowing for this, by comparing the earnings of women and men when both are in work, there is still a considerable gap between the two. In all countries, the earnings of women are on average less than 80% of those of men (Figure 8).

Figure 8. Women's earnings relative to men's by age of child - couple households with both partners employed, 2004

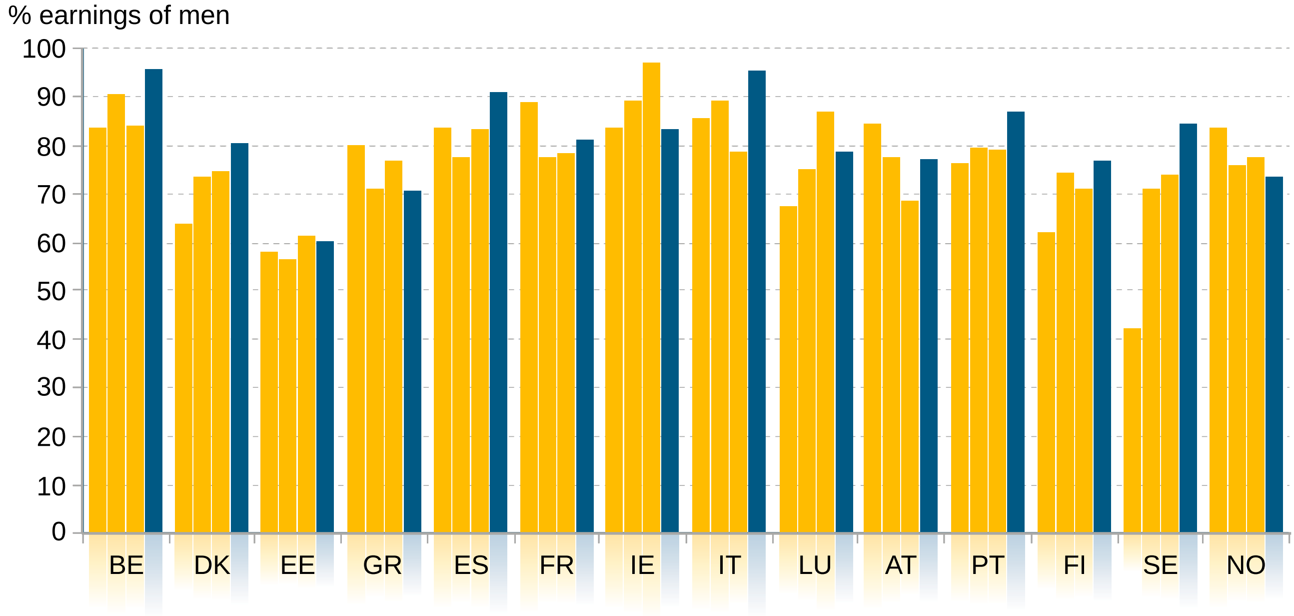


From left to right: Age of youngest child 0-2, 3-5, 6-11; No child
Source: EU-SILC XUDB 2004 - version of February 2006

This again can only partly be attributed to a significant number of them working part-time. Even after adjusting for hours worked, earnings of women in work with children are over 10% less than those of men in all countries, with the sole exception of women with a child aged 3-5 in Belgium and with one aged 6-11 in Ireland (Figure 9).

Although the relative number of women in work tends to rise as children grow older, in 6 of the 14 countries, the average earnings of women as compared with those of men are lower for those whose youngest child is aged 3 to 5 than for those with a child aged under 3. Moreover, in half the remaining countries, the earnings of women relative to men are only slightly higher for those with a child over 3 than for those with a child younger than this. In most countries, therefore, the gap between men's and women's earnings for couples with a child aged 3 to 5 is wider once allowance is made for differences in their average employment rate and working time than for those with a child under 3.

Figure 9. Women's earnings relative to men's, adjusted for hours worked, by age of child - couple households with both partners employed, 2004



From left to right: Age of youngest child 0-2, 3-5, 6-11; No child
Source: EU-SILC XUDB 2004 - version of February 2006

Much the same is true for couples with the youngest child aged 6 to 11 as compared with those with a child aged 3 to 5. In general, the earnings of women in such households are little if any higher relative to those of men than in the case of women with a child under 6 and in some countries, they are lower.

5. Concluding remarks

The general conclusion, therefore, is that women in couple households contribute much less to income than men in all the countries covered by the 2004 EU-SILC data, the more so when they have young children. In most of the countries, women's earnings on average amount to around half or less of men's when they have a child under 12, and the specific age of the child makes comparatively little difference in this respect. The conventional assumption that men and women in such households share the income they both individually receive equally between them needs to be considered against this background. While the assumption might be valid, there is clearly a greater likelihood that women in practice receive less than implied by this assumption than that they receive more.

It is equally arguable that it is relevant to take account of women's earnings relative to men's in the way that has been done above in order to obtain a more complete picture of the position of women as compared with men, just as it is relevant to take account of their labour market situation and their relative access to employment. The accessibility of childcare, in terms of both its affordability and the convenience of the location of the services provided, is also more than relevant in this regard , since for most women, the availability of childcare is essential if they have young children and wish to pursue a working career . Even though these aspects are not covered by the EU-SILC, the survey can still throw light on the extent to which households make use of childcare in different countries and how this is linked to employment and income. hile no specific indicators additional to those at present in use have been proposed above, the analysis suggests:

first, that the form in which the present indicator on childcare is framed should be reconsidered to incorporate households' use of care explicitly;

secondly, that there is some policy relevance in monitoring the division of employment between women and men living in the same household, especially those with young children, since this is indicative of the way that caring responsibilities are shared between them;

thirdly, that it is equally relevant to monitor the extent to which women and men contribute to household income, especially as regards their earnings from employment, which in some degree is related to their relative rates of employment and differences in the hours they work but also reflects the continuing pay gap between men and women. This arguably provides a useful indicator to supplement comparisons of equivalised disposable income between women and men – or more specifically the indicator of their relative risk of poverty based on this.

Tables

Annex

Table 1. The proportion of couple households in which the woman is aged 25-49 making use of childcare, 2004

% of total households in each category

	BE			DK			EE			GR			ES			FR			IE		
	Age of child:			Age of child:			Age of child:			Age of child:			Age of child:			Age of child:			Age of child:		
	0-2	3-5	6-11	0-2	3-5	6-11	0-2	3-5	6-11	0-2	3-5	6-11	0-2	3-5	6-11	0-2	3-5	6-11	0-2	3-5	6-11
Total couple households																					
Formal	36.3	65.3	0.7	67.7	94.1	19.0	5.6	13.9	4.7	9.1	43.8	6.1	39.7	90.3	4.6	36.7	73.6	5.7	26.7	29.5	1.3
Informal	12.6		0.2	1.1	0.6	0.1	12.8	13.6	6.5	35.8	13.4	0.5	9.8	0.6		10.6	0.7		12.1	4.6	0.7
Formal + informal	8.9	25.0					1.1	1.1	0.5	4.8	22.6	1.8	4.3	6.3	0.0	9.9	20.5	1.8	4.5	5.5	
Compulsary school	0.0	5.3	56.2	0.0	0.0	29.0				0.0	0.0	65.6	0.0	0.0	64.8	0.0	1.2	72.6	0.0	27.8	66.6
School + formal		0.7	19.0			51.1						10.9			26.9		0.1	4.8		3.3	9.2
School + informal		1.8	15.0									10.9			1.4		0.4	12.8		6.2	11.9
School + formal + informal		0.2	3.9									2.4			1.5			1.8		2.5	4.9
Total childcare	57.8	93.0	38.9	68.9	94.7	70.2	19.5	28.5	11.8	49.7	79.8	32.7	53.8	97.2	34.5	57.2	95.3	27.0	43.3	51.7	28.1
Childcare + school	57.8	98.3	95.1	68.9	94.7	99.2	0.0	0.0	0.0	49.7	79.8	98.4	53.8	97.2	99.3	57.2	96.6	99.6	43.3	79.5	94.7
Households with income above poverty line																					
Formal	38.2	63.0	0.5	68.9	93.9	18.6	6.4	16.5	4.3	10.7	44.4	6.0	41.4	90.2	4.9	38.3	73.0	5.4	29.6	30.9	1.5
Informal	13.8		0.2	1.2	0.6	0.1	16.4	14.8	6.8	36.5	14.9	0.6	10.8	0.4		11.1	0.8		13.2	4.9	0.9
Formal + informal	9.8	27.2					1.4	1.3	0.6	5.7	24.9	1.8	5.0	6.8	0.1	10.2	21.6	2.0	5.0	6.2	
Compulsary school	0.0	5.8	54.7	0.0	0.0	28.4				0.0	0.0	62.0	0.0	0.0	62.0	0.0	1.1	71.8	0.0	27.2	64.7
School + formal		0.8	19.6			52.0						12.1			29.4		0.1	5.3		3.8	10.1
School + informal		2.0	16.4									12.9			1.6		0.4	13.6		7.2	13.1
School + formal + informal		0.3	4.0									3.0			1.8			1.6		2.9	5.5
Total childcare	61.7	93.3	40.8	70.1	94.5	70.7	24.3	32.6	11.7	52.8	84.2	36.5	57.1	97.5	37.7	59.6	96.0	28.0	47.8	55.9	31.1
Childcare + school	61.7	99.2	95.5	70.1	94.5	99.1	0.0	0.0	0.0	52.8	84.2	98.5	57.1	97.5	99.8	59.6	97.1	99.8	47.8	83.1	95.7
Households with income below poverty line																					
Formal	23.4	84.4	2.2	56.5	97.1	25.9	2.9		6.8		40.1	6.8	30.7	90.5	3.9	20.4	79.2	8.3	1.6	20.5	
Informal	4.4							6.8	5.1	31.3	4.0		4.0	1.4		6.2			3.0	2.5	
Formal + informal	3.2	5.6									8.3	1.5	0.7	4.2		6.7	10.4			1.4	
Compulsary school	0.0	1.3	70.0	0.0	0.0	36.9				0.0	0.0	80.6	0.0	0.0	72.8	0.0	2.3	80.1	0.0	31.7	78.7
School + formal			13.8			37.2						6.0			19.7			0.6			3.8
School + informal			2.2									2.8			0.8			5.2			4.4
School + formal + informal			2.6												0.8			4.1			0.9
Total childcare	31.1	90.1	20.8	56.5	97.1	63.1	2.9	6.8	11.9	31.3	52.5	17.2	35.4	96.1	25.2	33.3	89.6	18.2	4.6	24.4	9.1
Childcare + school	31.1	91.4	90.7	56.5	97.1	100.0	0.0	0.0	0.0	31.3	52.5	97.8	35.4	96.1	98.1	33.3	91.9	98.2	4.6	56.1	87.8

Note: 'Formal' covers pre-school, day-care centre, centre-based services and professional child-minders; 'informal' covers all kinds of informal arrangements (with granspharents, ect).
The poverty line is defined as 60% of the national median equivalised income.

Source: EU-SILC, 2004.

Table 1. The proportion of couple households in which the woman is aged 25-49 making use of childcare, 2004 (cont'd)

% of total households in each category

	IT			LU			AT			PT			FI			SE			NO		
	Age of child:			Age of child:			Age of child:			Age of child:			Age of child:			Age of child:			Age of child:		
	0-2	3-5	6-11	0-2	3-5	6-11	0-2	3-5	6-11	0-2	3-5	6-11	0-2	3-5	6-11	0-2	3-5	6-11	0-2	3-5	6-11
Total couple households																					
Formal	18.8	57.5		26.1	65.5	9.9	10.8	52.7	8.1	37.1	66.2	8.9	22.1	78.5	16.1	46.8	81.9	14.3	36.7	84.8	1.5
Informal	17.5	1.3		20.1	7.0	0.5	16.6	6.0	0.1	21.4	7.2	0.9	0.9	0.4	0.1	0.9	0.2	0.3	4.6	1.7	0.1
Formal + informal	7.8	30.5		7.5	20.5	6.3	3.2	21.5	1.7	4.4	13.4	2.9		0.3	0.2	1.0	2.0	0.2	3.8	3.9	
Compulsary school	0.0	2.8	59.0	0.0	0.0	53.0	0.0	0.0	55.4	0.0	0.1	40.7	0.0	0.0	70.7	0.0	0.0	43.3	0.0	0.0	61.3
School + formal		1.0	13.6			12.5			22.8		0.4	28.2			10.5			34.8			30.6
School + informal		1.1	17.9			13.0			8.0			10.5			0.3			0.8			5.1
School + formal + informal		0.5	9.5			1.1			2.9			2.2			0.3			0.4			0.8
Total childcare	44.1	92.0	41.0	53.8	92.9	43.3	30.6	80.2	43.6	62.9	87.2	53.7	23.0	79.3	27.5	48.8	84.1	50.8	45.0	90.5	38.2
Childcare + school	44.1	94.8	100.0	53.8	92.9	96.3	30.6	80.2	99.0	62.9	87.3	94.5	23.0	79.3	98.2	48.8	84.1	94.1	45.0	90.5	99.4
Households with income above poverty line																					
Formal	19.3	56.1		26.0	62.0	8.5	11.3	51.4	8.4	40.3	68.3	9.6	24.1	80.0	16.3	46.1	83.1	14.3	37.4	86.2	1.6
Informal	19.7	1.4		24.0	8.0	0.7	17.3	6.2	0.2	22.9	7.4	1.1	0.9	0.4	0.1	0.5	0.2	0.3	4.0	1.1	0.1
Formal + informal	8.9	33.5		9.3	22.6	6.3	3.7	22.9	1.9	5.2	15.7	3.5		0.4	0.1	1.1	2.1	0.1	3.8	4.2	
Compulsary school	0.0	2.4	55.4	0.0	0.0	50.7	0.0	0.0	56.1	0.0	0.1	35.1	0.0	0.0	70.2	0.0	0.0	43.3	0.0	0.0	60.2
School + formal		0.9	13.7			13.6			21.6		0.5	31.4			10.8			35.0			31.9
School + informal		1.3	19.8			14.7			8.2			11.4			0.3			0.9			5.0
School + formal + informal		0.7	11.0			1.3			3.0			2.8			0.3			0.4			0.9
Total childcare	47.9	93.8	44.6	59.2	92.7	45.1	32.3	80.5	43.2	68.4	91.9	59.8	25.0	80.8	27.9	47.7	85.5	51.1	45.2	91.5	39.5
Childcare + school	47.9	96.1	100.0	59.2	92.7	95.8	32.3	80.5	99.3	68.4	92.0	94.9	25.0	80.8	98.1	47.7	85.5	94.4	45.2	91.5	99.7
Households with income below poverty line																					
Formal	16.5	63.3		26.9	88.1	16.7	7.1	58.9	6.0	18.4	56.6	6.8	3.5	61.9	13.8	53.2	64.0	13.4	25.3	64.6	
Informal	8.2	1.2		3.9			11.3	5.2		12.3	6.3	0.4		0.5		4.7			14.0	11.5	
Formal + informal	3.5	18.8		0.1	6.3	6.4		14.4			3.1	1.1			0.9			1.9	3.7		
Compulsary school	0.0	4.5	71.2	0.0	0.0	64.3	0.0	0.0	49.8	0.0	0.0	58.9	0.0	0.0	76.1	0.0	0.0	43.3	0.0	0.0	77.6
School + formal		1.5	13.0			7.1			32.5			17.9			7.5			32.2			9.9
School + informal			11.5			4.6			6.3			7.7									7.5
School + formal + informal		0.1	4.3						1.9			0.3									
Total childcare	28.3	84.9	28.8	30.9	94.5	34.8	18.4	78.5	46.6	30.7	65.9	34.3	3.5	62.5	22.1	57.9	64.0	47.5	43.0	76.1	17.4
Childcare + school	28.3	89.4	100.0	30.9	94.5	99.1	18.4	78.5	96.5	30.7	65.9	93.2	3.5	62.5	98.3	57.9	64.0	90.7	43.0	76.1	95.0

Note: 'Formal' covers pre-school, day-care centre, centre-based services and professional child-minders; 'informal' covers all kinds of informal arrangements (with granspärents, ect).
The poverty line is defined as 60% of the national median equivalised income.

Source: EU-SILC, 2004.

Table 2. Employment of men and women in couple households where the woman is aged 25-49, 2004

% men/women in households in each category

		BE				DK				EE				GR				ES			
		Age of child:			No	Age of child:			No	Age of child:			No	Age of child:			No	Age of child:			No
MEN	WOMEN	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child
Working full-time																					
	Working full-time	40.4	34.8	38.8	59.3	53.6	55.8	56.5	69.6	23.8	65.4	78.2	84.7	44.5	54.0	49.8	62.8	35.8	33.4	39.9	65.5
	Working part-time	30.6	38.3	40.1	22.2	17.1	29.8	27.5	12.0	7.4	7.6	6.2	7.1	7.3	8.4	9.3	7.8	16.9	16.6	10.6	11.8
	Not working	29.0	26.9	21.1	18.6	29.2	14.3	16.0	18.3	68.8	27.0	15.6	8.2	48.2	37.6	40.9	29.3	47.3	50.0	49.5	22.7
Men full-time, total		91.5	85.0	90.8	80.0	89.1	92.9	92.8	80.2	88.5	91.1	86.7	74.9	95.4	93.9	92.9	87.6	92.5	91.2	88.9	89.2
Working part-time																					
	Working full-time	48.3	37.1	35.0	43.3	36.4	73.5	57.0	55.1	0.0	0.0	85.5	47.7	51.5	73.8	62.5	30.1	55.0	49.8	44.0	47.3
	Working part-time	0.0	38.4	53.0	37.3	36.1	26.5	13.9	17.0	15.8	0.0	14.5	0.0	46.7	0.0	32.1	46.0	10.5	41.9	22.2	29.9
	Not working	51.7	24.6	12.0	19.5	27.5	0.0	29.1	27.9	84.2	100.0	0.0	52.3	1.8	26.2	5.5	23.9	34.5	8.3	33.8	22.7
Men part-time, total		1.9	6.2	2.5	4.3	2.8	2.2	1.5	5.0	4.2	0.6	2.9	2.8	2.0	2.9	0.8	3.4	2.1	1.4	1.4	2.6
Not working																					
	Working full-time	27.7	18.8	49.8	26.6	43.5	53.0	63.3	38.4	11.1	21.1	74.0	62.4	71.3	41.8	53.6	45.6	36.1	23.2	35.0	32.5
	Working part-time	16.7	15.1	2.7	26.9	0.0	9.9	10.4	7.5	0.0	9.9	1.1	2.1	0.0	0.0	6.8	12.6	5.4	13.5	15.2	12.0
	Not working	55.7	66.0	47.5	46.5	56.5	37.2	26.3	54.0	88.9	69.1	24.9	35.4	28.7	58.2	39.6	41.8	58.5	63.2	49.8	55.6
Men not working		6.6	8.8	6.7	15.8	8.1	4.9	5.7	14.8	7.4	8.3	10.5	22.4	2.6	3.2	6.3	9.0	5.4	7.4	9.7	8.2
Women full-time total		39.7	33.5	39.4	53.4	52.3	56.1	56.9	64.3	21.9	61.3	78.0	78.7	45.3	54.2	50.1	60.2	36.2	32.9	39.5	62.4
Women part-time total		29.1	36.3	37.9	23.6	16.3	28.8	26.3	11.6	7.2	7.8	5.9	5.8	7.9	7.9	9.3	9.6	16.1	16.7	11.2	12.3

Note: Employment status is self-defined.
Source: EU-SILC, 2004.

Table 2. Employment of men and women in couple households where the woman is aged 25-49, 2004 (cont'd)

% men/women in households in each category

		FR				IE				IT				LU				AT			
		Age of child:			No	Age of child:			No	Age of child:			No	Age of child:			No	Age of child:			No
MEN	WOMEN	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child
Working full-time																					
	Working full-time	40.0	44.1	49.6	69.8	38.4	33.1	32.4	68.7	31.5	35.3	35.9	58.5	54.9	49.1	58.2	75.2	17.8	21.3	27.9	68.4
	Working part-time	21.0	30.1	29.7	14.0	23.5	21.6	29.0	18.0	18.6	15.5	16.2	10.4	4.0	4.2	2.2	4.2	14.9	41.8	41.2	14.8
	Not working	39.0	25.8	20.6	16.2	38.1	45.2	38.5	13.2	49.9	49.2	47.9	31.1	41.2	46.7	39.6	20.6	67.4	36.9	30.9	16.8
Men full-time, total		87.3	87.3	89.3	84.6	87.0	87.7	88.9	78.7	89.3	89.2	87.4	88.8	96.5	95.3	94.5	93.2	93.6	90.9	92.0	80.8
Working part-time																					
	Working full-time	37.5	60.3	33.1	40.1	55.3	0.0	43.4	36.8	33.7	21.6	25.4	27.6	0.0	0.0	0.0	0.0	20.6	27.9	45.6	55.7
	Working part-time	43.4	19.6	30.0	23.3	0.0	0.0	46.8	27.0	24.0	24.5	11.5	30.5	0.0	0.0	0.0	0.0	57.9	54.6	22.3	22.8
	Not working	19.1	20.1	36.9	36.6	44.7	100.0	9.8	36.2	42.3	53.8	63.1	41.9	0.0	0.0	0.0	0.0	21.5	17.6	32.2	21.5
Men part-time, total		3.9	3.3	2.4	3.5	2.4	1.9	4.1	4.2	2.0	1.7	2.1	1.8	0.0	0.0	0.0	0.0	2.4	3.6	1.4	3.6
Not working																					
	Working full-time	27.8	32.5	44.5	39.9	21.1	25.6	20.7	31.9	35.8	23.3	31.0	45.0	23.8	68.7	69.8	35.9	32.6	46.5	24.1	61.5
	Working part-time	11.5	22.6	23.9	11.7	18.8	4.4	23.9	6.5	7.8	7.2	14.0	9.2	0.3	13.9	0.6	0.0	23.9	25.1	25.6	7.6
	Not working	60.7	44.9	31.6	48.4	60.0	70.0	55.5	61.6	56.4	69.6	55.0	45.8	75.9	17.4	29.6	64.1	43.5	28.4	50.4	30.9
Men not working		8.9	9.4	8.4	11.9	10.5	10.5	7.0	17.2	8.6	9.0	10.5	9.4	3.5	4.7	5.5	6.8	4.0	5.5	6.6	15.6
Women full-time total		38.8	43.5	48.8	65.2	37.0	31.7	32.1	61.1	32.0	33.9	35.2	56.6	53.8	50.0	58.8	72.6	18.4	22.9	27.9	66.9
Women part-time total		21.0	29.0	29.3	14.0	22.4	19.4	29.4	16.4	17.7	14.9	15.9	10.7	3.8	4.6	2.1	3.9	16.3	41.3	39.9	14.0

Note: Employment status is self-defined.
Source: EU-SILC, 2004.

Table 2. Employment of men and women in couple households where the woman is aged 25-49, 2004 (cont'd)

% men/women in households in each category

		PT				FI				SE				NO			
		Age of child:			No	Age of child:			No	Age of child:			No	Age of child:			No
MEN	WOMEN	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child
Working full-time																	
	Working full-time	71.1	73.6	67.9	72.6	30.0	68.1	80.1	76.7	31.5	42.5	53.2	70.2	54.3	51.9	53.2	70.9
	Working part-time	6.3	4.5	8.5	7.0	5.0	11.7	7.2	6.2	21.5	40.3	33.4	11.1	23.5	27.0	26.0	8.8
	Not working	22.5	21.9	23.6	20.4	65.1	20.2	12.7	17.0	46.9	17.3	13.4	18.7	22.1	21.2	20.8	20.2
Men full-time, total		94.2	94.7	89.8	92.2	88.0	86.3	88.3	81.4	76.6	88.9	89.8	82.5	86.5	91.8	90.9	84.6
Working part-time																	
	Working full-time	48.2	65.5	75.8	75.4	43.6	36.6	90.0	55.2	39.2	38.2	47.2	53.0	34.0	54.2	73.4	50.0
	Working part-time	0.0	34.5	0.0	24.6	31.3	18.6	1.4	23.7	6.2	32.2	25.7	19.7	16.2	37.1	26.6	50.0
	Not working	51.8	0.0	24.2	0.0	25.2	44.7	8.5	21.1	54.6	29.6	27.1	27.3	49.9	8.7	0.0	0.0
Men part-time, total		1.4	1.6	1.6	1.4	1.5	2.3	1.9	2.9	4.4	1.3	3.9	3.5	2.6	1.6	1.5	1.5
Not working																	
	Working full-time	44.6	47.4	51.0	67.1	20.1	38.8	65.6	54.9	27.8	41.1	53.9	45.9	34.6	41.4	55.5	54.6
	Working part-time	0.0	20.8	6.1	9.3	4.3	6.6	8.7	6.6	15.2	30.6	9.9	12.9	13.4	18.3	8.8	15.6
	Not working	55.4	31.8	42.9	23.5	75.6	54.5	25.7	38.5	57.0	28.4	36.2	41.2	52.0	40.3	35.7	29.8
Men not working		4.4	3.7	8.6	6.4	10.5	11.5	9.9	15.6	19.0	9.8	6.3	14.0	10.9	6.6	7.6	13.9
Women full-time total		69.6	72.5	66.6	72.3	29.1	64.0	78.8	72.7	31.2	42.3	53.0	66.2	51.7	51.2	53.7	68.4
Women part-time total		5.9	5.6	8.2	7.4	5.3	11.2	7.3	6.8	19.7	39.2	31.6	11.6	22.2	26.5	24.7	10.4

Note: Employment status is self-defined.
Source: EU-SILC, 2004.

Table 3. Average usual hours worked per week in couple households where the woman is aged 25-49, 2004

% men/women in households in each category of household

		BE				DK				EE				GR				ES			
		Age of child:			No	Age of child:			No	Age of child:			No	Age of child:			No	Age of child:			No
MEN	WOMEN	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child
< 15 hours																					
	< 15 hours	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	part-time	0	0	44	0	0	0	0	0	0	0	0	0	0	0	100	0	0	100	0	0
	long part-time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
	full-time	0	0	56	0	0	0	100	100	0	0	100	100	0	100	0	0	0	0	0	100
< 15 hours total		0	0	1	0	0	0	0	0	0	0	3	1	0	2	0	0	0	0	1	0
Part-time (15-29)																					
	< 15 hours	0	0	0	7	42	0	0	5	0	0	0	0	0	0	0	10	0	0	34	0
	part-time	56	17	21	17	21	0	0	12	31	0	0	0	22	39	22	56	14	24	18	0
	long part-time	17	0	13	10	36	0	0	6	0	0	51	0	5	0	0	0	0	33	0	58
	full-time	26	83	66	66	0	100	100	78	69	100	49	100	73	61	78	34	86	44	48	42
Part-time total		2	6	3	4	1	1	1	4	7	1	1	4	5	6	5	6	3	2	2	2
Part-time (30-34)																					
	< 15 hours	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0
	part-time	0	0	13	37	19	13	20	30	0	16	0	0	43	0	21	70	31	0	0	16
	long part-time	56	49	31	12	0	27	36	0	0	0	0	100	4	0	46	30	13	42	40	0
	full-time	44	51	37	50	81	60	44	70	100	84	100	0	54	100	33	0	56	58	42	84
Long part-time total		2	2	2	4	2	3	1	3	1	1	0	2	4	0	6	1	3	3	2	1
Full-time (35+)																					
	< 15 hours	4	3	4	1	1	2	0	0	9	0	4	0	3	6	2	2	2	8	3	2
	part-time	22	33	36	19	10	16	13	8	17	13	5	4	14	17	16	13	28	25	14	10
	long part-time	20	16	15	10	22	25	26	10	0	3	0	10	16	7	11	5	7	8	7	6
	full-time	55	49	45	71	67	58	61	82	74	84	91	86	67	71	71	81	64	60	76	83
Full-time total		96	92	95	92	98	96	98	93	92	98	96	93	91	91	88	93	95	95	96	97
overal division of women employed		3	3	4	1	1	2	0	0	8	0	4	0	3	5	2	2	2	7	4	2
	part-time	22	31	35	20	10	15	13	8	18	13	4	4	15	18	16	16	27	24	14	9
	long part-time	20	15	15	10	22	24	26	9	0	3	1	11	15	6	13	5	7	9	8	6
	full-time	54	51	45	70	67	58	61	82	74	85	91	85	67	71	69	77	64	59	74	82

Source: EU-SILC.

Table 3. Average usual hours worked per week in couple households where the woman is aged 25-49, 2004 (cont'd)

% men/women in households in each category of household

		FR				IE				IT				LU				AT			
		Age of child:			No	Age of child:			No	Age of child:			No	Age of child:			No	Age of child:			No
MEN	WOMEN	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child
< 15 hours																					
	< 15 hours	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
	part-time	0	0	0	0	0	0	40	100	29	58	0	0	0	0	0	0	0	0	0	0
	long part-time	62	0	100	24	0	100	28	0	10	0	74	0	0	0	0	0	0	0	0	0
	full-time	38	100	0	76	0	0	32	0	61	42	26	95	0	0	0	0	100	0	0	100
< 15 hours total		0	1	0	1	0	1	3	1	1	1	0	0	0	0	0	0	2	0	0	1
Part-time (15-29)																					
	< 15 hours	11	0	6	0	0	0	0	0	1	13	0	0	33	0	0	1	51	41	26	0
	part-time	48	29	53	34	22	0	16	65	29	55	52	40	2	0	0	31	49	59	42	29
	long part-time	0	6	0	0	9	0	30	0	25	0	7	6	0	0	3	0	0	0	0	29
	full-time	41	65	41	66	69	0	55	35	45	32	41	55	65	100	97	68	0	0	32	42
Part-time total		3	3	3	2	4	0	3	4	3	4	3	2	1	2	1	1	3	2	1	4
Part-time (30-34)																					
	< 15 hours	0	11	0	11	0	0	0	0	0	12	0	6	0	0	0	0	0	0	0	0
	part-time	45	27	22	10	19	100	43	16	41	38	39	31	55	0	100	0	0	48	0	34
	long part-time	20	20	32	24	24	0	0	42	43	23	17	0	0	0	0	5	0	0	0	0
	full-time	35	41	46	55	58	0	57	42	16	27	44	63	45	0	0	95	100	52	0	66
Long part-time total		4	3	3	4	3	1	5	5	1	2	2	2	2	0	1	1	2	2	0	2
Full-time (35+)																					
	< 15 hours	3	4	4	3	4	10	9	5	2	3	2	1	7	8	4	5	10	11	6	1
	part-time	23	24	22	12	36	41	48	19	32	34	32	18	40	46	41	14	33	50	47	15
	long part-time	13	15	15	9	11	16	13	6	11	11	8	6	10	2	6	3	8	12	13	5
	full-time	62	56	60	76	49	33	30	71	56	53	57	75	43	43	49	77	50	27	34	79
Full-time total		93	92	94	93	94	98	89	90	96	94	95	96	96	98	98	98	93	96	99	93
overal division of women employed		3	4	4	3	3	10	8	5	2	3	2	1	7	8	4	5	11	12	6	1
	part-time	24	25	23	13	35	41	47	21	32	35	33	19	40	45	41	14	32	50	47	16
	long part-time	13	15	15	9	11	16	13	7	11	10	8	6	10	2	6	3	7	12	13	6
	full-time	60	56	59	75	50	32	32	67	55	51	57	74	44	44	49	77	50	26	34	78

Source: EU-SILC.

Table 3. Average usual hours worked per week in couple households where the woman is aged 25-49, 2004 (cont'd)

% men/women in households in each category of household

		PT				FI				SE				NO			
		Age of child:			No	Age of child:			No	Age of child:			No	Age of child:			No
MEN	WOMEN	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child
< 15 hours																	
	< 15 hours	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	36
	part-time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
	long part-time	100	0	0	0	0	43	0	0	0	0	0	0	0	0	0	0
	full-time	0	0	0	0	100	21	100	100	0	0	0	100	100	0	100	55
< 15 hours total		0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	3
Part-time (15-29)																	
	< 15 hours	0	0	0	0	4	0	3	17	0	0	0	0	0	0	0	0
	part-time	0	0	0	0	12	18	6	9	26	0	33	14	17	34	50	13
	long part-time	0	0	0	61	19	30	30	3	0	0	7	14	8	0	0	7
	full-time	100	100	100	39	65	52	62	71	74	100	60	72	75	66	50	80
Part-time total		0	1	1	1	4	3	1	3	2	1	3	2	3	2	3	4
Part-time (30-34)																	
	< 15 hours	0	0	0	0	0	0	0	0	0	0	0	0	10	0	8	0
	part-time	0	0	0	0	0	11	7	7	0	0	19	22	24	43	24	48
	long part-time	0	0	100	35	39	37	14	27	0	100	12	18	9	18	28	0
	full-time	0	0	0	65	61	52	79	67	100	0	69	60	57	39	40	52
Long part-time total		0	0	1	1	3	5	2	3	3	1	3	2	3	4	3	1
Full-time (35+)																	
	< 15 hours	1	1	3	1	2	3	0	0	1	0	0	0	5	8	5	3
	part-time	8	5	6	8	13	8	7	5	12	12	13	8	28	29	31	12
	long part-time	2	1	2	1	11	15	8	6	29	35	26	5	15	19	19	7
	full-time	89	92	89	91	74	74	85	88	57	52	60	86	51	45	46	79
Full-time total		99	99	98	98	93	92	96	93	95	99	94	96	93	94	93	91
overal division of women employed		1	1	3	1	2	3	0	1	1	0	0	0	5	7	5	3
	part-time	8	5	6	7	12	8	7	5	12	12	14	8	27	29	31	12
	long part-time	2	1	3	2	12	17	9	7	28	36	25	6	15	18	18	7
	full-time	89	92	88	90	73	72	85	87	59	52	60	86	53	46	46	78

Source: EU-SILC.

Table 4. Average income from employment of men and women in couple households where the woman is aged 25-49, 2004

	BE				DK				EE				GR			
	Age of child:			No	Age of child:			No	Age of child:			No	Age of child:			No
	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child
Average monthly earnings men/women																
Men (EUR)	2,389	2,279	2,564	2,188	3,203	3,809	3,976	3,015	648	579	504	430	1,343	1,367	1,235	1,253
Women (EUR)	1,304	1,315	1,391	1,629	1,701	2,333	2,474	2,208	231	214	296	292	586	605	586	631
Women as % men	54.6	57.7	54.2	74.5	53.1	61.2	62.2	73.2	35.6	36.9	58.7	67.7	43.6	44.3	47.5	50.3
Women's working time as % men's	62.6	63.7	65.9	83.7	68.7	79.0	80.3	86.5	27.4	71.5	90.6	109.2	49.9	58.0	58.6	71.4
Adjusted earnings ratio (men relative to women, %)	14.7	10.4	21.4	12.5	29.4	29.1	29.1	18.2	-23.0	93.6	54.5	61.2	14.4	31.1	23.3	41.8
Average, women and men both working																
Men (EUR)	2,497	2,434	2,630	2,400	3,502	3,990	4,170	3,465	1,133	553	566	556	1,462	1,501	1,348	1,351
Women (EUR)	1,772	1,833	1,755	2,104	2,053	2,592	2,826	2,704	572	297	337	335	1,066	966	952	886
Women as % men	71.0	75.3	66.7	87.7	58.6	65.0	67.8	78.1	50.5	53.7	59.5	60.2	72.9	64.4	70.6	65.5
Women's working time as % men's	85.0	83.3	79.4	91.6	92.0	88.6	91.0	97.1	87.2	95.0	96.8	100.3	91.3	90.6	92.3	93.1
Adjusted earnings ratio (men relative to women, %)	19.7	10.6	19.0	4.5	57.0	36.3	34.3	24.4	72.5	76.8	62.8	66.7	25.2	40.7	30.8	42.0

	ES				FR				IE			
	Age of child:			No	Age of child:			No	Age of child:			No
	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child
Average monthly earnings men/women												
Men (EUR)	1,402	1,375	1,331	1,162	2,001	2,112	2,237	1,991	3,141	3,400	3,257	2,625
Women (EUR)	647	501	541	810	1,083	1,077	1,267	1,394	1,440	1,210	1,335	1,830
Women as % men	46	36	41	70	54	51	57	70	46	36	41	70
Women's working time as % men's	48	44	51	77	57	68	73	83	54	40	47	82
Adjusted earnings ratio (men relative to women, %)	4	20	25	10	5	33	29	19	17	11	16	18
Average, women and men both working												
Men (EUR)	1,553	1,511	1,408	1,277	2,146	2,257	2,349	2,232	3,553	3,561	3,186	3,162
Women (EUR)	1,118	957	1,055	1,091	1,648	1,477	1,573	1,671	2,392	2,192	2,208	2,312
Women as % men	72	63	75	85	77	65	67	75	67	62	69	73
Women's working time as % men's	86	82	90	94	87	85	86	92	81	69	72	88
Adjusted earnings ratio (men relative to women, %)	20	29	21	10	13	29	28	23	20	12	4	20

Note: The top half of the table shows average earnings of all men and women in couple households, including those not working, by age of youngest child, the tottom half only of those in households where both partners are in work.
Adjusted earnings ratio is the ratio of men's earnings to those of women (expresses as a %) adjusted for differences in working time.

Source: EU-SILC, 2004.

Table 4. Average income from employment of men and women in couple households where the woman is aged 25-49, 2004 (continued)

	IT				LU				AT				PT			
	Age of child:			No	Age of child:			No	Age of child:			No	Age of child:			No
	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child
Average monthly earnings men/women																
Men (EUR)	1,723	1,745	1,999	1,520	3,853	4,382	4,101	3,828	2,374	2,430	2,470	1,980	967	853	803	942
Women (EUR)	773	711	749	963	1,286	1,267	1,575	2,214	676	797	842	1,402	607	587	488	711
Women as % men	44.9	40.8	37.5	63.4	33.4	28.9	38.4	57.8	28.5	32.8	34.1	70.8	62.8	68.9	60.8	75.5
Women's working time as % men's	45.6	43.7	47.5	67.6	44.4	40.8	49.8	72.9	27.3	43.7	51.3	90.4	75.9	79.1	78.0	82.5
Adjusted earnings ratio (men relative to women, %)	1.6	7.2	26.9		33.0	41.2	29.5	26.1	-4.0	33.3	50.3	27.6	20.8	14.8	28.2	9.4
Average, women and men both working																
Men (EUR)	1,920	1,926	2,114	1,576	4,070	4,086	3,830	4,083	2,297	2,470	2,395	2,286	1,080	941	867	1,040
Women (EUR)	1,374	1,396	1,383	1,364	2,038	2,186	2,560	2,850	1,463	1,228	1,159	1,665	789	729	652	874
Women as % men	71.6	72.5	65.4	86.6	50.1	53.5	66.8	69.8	63.7	49.7	48.4	72.8	73.0	77.6	75.2	84.1
Women's working time as % men's	83.8	81.4	83.3	91.0	74.3	71.2	77.1	88.9	75.7	64.3	70.5	94.4	95.9	97.5	95.4	97.0
Adjusted earnings ratio (men relative to women, %)	17.1	12.2	27.3	5.1	48.4	33.1	15.4	27.3	18.8	29.4	45.8	29.5	31.4	25.7	26.8	15.3

	FI				SE				NO			
	Age of child:			No	Age of child:			No	Age of child:			No
	0-2	3-5	6-11	child	0-2	3-5	6-11	child	0-2	3-5	6-11	child
Average monthly earnings men/women												
Men (EUR)	2,313	2,414	2,515	2,112	2,403	2,506	2,581	2,176	1,877	2,050	1,866	2,060
Women (EUR)	782	1,425	1,672	1,581	885	1,566	1,639	1,565	1,118	1,021	1,070	1,146
Women as % men	33.8	59.0	66.5	74.9	36.8	62.5	63.5	71.9	59.5	49.8	57.3	55.6
Women's working time as % men's	35.7	79.8	93.0	93.1	56.9	81.0	82.6	88.2	68.3	65.2	68.0	86.7
Adjusted earnings ratio (men relative to women, %)	5.7	35.2	39.9	24.4	54.6	29.7	30.1	22.6	14.6	31.0	18.6	55.9
Average, women and men both working												
Men (EUR)	2,557	2,588	2,746	2,479	2,562	2,732	2,735	2,364	1,992	2,004	1,902	2,019
Women (EUR)	1,472	1,800	1,898	1,878	986	1,783	1,848	1,943	1,369	1,190	1,179	1,408
Women as % men	57.6	69.6	69.1	75.7	38.5	63.6	67.6	82.2	68.7	59.4	62.0	69.7
Women's working time as % men's	92.9	93.9	97.4	98.8	90.6	89.7	91.4	97.5	82.2	78.3	80.2	94.8
Adjusted earnings ratio (men relative to women, %)	61.5	34.9	40.9	30.5	135.4	41.0	35.3	18.7	19.7	31.8	29.4	36.0

Note: The top half of the table shows average earnings of all men and women in couple households, including those not working, by age of youngest child, the tottom half only of those in households where both partners are in work.
Adjusted earnings ratio is the ratio of men's earnings to those of women (expresses as a %) adjusted for differences in working time.

Source: EU-SILC, 2004.

Social class variation in income poverty, deprivation and consistent poverty: an analysis of EU-SILC

Christopher T. WHELAN, Dorothy WATSON and Bertrand MAITRE

chapter 4

SOCIAL CLASS VARIATION IN INCOME POVERTY, DEPRIVATION AND CONSISTENT POVERTY: AN ANALYSIS OF EU-SILC

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Abstract

In this paper we develop a measure of social class based on the new European Socio-economic Classification (ESeC) for the first wave of EU-SILC data and look at the relationship between social class, income poverty and deprivation.

1. The European Socio-economic Classification

The ESeC schema, based as it is on the work of Erikson and Goldthorpe (1992) involves a focus on employment relations. As well as distinguishing between those who own the means of production and those who do not, within the former it distinguishes large from small employers, and, among employees, between different forms of employment relationship. The major contrast in the employment relationship is between the service relationship, entailing a long-term and diffuse exchange of rewards for commitment, and the labour contract, involving a relatively short-term and specific exchange of money for effort. The crucial dimensions along which work is differentiated are the degree of asset specificity involved and ease or difficulty of measuring performance (Goldthorpe, 2000:13). In response to such variation employers offer different forms of employment relations.

The purpose of this schema, as Goldthorpe (2002:213), observes is to bring out the constraints and opportunities typical of different class positions particularly as they bear “on individuals *security, stability and prospects* as a precondition of constructing explanations as of empirical regularities”. This approach can be contrasted with those that make use of information on income, education or, perhaps more importantly, occupation, to develop either continuous or finely differentiated measure (Grusky and Weede, 2001, 2005). A major concern of such class analysis is with the association and actual causal connection between class and differential life-chances - with how class influences what actually happens to people (Goldthorpe, 2002:21).

Our analysis takes as its starting point earlier work relating to income poverty and deprivation based on the analysis of the European Community Household Panel Survey (ECHP) in its User Data Base (UDB) format (Whelan *et al* 2001, 2003, 2004). However, comparative analysis focusing on social class effects using the UDB was possible only at the price of utilising a rather crude version of class schema.

One of the major justifications for devoting attention to the conceptualisation and measurement of social class is the argument that such measures provide us with a better understanding of the determinants of longer-term command over resources and exposure to deprivation (Breen and Rottman, 1995). In seeking to test the validity of this argument employing EU-SILC data by comparing the impact of social class on income poverty, material deprivation and consistent poverty. Our expectation is that class differentiation will become progressively sharper as we move from income poverty to deprivation and consistent poverty.

The ESeC schema distinguishes a relatively small set of classes that are distinctive in terms of their employment relations. The logic of the classification system is discussed more fully elsewhere and will not be repeated here (Rose 2005). The version of the ESeC we employ is Version 4 from August 2006. The schema distinguished ten social classes as shown in Figure 1, below. Social class is operationalised in terms of the information available in the first wave of the EU-SILC survey in each country.

Figure 1. The ESeC Classes

	ESeC Class V4	Common Term	Employment Regulation
1	Large employers, higher grade professional, administrative & managerial occupations	Higher salariat	Service Relationship
2	Lower grade professional, administrative and managerial occupations and higher grade technician and supervisory occupations	Lower salariat	Service Relationship (modified)
3	Intermediate occupations	Higher grade white collar workers	Mixed
4	Small employer and self employed occupations (exc. agriculture etc)	Petit bourgeoisie or independents	-
5	Self employed occupations (agriculture etc)	Petit bourgeoisie or independents	-
6	Lower supervisory and lower technician occupations	Higher grade blue collar workers	Mixed
7	Lower services, sales & clerical occupations	Lower grade white collar workers	Labour Contract (modified)
8	Lower technical occupations	Skilled workers	Labour Contract (modified)
9	Routine occupations	Semi- and non-skilled workers	Labour Contract
10	Never worked and long-term unemployed	Unemployed	-

Appendix 1 gives details of the variables available in EU-SILC for the measurement of ESeC[1]. Because of some limitations in the data we needed to make some compromises, compared to the 'blueprint' ESeC. Chief among these are outlined in the following.

Information on a number of variables (supervisory variable and size of establishment) is only available for those who are unemployed or currently working. This means that the construction of ESeC for the retired (based on former occupation) is much less precise, relying on information on occupation only. In the Nordic countries and Greece, in particular, information on supervisory status is missing in about one third of cases. This means that ESeC class 6 (lower technical and supervisory) is not adequately defined in these countries, as it will only include lower technician occupations[2].

The level of missing information (where ESeC cannot be assigned) is quite high for several countries (particularly Denmark, Finland, Norway and Austria), due to missing information on some of the required variables (ISCO, supervisory status, whether ever worked, size of establishment), often because the information is only available for those currently at work. The proportion of cases assigned and missing is shown in the final column of Table 1.

The version of ISCO available on EU-SILC is the two-digit version. As the ESeC prototype is developed for the three-digit version of ISCO, there is some loss of precision in using the two-digit version of ISCO. *ESeC Class 10* is intended for those who do not have an employment relationship: those who never worked and the long-term unemployed. The retired, other inactive and more recently unemployed are classified according to the occupation in their previous job. In this implementation, we have reserved ESeC 10 for those who have never worked only. We would argue that unemployment is an outcome of the unfavourable employment relations experienced by those in the less advantaged class locations. As

1 Since the detailed tables underlying the charts in this paper are rather long, we have not reproduced them here. They are available from the authors on request:

2 Where supervisory status, employment status and/or size of firm are missing, the assignment to ESeC classes is made on the basis of occupation only, in an attempt to reduce the number of non-assigned cases.

such, to group the unemployed in a separate class would result in an underestimation of the impact of class structure on outcomes such as poverty and deprivation. It would also have the perverse effect of making the gap between the labour contract and service classes appear narrower in periods or places with high levels of unemployment, as the burden of economic downturn is likely to fall most heavily on the weaker occupants of labour contract positions. In the SILC data, information on whether the person never worked is missing in a high proportion of cases (18 to 27 percent) in Sweden, Denmark, Finland and Norway.

Household Level Class

For the analysis in this paper, we assign ESeC at the *household level* and take the person (including children) as the unit of analysis. We would argue that since poverty status and deprivation status are household level-constructs – taking account of total household income and access of household members to goods and services – social class ought also to be measured at the household level. There are other circumstances, such as in assessing differences in unemployment risk, psychological well-being, work-life balance, and so on, where use of social class measured at the individual level would be equally, if not more, appropriate.

The ESeC of the household reference person is assigned to all household members. In SILC, the household reference person is the person responsible for the accommodation or the older of two or more equally responsible persons, that is the person in whose name the title to the property or rental agreement is. Since, in most couple households, the couple is jointly responsible, we used a dominance rule to decide which persons class to use where the household reference person has a spouse or partner (rather than the straightforward age rule). The idea behind the dominance rule is that each person is assigned the same class position as the household member whose occupation and employment conditions are likely to affect household circumstances the most (Erikson, 1984). In this regard, higher socio-economic positions dominate lower ones and self-employment dominates employee status. We based the presumed dominance of socio-economic positions on the link between poverty risk and ESeC class[3], with positions associated with a lower risk dominating those with a higher risk. The dominance order adopted for ESeC was: 1,2,3,4,6,7,8,9,5,10. Note that only the class of those responsible for the accommodation is considered. This means that, for instance, the class position of an adult child still living at home is not allowed to dominate the class position of the parents[4]. The effect of using the dominance rule is to increase the proportion of individuals assigned to the more advantaged ESeC classes.

2. Income Poverty and Deprivation

It is now widely agreed that in measuring poverty and social exclusion we need to go beyond income measure. The increasing emphasis on multidimensionality is reflected, among other things, in the set of indicators adopted by the European Union (EU) to monitor social exclusion at the Laeken council[5]. As part of this development there has been a renewed discussion of the contribution that material deprivation indicators can make at both national and European levels[6].

[3] Based on previous work using the ECHP dataste.

[4] Analyses on the ECHP data showed that the class assignment using the dominance rule differed from the class assignment using the age rule (i.e. the older partner) in about 15 per cent of cases overall (unweighted), ranging from 10 per cent in Greece to 20 per cent in Denmark.

[5] For a general discussion of how and when a multidimensional approach to poverty and social exclusion might be necessary or helpful and a more detailed treatment of the issues dealt with in this introduction see Nolan and Whelan (forthcoming).

[6] See Atkinson *et al* (2005), and Guio (2005).

Poverty in advanced societies is generally understood to have two core elements: it is about inability to participate, due to inadequate resources. Most quantitative research then employs a unidimensional approach to distinguishing the poor: The most common practice in Western Europe in recent years has been to rely on relative income lines, with thresholds. The broad rationale is that those falling more than a certain 'distance' below average income are unlikely to be able to participate fully in the life of the community. However, it has been recognized for some time (Ringen 1988) that low income may be an unreliable indicator of poverty in this sense, failing in practice to identify those who are unable to participate in their societies due to lack of resources. The evidence for a range of countries strongly suggests that it is hazardous to draw strong conclusions about whether a household is poor from current income alone[7].

In such circumstances a complementary rather than alternative route is to use non–monetary indicators to measure levels of deprivation directly, and see whether these can assist in improving the measurement of poverty. Such indicators can help capture situations involving, for example, temporarily low income, additional needs and cost variations. Despite the concern that non-monetary indicators of deprivation may reflect choice/taste, the available evidence suggest that such indicators do contain valuable information that, particularly when combined with information on financial constraints, greatly enhance our capacity to identify those experiencing exclusion due to lack of resources[8]. This evidence derives from a range of studies that have explored the relationship between both income and broader economic resources and have combined information relating to income and material deprivation to construct measures of consistent poverty, to develop notions of economic vulnerability and address more general issues relating to the multidimensionality of poverty and social exclusion.

In addressing these issues, using data from the first wave of EU-SILC we shall not seek to treat the full range of material deprivation but rather will focus on the particular form that is most strongly associated with income and that has been used by a range of authors to construct measures of consistent poverty and to develop notions of economic vulnerability[9]. Thus we shall not attempt to incorporate indicators relating to housing, health and neighbourhood environment. In pursuing our analysis, our choice of indicators is constrained by the fact that the range of deprivation items currently available in EU-SILC is considerable more restricted than was the case for the ECHP and it is consequently more difficult to develop measures that display satisfactory levels of reliability across European societies and at the European level[10].

Our analysis will proceed as follows. We shall first construct an index of material deprivation that we shall refer to as 'economic strain' that comes as close as we can to capturing what has been referred to in earlier work as 'basic deprivation', although in fact the measure falls somewhere between 'basic deprivation' and the somewhat broader measure of 'current life-style deprivation' also employed in earlier studies[11]. This comprises indicators available in the EU-SILC data set relating to inability to afford rather basic food, clothing and heat items, enforced absence of particular consumer items and difficulty in financial coping. As a consequence, when we refer to European 'levels' our estimates will actually relate to the fourteen countries comprising the currently available EU-SILC data set. Having established reliability levels in relation to such an index both nationally and at the European level we shall proceed to compare income poverty levels using the conventional 60% of equivalent median at income threshold at both national and European level with those relating to a comparable material deprivation set at the European level threshold. Combining information relating to both

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7 These include Townsend (1979), Mack and Lansley (1985), Gordon et al (2000) and Bradshaw and Finch (2003), Mayer (1993), Nolan and Whelan (1996), Muffels (1993), Hallerod (1995), Kangas and Ritakallio (1998), Tsakloglou and Papadopoulous (1998).

8 For recent discussions of these issues see McKay (2004) and Halleröd (2006).

9 See Boarini and d'Ercole (2005), Förster (2005), Layte *et al* (2001).

10 For an analysis using the full range of items available in the Irish survey see Whelan & Maître (forthcoming a) and for a comparison of measures of consistent poverty and economic vulnerability employing Irish specific measures with ones based on the common set of EU-SILC items see Whelan & Maître (forthcoming).

11 Callan *et al* (1993) & Whelan *et al* (2001).

income poverty and material deprivation we shall go on to construct a measure of consistent poverty and to document European and national variation in levels of income poverty, risk of being above the corresponding deprivation threshold and consistent poverty by the social class of the household. In so doing we will take advantage of the body of work that has led to the development of the provisional European Socio-economic Classification (ESeC)[12].

Income and Material Deprivation in EU-SILC

The income measure we used to construct the income poverty line is the total disposable household income. The total disposable household income is defined as the sum for all household members of net (of income tax at source and social contributions) personal income components plus all net income components at household level.

Finally in order to adjust the level of household income to the different sizes and compositions of households we use the "modified OECD scale". Thus the first adult in the household is accorded a value of one with each additional adult being given a value of 0.5. Children aged less than 16 have a weight of 0.3. The number of equivalent adults in the household is then calculated by summing these values. The household equivalised income is given by dividing the total household disposable income by the number of adult equivalents. As we have noted earlier, the range of deprivation items available in EU-SILC is more restricted than was the case for the ECHP. The list of items available is shown in Figure 2, below.

These items with the addition of the PC item combine items that Eurostat have shown to load on dimensions that they have labelled "economic strain". In previous analysis comparing the set of items on which we focus here with a rather wider set available in the Irish component of EU-SILC, Whelan and Maître found that the major difference related to the possibility in the latter case of distinguishing rather basic items such as food, clothing, heat and social participation, which load on the economic strain dimension, and deprivation relating to consumer durables. However, given the importance of achieving a satisfactory level of reliability we have chosen to focus on the combined 10-item set.

Figure 2. Items used to measure deprivation

Item	Variable
Cannot afford meal with meat, chicken, fish (or vegetarian) every second day	HS050
Inability to keep home adequately warm	HH050
Cannot afford to have a car	HS110
Cannot afford a telephone	HS070
Cannot afford a PC	HS090
Cannot afford a colour TV	HS080
Cannot afford a washing machine	HS100
Cannot afford a weeks holiday away from home	HS040
Cannot afford to pay unexpected required expenses	HS060
Experiencing arrears on rent, mortgage, utility bills or hire purchase payments	HS010 / 020 /030

[12] See Rose (2005).

This measure achieves a reasonably satisfactory level of reliability across the 14-country sample with an overall Cronbach alpha of 0.68, ranging from 0.63 in Denmark, Spain and Luxembourg to a high of 0.73 in Ireland (see Appendix Table 1). Thus our conclusions regarding cross-national variations will not be significantly affected by differential reliability. Since in our view the 10-item measures comes closer to tapping a what we would refer to as economic strain or basic deprivation than more general consumption deprivation we shall refer to it as a measure of economic strain.

In the analysis that follows we compare being income poor at the 60% line with a dichotomous deprivation variable based on the 10-item index that in each country comes as close as possible within each country to identifying the same proportion above the deprivation threshold as are located below the 60% income poverty line. We then proceed to construct a consistent poverty measure that identifies as poor those who are below the 60% income line and above the threshold. Variations across country in the percentage poor will then be affected by percentage below the income poverty line and by the degree of association within each country between the income poverty and consistency measures. However, cross-national variations in levels of deprivation will have no effect. It is our intention in the future to explore the consequences of different forms of weighting and the movement between national and European perspectives implied by such choices.

3. Social Class by Country

Table 1 shows the ESeC class distribution in each of the 14 countries under consideration.

- For most cases, as assignment to social class at the household level is possible on SILC, with only 3 per cent not assigned overall. As noted above, this involves using more limited information in the case of those not currently at work, where data on establishment size and supervisory status is not collected. Social class is missing for a considerably higher proportion of cases in Finland, Norway and Austria (28, 21 and 17 percent, respectively), for the reasons noted above: missing information on the occupation of those not currently at work or inadequate identification of those who never worked.

Table 1. ESeC Social Class Distribution by Country (row percentages)

	1 Large emp, hi prof/admin /manag.	2 Lo prof/ admin/ manag, hi tech/superv.	3 Intermediate occupat-ions	6 L6 Lo supervis /techncian	7 Lo services/ sales/clerical	8 Lo technical occ.	9 Routine occupations	4 Small emp & self emp. (exc. ag)	5 Small emp /farmer (ag. etc)	10 Never worked	Not assigned
Sweden	12	19	15	2	5	9	26	7	2	3	3
Denmark	12	23	14	2	4	9	23	5	3	4	4
Finland	17	22	12	2	5	11	16	8	4	4	28
Norway	14	29	13	4	6	8	17	6	2	1	21
Austria	8	14	7	9	10	11	21	13	4	4	17
Belgium	14	23	14	5	4	11	15	9	1	5	2
France	12	25	17	7	5	9	16	6	3	1	0
Luxembourg	12	28	16	6	4	11	15	5	2	1	0
Ireland	17	21	10	5	6	6	18	9	3	4	1
Italy	8	18	9	6	2	12	18	18	4	6	1
Spain	8	14	7	9	5	14	23	13	3	4	5
Portugal	9	13	7	7	3	19	18	17	7	1	0
Greece	9	11	8	2	3	14	15	20	13	4	0
Estonia	8	20	11	1	8	12	31	3	3	3	1
Total	**10**	**19**	**11**	**6**	**4**	**11**	**18**	**12**	**4**	**4**	**3**

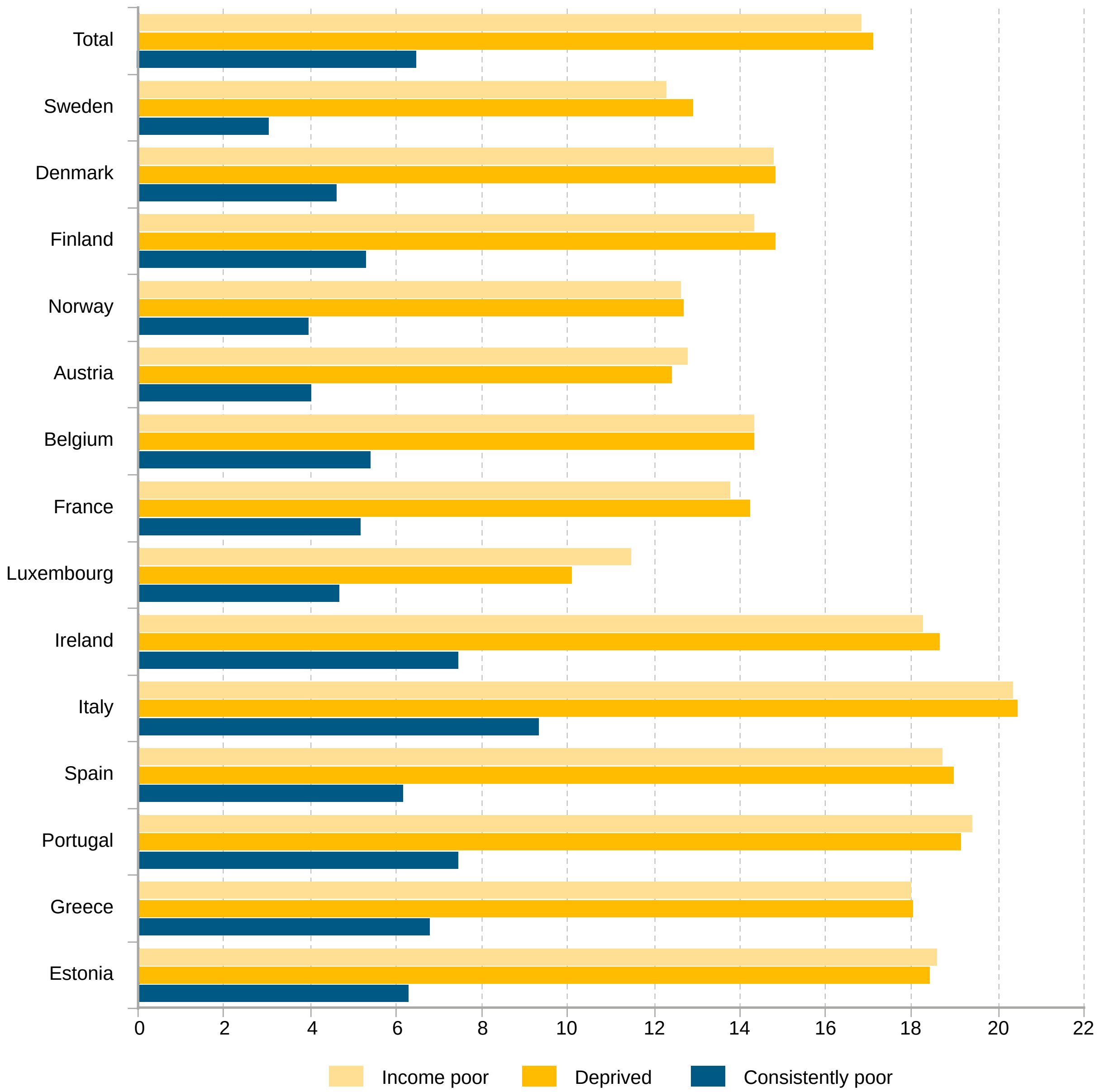
- The sizes of the classes differ by country, with the proportion in Classes 1 and, especially, 2 (large employers, professionals, managers, higher administrative, technical and supervisory) higher in the northern countries than in the southern countries (Greece, Spain, Portugal, Italy) and Estonia.
- The 'petit bourgeois classes' (small employers and the self-employed) are large in the Southern countries, especially Italy, Portugal and Greece.
- The size of the routine occupation class is largest in Estonia, but is also large in Sweden, Denmark, Austria and Spain.
- The size of ESeC 6 (lower technical and supervisory occupations) is understated in the Nordic countries since, as noted earlier, information on managerial or supervisory status is not available for about one third of cases assigned to a class based on occupation. In these circumstances, the individual would be assigned based on occupation, typically to classes 7, 8 or 9.

Some earlier work on the Irish national data used to construct the SILC dataset allowed us to compare the impact of moving from a two-digit to a three-digit version of ISCO. With the two-digit version of ISCO, several occupations were assigned to class 1 that might have been assigned to class 2 if the three-digit version of ISCO were available, particularly corporate managers (minor group 12) and other professionals (minor group 24). Similar findings were reported across several countries by Rose and Harrison (2006) using the ESS data, but the differences were rather minor.

4. Poverty and Deprivation Levels by Country

Income poverty, in the present analysis, is measured as being below the 60 per cent of median household equivalised income line[13]. Deprivation is measured by taking the threshold within each country that identifies the same percentage of persons as 'deprived' as are below the 60 per cent poverty line. The ten items described above are used and are weighted by the proportion of people who lack them within each country. Note that although the poverty and deprivation thresholds identify the same proportion of people as poor, they will not necessarily be the same people: some will be income poor but not deprived and vice versa. We construct a measure of consistent poverty that identifies those who are both income poor and deprived. The incomplete overlap between the poverty and deprivation measures can be seen in that the percentage of persons who are consistently poor is lower than the percentage income poor or deprived.

Figure 3. Poverty and Deprivation Levels by Country (percentage of persons)



[13] The median is calculated within country across persons of all ages and the modified OECD scale is used for equivalisation.

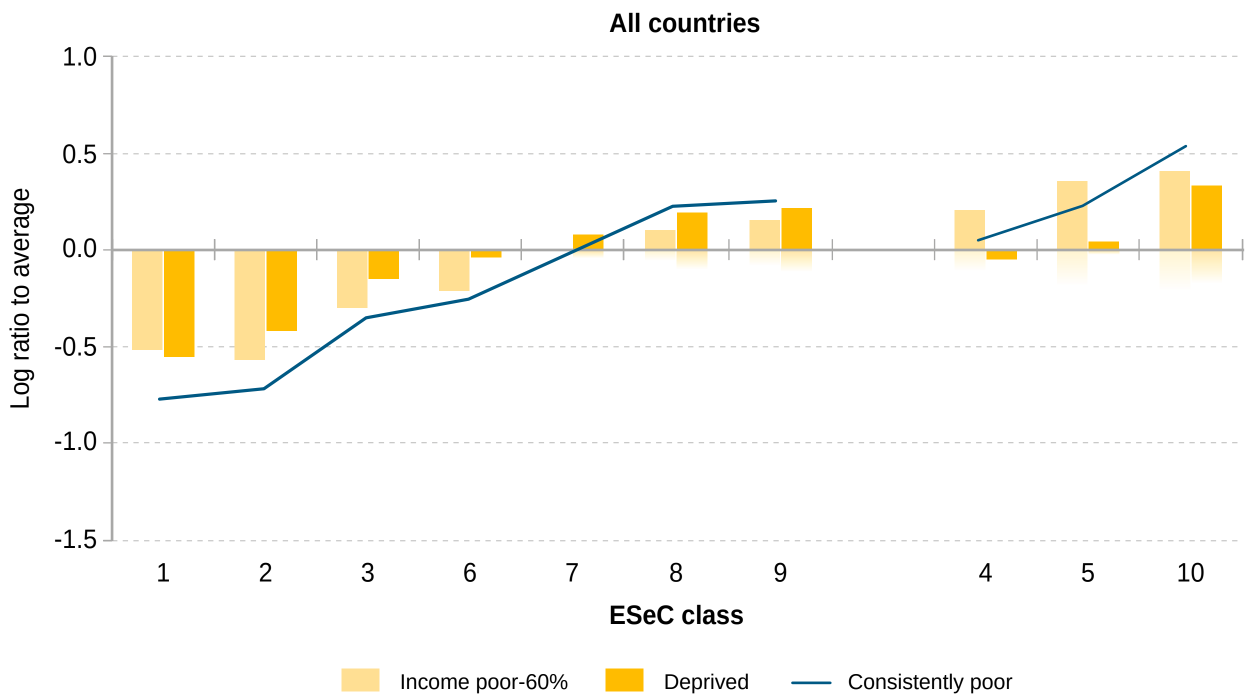
Since the measure of deprivation used is designed to capture the same percentage deprived in a country and the percentage below the 60 per cent of the median equivalised income line, the overall distribution of poverty and deprivation will be almost identical, as shown in Figure 3. The levels of poverty/deprivation are highest in the Southern countries, but also in Ireland and Estonia, and lowest in the Scandinavian countries.

5. Poverty, Deprivation and Social Class

Figure 4 shows how the risk of poverty and deprivation varies by social class across all countries in the 2004 EU-SILC dataset.

Here, in order to facilitate comparison between our income and deprivation results we present our results in terms of the log ratios for each class compared to the average across all classes. On these charts, the 'zero' line represents the average level of risk across all classes. Figures below zero represent a below-average risk, while figures above zero represent a higher than average risk of poverty and deprivation. The chart shows the relative risk of income poverty (the white bar), deprivation (the grey bar) and consistent poverty (being both income poor and deprived – the dark line).

Figure 4. Poverty and Deprivation by Social Class, all countries (Log ratio of risk of income poverty, deprivation and consistent poverty for each class to risk for all classes)



The 'employee classes' are shown to the left of the chart, with the self-employed and 'never worked' to the right. There is a clear increase in the risk of both income poverty and deprivation as we move from classes characterised by the service relationship (1 and 2) to those characterised by 'mixed contracts (3, 6 and 7) to the labour contract (8 and 9). The class differences are slightly more marked for deprivation than for income poverty if class 1 is compared to classes 8 and 9, but not when class 2 (which shows a greater advantage in income than in deprivation terms) is considered. The class differences are clearly stronger for consistent poverty (being both below the income poverty threshold and the deprivation threshold) than for income poverty or deprivation taken alone. The ratio of risk for classes 8& 9, taken together, to classes 1&2 are 4.8 and 4.9 for income poverty and deprivation, respectively, and 9.5 for consistent poverty (see Table 2).

As we found in earlier analyses using the ECHP data, the self-employed appear 'worse off' when we focus on income than when the focus shifts to deprivation. This may reflect difficulties in accurately measuring the income of the self-employed, and the greater command of resources that people who own a business have access to. The income poverty measure for the self-employed (classes 4 and 5) shows them with a higher risk of poverty even than those in class 9 (routine occupations). The deprivation measure for the self-employed places them close to average, even a little below average for the self-employed outside of agriculture.

Table 2. Ratio of Risk for Classes 8&9 versus Classes 1&2 for Income Poverty, Deprivation and Consistent Poverty by Country

	Income Poverty	Deprivation	Consistent Poverty
Sweden	2.8	3.1	2.9
Denmark	2.9	2.4	5.0
Finland	3.5	4.7	8.3
Norway	3.1	2.7	6.2
Austria	2.7	5.7	11.0
Belgium	5.5	4.7	9.6
France	5.5	4.4	8.3
Luxembourg	13.7	13.8	53.8
Ireland	6.2	5.4	12.1
Italy	4.9	3.9	10.6
Spain	4.5	7.4	13.3
Portugal	4.4	7.8	11.8
Greece	4.6	5.2	8.9
Estonia	2.3	2.6	3.6
Total	**4.8**	**4.7**	**9.5**

6. Country Differences

Figure 5 shows the class pattern within country in terms of income poverty, deprivation and consistent poverty. Because class 6 is not adequately defined in the Nordic countries, figures are not shown separately for Class 6 in these charts for Sweden, Denmark, Finland and Norway and also for Greece, Estonia and Belgium.

The main points are as follows:

- In all countries, there is a stronger risk of poverty and deprivation for classes 8 and 9 than for classes 1, 2 and 3.
- The class pattern in all countries is stronger for consistent poverty (both income poor and deprived), than for either income poverty or deprivation taken separately.
- It is not always clearly the case that the contrast between classes is stronger for deprivation than for income.

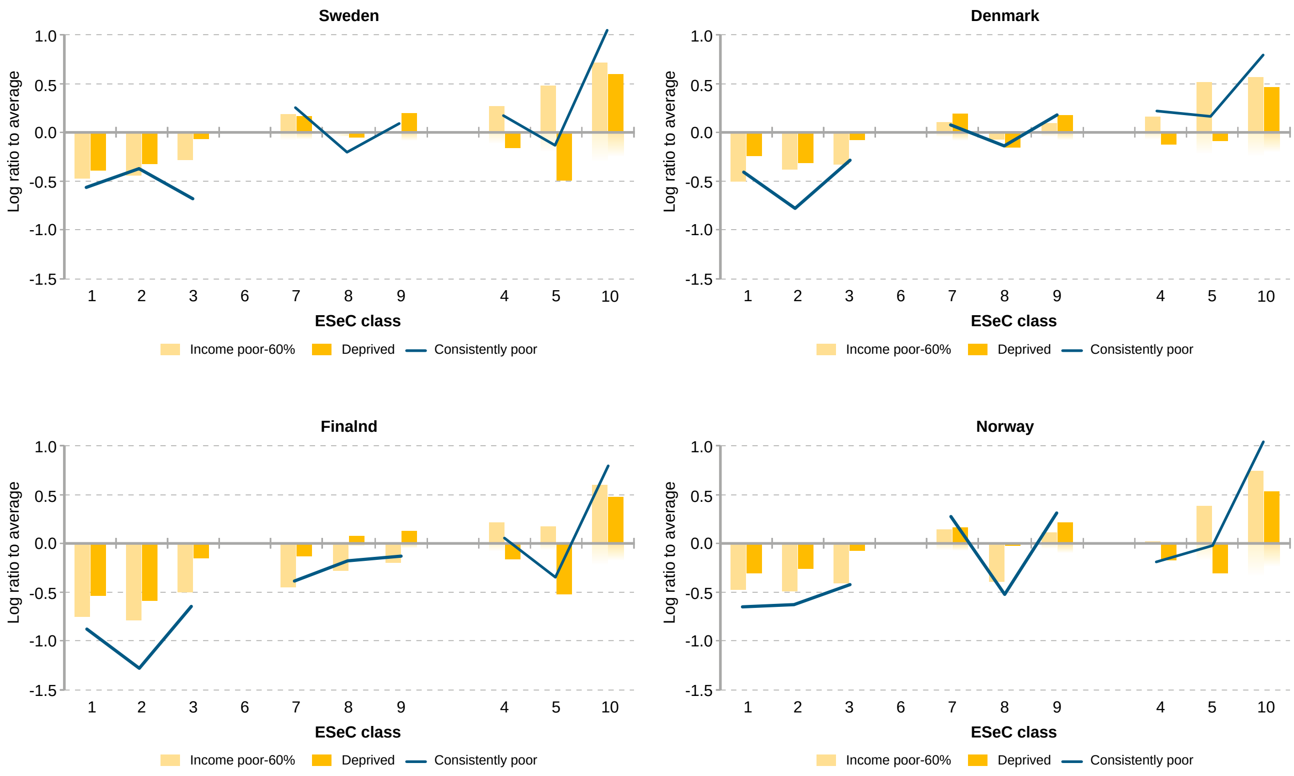
The class pattern is stronger for deprivation than for income poverty in Austria, Belgium, France, Luxembourg, Spain Portugal and Estonia. In the remaining countries, the gap between Classes 1 and 2 and the average tends to appear larger for income poverty than for deprivation. On the other hand, the gap between classes 8 and 9 and the average tends to be larger for deprivation than for income. The result is that the strength of the class pattern is similar for income poverty and deprivation for these latter countries.

- In all countries, the risk for the self-employed classes (4 and 5) is greater for income poverty than for deprivation. This indicates that the measure of deprivation is providing an important 'correction' to the tendency for income-only measures to overstate the poverty levels of these groups.
- In all countries those who never worked experience the highest or second highest risk of consistent poverty.

If we focus on the Scandinavian countries we find the overall anticipated pattern of class differentials. However, perhaps because of the low absolute levels of deprivation, we find the anticipated pattern of stronger association with deprivation as opposed to income only for Sweden and Finland. The gap between classes 1,2, and 3 and the average is greater for income poverty than for deprivation, while the reverse is true for class 9. However, generally (apart from Sweden where the gap is greatest for deprivation) the disparities are more substantial in relation to consistent poverty. For the comparison between classes 8&9 and 1&2 the respective consistent poverty ratios for Sweden Denmark, Finland and Norway are 2.9, 5.0, 8.3 and 6.2 (Table 2).

The relative positions of classes 1, 2 and 3 vary between the countries in terms of consistent poverty. In Denmark and Finland, class 2 has a lower risk of consistent poverty than class 1, while in Sweden class 3 (intermediate non-manual) has a lower risk than classes 1 and 2. Those who never worked experience the greatest risk of poverty and deprivation in all four countries.

Figure 5a. Poverty and Deprivation by Social Class: Sweden, Denmark, Finland and Norway



Taking Austria, Belgium, France and Luxembourg together, there is a clear tendency for the class differentials to be greater in the case of deprivation if Class 1 alone is compared to Classes 8 and 9 (Figure 5b), but only for two of the four countries when Classes 1 and 2 are combined (Table 2). However, in every case the consistent poverty differentials are higher than for income or deprivation separately. The respective Class 8&9 to Class 1&2 consistent poverty ratios for Austria, Belgium, France and Luxembourg are 11.0, 9.6, 8.3 and 53.8.

The levels of income poverty and deprivation for the self-employed and farmers varies across countries. However, they generally appear considerably more disadvantaged in relation to income poverty than in relation to deprivation or consistent poverty. Again, those who never worked are likely to experience the highest risks of poverty and deprivation.

Figure 5b. Poverty and Deprivation by Social Class: Austria, Belgium, France and Luxembourg

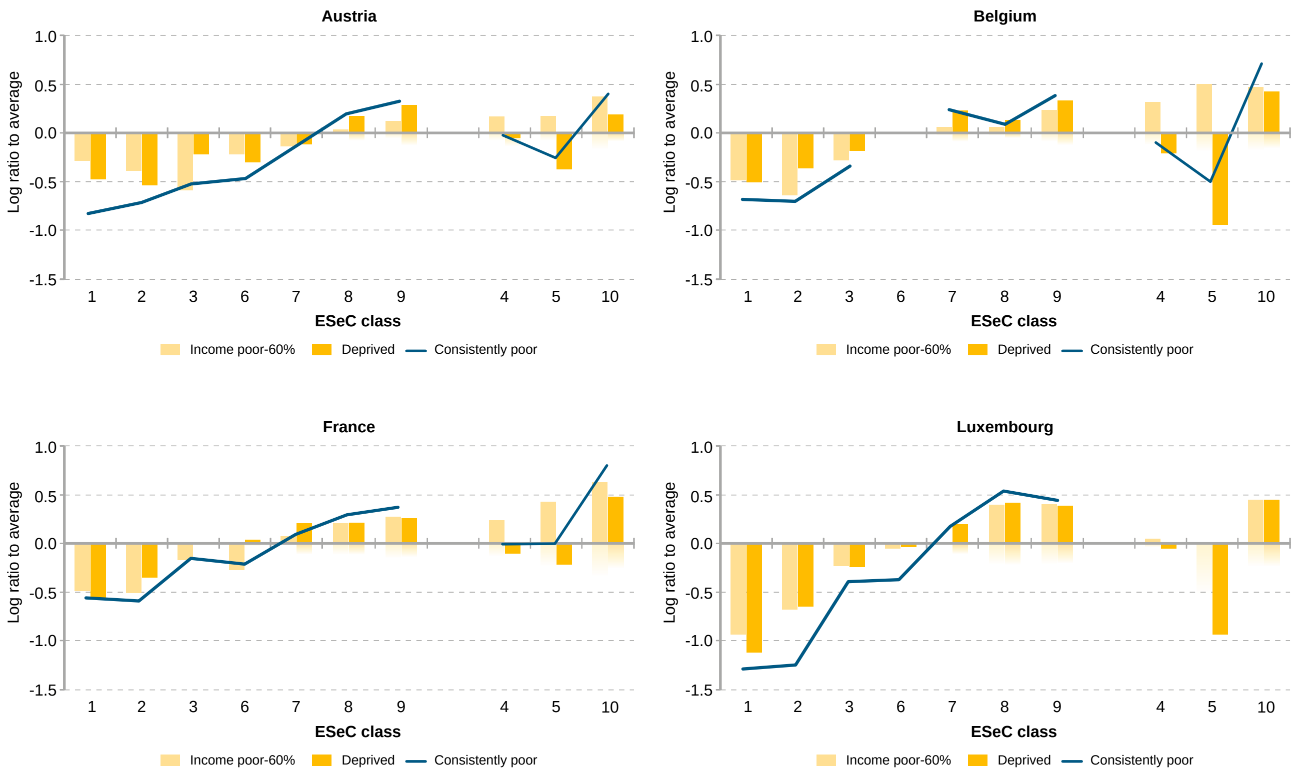
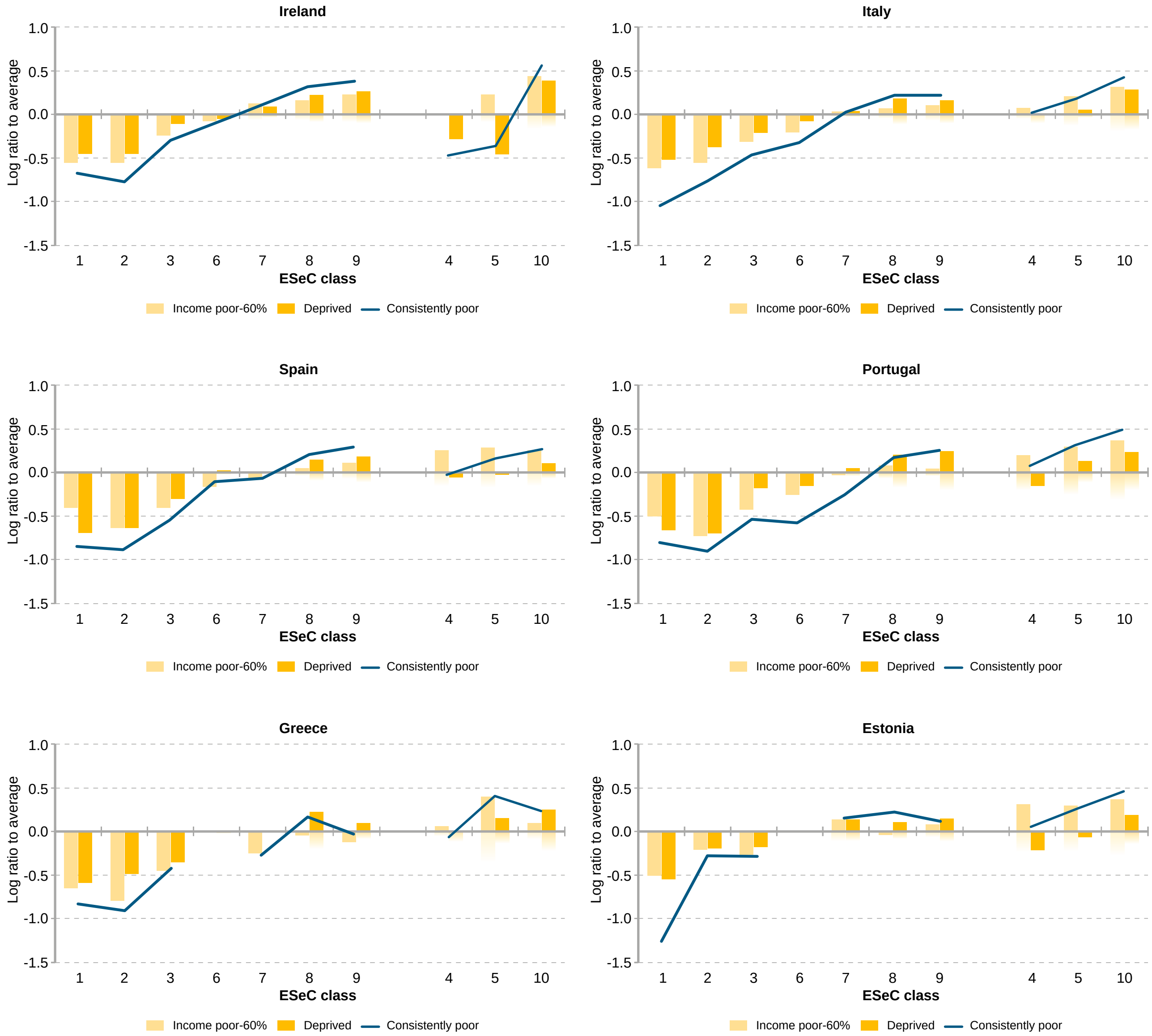


Figure 5c shows the risks of poverty, deprivation and consistent poverty by class for the remaining 6 countries: the southern countries plus Ireland and Estonia.

In Spain, Portugal and Greece we do observe larger disparities between classes in relation to deprivation (Table 2) but for Italy, Ireland and Estonia the pattern is more similar to that in the Nordic countries: the ratio to the average risk for classes 1 and two is greater for income poverty than for deprivation, but the reverse is true for Classes 8 and 9. Once again, however, the pattern whereby social class differences are greatest for consistent poverty emerges with the respective differences (Classes 8&9 compared to Classes 1&2) ranging from 8.9 to 13.3 in Ireland, Italy, Spain, Portugal and Greece and 3.6 in Estonia (Table 2).

Figure 5c. Poverty and Deprivation by Social Class: Ireland, Italy, Spain, Portugal, Greece and Estonia



7. Conclusion

This analysis has demonstrated that the ESeC social class measure can be constructed using the SILC data, although further work is clearly needed to handle situations (particularly in some of the Scandinavian countries) where some of the required information is missing. Our analysis did not confirm the finding observed in earlier work on the ECHP that the association with social class was stronger for material deprivation than income poverty (Watson *et al* forthcoming and Whelan *et al* (2004). Whether this is due to the different measure of deprivation employed or the need to improve the operationalising of the ESEC class schema is an issue that requires further exploration. This analysis has also demonstrated the usefulness of taking account of deprivation as well as income in evaluating the risk of social exclusion. Measures of deprivation provide an important 'correction' to income-only poverty measures, particularly in understanding the situation of the self-employed.

The consistent poverty measure, which takes account of both income and living standards, shows a stronger pattern of class differentiation than either measure taken alone. It also tends to reveal rather different patterns of variation for the self-employed and farming classes. Further analysis of deprivation is also desirable. For instance, we could usefully explore the impact on class and country differences of changing the assumptions implicit in the way the measure of deprivation is constructed, by taking Europe as the reference point rather than focusing on relativities within the country.

A number of lessons for EU-SILC have emerged from this analysis:

1. There needs to be a clear identifier for those who never worked. Households where the reference person never worked have the highest risk of poverty and deprivation. It is important that this variable be clearly specified. This variable is missing in a high proportion of cases in the Scandinavian countries.
2. Information on previous occupation should be collected for those who worked in the past. In order to adequately explore the link between social class and outcomes such as unemployment risk and income adequacy in retirement or following family break-up, it is important to collect sufficient occupation on previous occupation to accurately allocate the individual to a social class. This means collecting data on occupation (ISCO, at least two digits), but also on managerial status, employment status and size of establishment. The item on occupation is likely to be most burdensome in terms of the accurate coding into ISCO categories, but there were more problems in SILC associated with missing information on the other variables for those who are not currently at work but who worked in the past.

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Appendix 1: Variables used to construct ESeC on EU SILC

*PL015 PERSON HAS EVER WORKED

*PL040 STATUS IN EMPLOYMENT

*PL050 OCCUPATION (ISCO-88 (COM))

*PL110 NACE

*PL130 NUMBER OF PERSONS WORKING AT THE LOCAL UNIT

*PL150 MANAGERIAL POSITION

Appendix Table 1: Cross-national Reliability Levels for the 10-item Economic Strain index

	Alpha
Austria	0.663
Belgium	0.691
Denmark	0.629
Estonia	0.672
Spain	0.632
Finland	0.655
France	0.666
Greece	0.692
Ireland	0.726
Italy	0.711
Luxembourg	0.631
Norway	0.625
Portugal	0.671
Sweden	0.668
Overall	**0.676**

Discussion

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DISCUSSION

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The importance of the emergence of EU-SILC as a source of harmonised data for the Social Inclusion Process cannot be over-estimated. Timely data for all the Member States is indispensable if the monitoring of performance and peer learning are to really be at the core of that Process – and, indeed, if social objectives are to be given their due weight in the framing of the Union's objectives.

It is still too early to properly assess the data being produced from EU-SILC in terms of underlying quality and in particular the extent to which harmonisation across countries has been achieved, but the early indications as presented at this Conference are encouraging. EU-SILC faces a very real challenge in aiming to achieve harmonisation by careful definition of the required output variables for national statistical offices – the European Community Household Panel (ECHP) of course employed a common questionnaire but faced other challenges as a panel survey. Eurostat must be congratulated on the seriousness with which the assessment of data quality in EU-SILC is being taken, and one looks forward to the publication of results of further in-depth studies as data for all the Member states becomes available, covering the various distinct elements. Access by the scientific community to the data will also play a key role in the assessment and underpinning of data quality. Proper linkage between statistics based on the ECHP and those based on the new SILC instrument is also a priority if trends over time are to be analysed accurately.

While consolidating and developing EU-SILC as a statistical source is critically important, it should not of course be seen as the only source, having to cover all aspects of income and living conditions. The data collected through EU-SILC has to complement that obtained through other instruments of the European Statistical System, filling key gaps rather than duplicating other sources. EU-SILC's primary aim is to collect data on income and living conditions, and the key is then that it - and other surveys - have the information required to derive relevant classification variables so that linkage and analysis is possible. The role of EU-SILC as part of a suite of data collection modes has to be kept to the forefront in deciding how best to adapt and develop it in the future.

While other sessions of the Conference have looked in some depth at the measurement of one core variable, income, this session been focused on non-income dimensions. It has been a characteristic of the Social Inclusion Process over the past number of years that the multidimensional nature of poverty and social inclusion has been increasingly brought to the fore, and this is to be very much welcomed. EU-SILC clearly has a critical role to play in capturing key non-income dimensions, and much has been learned in this respect from the rich data obtained in the ECHP. This was unique in a comparative context in allowing the relationships between non-income dimensions and income to be tracked over time, so that the dynamics of these relationships could be studied and compared across countries.

The two papers on which I have been asked to concentrate in my comments relate to the use of non-monetary indicators to capture material deprivation and poor housing, and access to health care. The use of non-monetary indicators to capture material deprivation and poor housing is the topic of the paper by Anne-Catherine Guio and Isabelle Macquet, and this presents a very thorough and impressive set of analyses of the currently available data from EU-SILC in this regard. This builds on previous work using data on non-monetary deprivation from ECHP, and having worked with this data for some years myself it was heartening to see the robustness of the results – notably in terms of distinguishing different dimensions of deprivation – in the transition to EU-SILC. The authors make a number of suggestions about how best to use these indicators to produce aggregate indices of material deprivation in a comparative context, and I very much agreed with the thrust of these proposals. While arriving at an agreed indicator or indicators for inclusion in the Laken set is not easy, the obstacles should not be insuperable[1].

One concern I would note, though, is that the set of non-monetary indicators included in EU-SILC is rather narrower than what was included in the ECHP. (This is brought out by a comparison using the EU-SILC data for Ireland, which includes the broader set from the ECHP, carried out recently by my ESRI colleagues Chris Whelan and Bertrand Maitre). The special module to be included in EU-SILC 2009 will be very important in testing new deprivation indicators and assessing the coverage of EU-SILC in this respect. (This could include both deprivation items specific to children and items aimed at capturing the situation of different adults within the household, rather than the household as a unit.) Assessing the comparability of the existing deprivation items across countries is also essential if they are to be used properly.

Turning to the second paper, on health and access to health care, the results are very much less encouraging in terms of a key aim, namely capturing differential access to health care and financial barriers to such access across and within countries. It had been hoped to employ data from EU-SILC to produce an indicator focused on this for inclusion in the Laeken set. My assessment of the results presented in Xander Koolman's paper analysing the currently-available EU-SILC data in this regard is that it is not likely to yield such an indicator. The patterns of responses to the question about not having visited the doctor when sick, and why that occurred, have several curious features and one would be very hesitant about basing a high-level indicator on them. The phenomena one is seeking to capture are complex and intimately related to the specific institutional features of the country in question, and so particularly hard to measure in a comparative context. None the less, they may well be a core feature of the experience of social exclusion in some Member States, and so further efforts will have to be made to improve the data available in this respect, keeping in mind other parts of the statistical system.

While in this specific case the results from EU-SILC may be considered disappointing, it is in the nature of development of statistical infrastructure that it is incremental; EU-SILC is now providing a core element of that infrastructure in the socio-economic sphere, and consolidating and improving it deserves the priority that Eurostat and the Union more broadly are according it.

[1] The issues this raises are discussed in some detail in Marlier, Atkinson, Cantillon and Nolan, *The EU and Social Inclusion: Facing the Challenges*, Bristol: The Policy Press, 2006).

Data quality and comparability in EU-SILC

VI

Issues in data quality and comparability in EU-SILC

Vijay VERMA

chapter 1

ISSUES IN DATA QUALITY AND COMPARABILITY IN EU-SILC

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Abstract

This paper develops and discusses a framework for the assessment of statistical quality in EU-SILC, with focus on comparability as a central dimension of quality. We view data quality as a multidimensional concept, covering not only statistical accuracy but also the relevance, timeliness, comprehensiveness, etc., of the data. There is a broad agreement on what dimensions make up the overall quality of statistical data, and we briefly review these dimensions, noting some relationships between them. All counties participating in EU-SILC produce national Quality Reports. We review them briefly since they provide valuable information on data quality, including comparability.

Comparability, as one of the dimensions of data quality, is a particularly important dimension in the context of a EU-wide undertaking such as EU-SILC. In ECHP, for instance, comparability was achieved through a standardised design and common technical and implementation procedures, with centralised support of the national surveys by Eurostat. The survey structure and implementation arrangements are more diverse in EU-SILC; we identify how this diversity makes the problem of comparability more complex and acute in EU-SILC.

We begin by clarifying what "comparability" means and how it may be achieved in practice, and identify the basic characteristics and requirements of EU-SILC in their effect on comparability. Comparability means the extent to which the results for different countries can be put together, compared, and interpreted in relation to each other and against common standards. An assessment of how far such comparability has been achieved in practice requires us to examine the data and procedures both from the "input" and the "output" sides. The former involves an analysis of the methodology and implementation of the process of production: how the data were collected, statistically treated, processed, and analysed. The latter involves a comparison of the substantive results actually obtained with appropriate standards such as alternative data sources, prior knowledge, and logical expectations. Both these aspects in the assessment of comparability are important.

On the basis of this framework, the paper proceeds to identify a number of specific aspects where problems of comparability are likely to arise in EU-SILC, and elaborates methodologies for the study of some of the more important ones among them.

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1. Data quality: a multidimensional concept

A comprehensive assessment of data quality requires its diverse dimensions to be taken into account. Various organisations have developed their own specific lists of 'quality dimensions', but they all have a great deal in common. Essentially, they all share the view that "improving statistical quality" means "increasing the utility of statistical products and services for the community of their users". Quality may be defined in terms of user needs as the "totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs". Or more simply, especially in relation to statistics, as "fitness to use" for the purpose for which the data were created[1].

Below is an illustration of overlapping concepts and categories used by different organisations to identify dimensions of quality[2].

1.1. Quality dimensions

Canada	Netherlands	R. of Korea	IMF	Eurostat
			Prerequisites of quality	
Relevance	Relevant	Relevance		Relevance
Accuracy	Accurate	Accuracy	Accuracy and reliability	Accuracy
Timeliness	Timely	Timeliness	Serviceability	Timeliness and Punctuality
Accessibility		Accessibility	Accessibility	Accessibility and clarity
Coherence				Coherence
		Comparability	Methodological soundness	Comparability
Interpretability				
			Integrity	Completeness
	Cost-effectively	Efficency		
	Without too much a burden			

1.1.1. *Relevance and use of the data*

Relevance refers to the capacity of the data to meet users' needs. It implies the identification of users and their needs, and assessment of the extent to which their needs are actually met. The concept also covers the *potential* of the data in meeting the relevant needs.

EU-SILC builds on the experience of ECHP, with a similar in scope and content. Judging from the enormous amount of academic and policy-relevant research which has been conducted using ECHP data, one can expect EU-SILC also to prove highly relevant for the purpose for which the instrument has been created. Perhaps so even to a greater extent than ECHP, because the experience of ECHP has contributed towards the creation of an improved instrument in the form of EU-SILC.

[1] Juran J.M., Gryna F.M. (1970). *Quality Planning and Analysis*. McGraw Hill.

[2] This table is taken from Lee D., Shon A. (2001). Korea's experiences in statistical quality assessment. *Proceedings*, Statistics Canada Symposium "Achieving data quality in a statistical agency: a methodological perspective".

This expectation by no means diminishes the need for continued assessment of the actual performance of EU-SILC, preferably on the basis of well-designed *user satisfaction surveys*, enumerating periodically at least the most important users.

1.1.2. Timeliness and punctuality

Punctuality refers to adherence to a pre-established time schedule for the release of statistics. Timeliness is a more objective criterion, assessing how fresh are the data and whether they became available when most needed. Punctuality acquires increased importance in the EU-wide context, in so far as the data are needed and used in a comparative context, and hence for many countries simultaneously.

On the other hand, it is important to note that the requirements of timeliness can conflict with those of accessibility and clarity, and above all with those of accuracy. At a minimum, the data must be checked and corrected to a high standard before their public release. We may call this "elementary quality control". Obviously, releasing data or results without adequate editing and correction can be misleading and wasteful. *It can also damage the credibility of the producer organisation*[3].

The requirements of punctuality have been expressed very strongly in EU-SILC Regulations. This is because of the desire (and the need) to improve upon the rather poor performance of ECHP in this respect. We will learn in the near future whether an appropriate balance has been reached in EU-SILC between the somewhat conflicting requirements of punctuality on the one hand, and pre-release quality control on the other.

1.1.3. Data accuracy

It has been customary in survey practice to focus on accuracy at the expense of – even to the exclusion of – other dimensions of quality. Even though some people may consider accuracy to be the most important and central aspect of data quality, it is essential to pay close attention to other dimensions of quality as well.

Just as quality is multi-dimensional, we may also view accuracy – one of the dimensions of quality – to be itself multidimensional. Firstly, it is useful to distinguish between two broad categories of error: errors of measurement and errors of estimation. *Errors of measurement* refer to the difference between the measurements and the actual (true) values for the given set of observation units. *Errors of estimation* refer to the biases and uncertainties involved in going from the observed sample to the whole target population. Next, within each of these broad types, there are errors arising from different sources: e.g., conceptual, interviewing (measurement, observation), respondent and processing errors under 'measurement errors'; and coverage, sample selection, non-response and sampling error under 'errors of estimation'.

Evaluation of the accuracy of survey data requires an assessment of the magnitude of errors arising from all these sources. In practice, in most surveys the assessment is limited to the more important and/or the more easily measured components. EU-SILC country data producing organisations no doubt collect a great deal of relevant information on different types of errors in their data, but we may expect serious limitations in the extent to which such detailed information can be made available in the public domain.

[3] Ivan Fellegi identifies credibility as a 'survival' issue for a statistical organisation.

1.1.4. Comparability

Comparability is increasingly considered a most central requirement of data quality. This dimension of quality is particularly important in the context of a multidimensional undertaking such as EU-SILC, where *issues relating to comparability underscore all aspects of data quality*. For instance, for most of the important uses of EU-SILC, the data can be relevant only if they are comparable across Member States, and also over time. Data for all countries need to be released at the same time: in international programmes it has often been a problem that the slowest country can delay the whole. Indications of accuracy (such as response rates) need to be defined and computed following identical procedures. And so on.

The survey structure and implementation arrangements are more diverse in EU-SILC, compared with ECHP for instance; this has implications for comparability. I will discuss diverse aspects related to comparability in the remaining sections of this paper.

1.1.5. Coherence with other statistics and over time

This refers to consistency with other sources providing similar and related information. *Consistency does not necessary mean identity*: often there are genuine and inherent differences in the information coming from sources of different types. What it means is whether different sources together lead to a consistent picture, with each making a contribution towards the development of the picture. In the case of the EU-SILC, the most relevant sources for external comparison include national household budget and labour force surveys, national accounts, and various administrative and other sources depending on the country.

In a panel (and in fact in any continuing survey) coherence over time is also a fundamental requirement. Only under this condition can we study trends, aggregate data over time, or construct micro-level longitudinal measures.

1.1.6. Accessibility and clarity

These aspects refer to the extent to which the statistical data are available in the form and under conditions which meet users' requirements, and to how well the data are described and documented for the purpose. 'Conditions of availability' include a whole range of factors such as restrictions on who can or cannot get access to the data, what items of information are suppressed, what restrictions apply on the conditions and purposes of data use, and also the difficulties, delays and the costs involved in gaining access to the micro data.

Well documented EU-SILC micro data became available for research very soon after they were ready for the purpose. *This is a remarkable achievement* and, in my view, represents a major advance in the ESS. There are of course shortcomings, such as the suppression of a little too much information in the name of confidentiality, and the price charged for data use which can be rather high especially for academic researchers. Documentation and provision of meta-data also needs improving and constant updating. Some of the most important requirements include the establishment of sufficiently high 'minimum standards' for data checking, a system of 'data alerts' warning users about data problems and limitations, and an actively interacting community of users.

1.1.7. Other quality aspects

A variety of other aspects are also covered in the various data quality frameworks.

Some of these overlap – different terms indicating more or less the same thing, perhaps from a somewhat different point of view or with a somewhat different emphasis. We have, for instance, 'completeness' in Eurostat terminology, 'integrity' in that of IMF and, with a little difference, 'interpretability' in that of Statistics Canada. Cost efficiency and minimisation of respondent burden are other aspects included as quality dimensions, especially in national frameworks (The Netherlands, South Korea in the table). Surprisingly, not all frameworks explicitly refer to 'comparability' as a dimension.

1.2. Relationship between different aspects of quality

No quality dimension is an all-or-nothing property: each is a matter of degree.

To a certain extent, the *different dimensions of data quality compete against each other*, an obvious example being the common conflict between timeliness and data accuracy – 'quickly released but rough data, versus refined data but much delayed'. And of course, statistically the most accurate data are not necessarily the most comparable. Often there is a clear trade-off between different dimensions of data quality – one dimension being enhanced at the expense of the other. The optimum choice of statistical design and procedures often takes the form of a balance between different quality requirements. *The appropriate balance is always specific to the particular circumstances and objectives, also the type and the particular uses of the data.* In some situations, punctuality for instance is absolutely critical, while in others it may hardly matters against the objective of producing robust and reliable information of long term utility.

It is not only conflict and competition which exists between quality dimensions, however. Even more importantly, different aspects of data quality can also *mutually support and reinforce each other*, one often forming a precondition for the other. For instance, it is hardly possible for two data sets to be comparable, when either or both lack statistical accuracy. I would like to propose the following model as a tool for thinking about the issue more concretely.

Reduction in data quality in any dimension involves a loss in the utility of the information, a loss which may be more or less steep depending on the particular context. Often the resources saved by reducing quality in one dimension can be used to improve quality in other dimensions; however, some dimensions can also be linked in such a way that a quality loss in one dimension necessarily implies a loss in the other as well.

Beyond a certain point, there is likely to be a critical zone when further reduction in quality along a particular dimension would result in increasing drastically the loss in the overall utility of the data. A certain minimum degree of quality has to be present in *every* dimension for the statistical information to remain useful overall.

Hence the relationship between different aspects of data quality is a complex one, and is highly context specific. Practical understanding of the relationship between different dimensions of data quality on the one hand, and on the other the relationship between them and the different components of data costs, is what I would term as "statistical wisdom". Appropriate balances have to be sought for EU-SILC as well.

1.3. Quality of EU-SILC Country Quality Reports

National Intermediate Quality Reports for the EU-SILC surveys of 2004 have been produced by countries on the basis of the requirements specified in Framework Regulation (EC) No 1177/2003, Article 16, Commission Regulation (EC) No 28/2004, and the technical elaboration provided in document EU-SILC 132/04 on intermediate and final quality reports[4].

Below we provide, very briefly, a summary assessment of the completeness and quality of the Quality Reports[5]. Of course, this assessment of the *reporting* of quality is not an assessment of the *quality* itself of the survey data. The latter type of assessment is a broader undertaking, and requires examining the survey procedures and processes, internal consistency of the data, their plausibility, and comparability of the results with other national sources, and also with similar data from other countries. Nevertheless, *an assessment of the reporting of quality forms an important part of the broader task of assessing data quality*; in fact the former may be considered the first step of the latter.

This is because the process of data quality assessment has two distinct aspects: evaluating the *survey process* through which the data are generated; and evaluating the *estimates and inferences* produced from the data. The survey process comprises the methodology of the survey, as well as the implementation of that methodology in all its aspects. We can assess data quality not only by evaluating the estimates and inferences from the data; a great deal is also learnt from examining the survey process (design, procedures, implementation …). From logic and experience, we often know that certain types of procedures and practices are more likely to yield good statistics than other types. At least we know that certain types of procedures are likely to produce data of poor quality, and it is critical in quality assessment to know whether such procedures, or some better alternatives, have been used. The national Quality Reports are designed primarily *to document the survey process* in the above sense. By reporting some important indicators computed from the survey data and comparing them with other sources, the national Quality Reports also provide some more direct information on the resulting data quality.

It is also useful to put together that information for a number of countries, so as to permit an examination of the national design and procedures in a *comparative context*. This greatly facilitates their assessment, especially for the purpose of assessing comparability in EU-SILC data.

It is our assessment that, overall, the national Quality Reports are of high quality. Most countries have provided most of the information requested by Eurostat, following systematically the sections and subsections specified in that document. However, in a few cases the country quality reports lack sufficient detail.

Common EU indicators

Nearly all the required Common EU indicators (at-risk-of poverty rate before and after social transfers, share ratio S80/S20, relative median at-risk-of poverty gap, Gini coefficient, and unadjusted gender pay gap) have been reported in the Quality Reports. A priori, the values of the various indicators appear generally plausible. EU-SILC data are used for estimating the gender pay gap by about half of the countries (the other using alternative sources). It is possible that the values of this index are rather sensitive to outliers in EU-SILC data, and are less reliable than other indicators constructed from the same source.

4 The countries participating in the 2004 survey included: Austria, Belgium, Denmark, Estonia, Spain, Finland, France, Greece, Ireland, Iceland, Italy, Luxembourg, Norway, Portugal, Sweden.

5 These remarks are based on: Verma V. and co-researchers (2006). *EU-SILC Quality of Quality Reports*. Document prepared for Eurostat.

Survey structure

Most countries have adopted the 4-year rotational integrated design recommended by Eurostat for situations in which EU-SILC is based on a new survey. Modified designs have been used in some countries, primary for the purpose of integrating EU-SILC with an existing survey (e.g., Sweden, Finland), and/or incorporating into EU-SILC an existing sample (e.g., Norway, Denmark, Luxembourg). In France, the structure is the same as the standard integrated design, except that much longer panel duration is used. In fact, apart from France, all other countries – including the ones mentioned above not using the standard design – have used 4-year panels. This of course is the minimum panel duration required for EU-SILC.

Sample selection and design

All samples are probability sample by design. In almost all countries, up-to-date sampling list are available for sample selection. The number of households or selected respondents interviewed varies from around 3,000 (Iceland) to 24,000 (Italy). In practically all cases, direct sampling of households/persons, or two-stage area samples have been used.

A serious shortcoming of the Quality Reports concerns the lack of information provided on *design effects* (the efficiency of the sample design used, compared to that of a simple random sample of households or persons). Standard errors for the common EU cross-sectional indicators have been reported only by half of the countries. More information is highly desirable.

Unit non-response and substitution

As noted, all samples are probability sample by design. *However, in some cases, high non-response rates and/or substitution may have damaged this desirable property of the sample.* Overall unit non-response rate for the personal interview varies from the low of 12% (Greece) to the high of 52% (Belgium).

Only two countries have chosen to allow substitution for selected sample units which cannot be enumerated: Spain and Ireland. In both cases, insufficient information has been provided on the substitution procedures used, and – much more importantly – on any measures applied to control the extent or manner of substitution. This is a major and potentially very damaging shortcoming.

Item non-response

Mostly, the requested information on the rates of item non-response has been provided in the Quality Reports. Where information on income components is obtained from registers, it can be assumed that there is no item non-response for these variables. Among the ‘survey countries’, the rates of unit response for self-employment income (perhaps the most problematic variable in this respect) varies from essentially zero in Greece and France (with very low values also in Estonia, Portugal, Italy and Ireland), to as high as 65% in Belgium, with high values also recorded in Spain (24%), Austria (38%), and Luxembourg (45%). The wide variation in item non-response rates is potentially a major factor adversely affecting comparability of the data. Note also that the ‘total’ response rate for an item is even lower – being the product of unit and item non-response rates considered separately.

Mode of data collection

There are surprising variations in mean interview duration, from 18 minutes in Norway to 60 minutes or more in France, Greece, Italy, Portugal and Sweden. The reason for this variation is not apparent. Interview by telephone has been the choice in Nordic countries, with the exception of Sweden where the report expresses a strong preference for normal face-to-face interviewing. In the remaining countries, there is almost equal division between PAPI and CAPI.

In some countries (such as Estonia, Greece and Norway) individual interviewing by proxy has been largely avoided, but it is disturbingly high in a number of other cases: reaching 25% in Finland, France and Italy; and reaching or exceeding 30% Ireland and Spain. Proxy interviewing is likely to damage data quality, especially given the nature of the data collected in EU-SILC personal interview.

The quality Reports also provide wealth of information on data collection and processing procedures.

Comparability and coherence

The Quality Reports are particularly rich in this area: detailed information has been provided in most cases on the definition of income components, noting any departure from the standards, even when such departures are only minor.

Coherence, in the form of comparisons with external sources, is admirably detailed in a few country reports (such as Spain and Greece), but limited or absent in a number of other reports.

2. Comparability: a central requirement

The survey structure and implementation arrangements are more diverse in EU-SILC, compared with ECHP for instance. In the rest of the paper, I try to identify how this diversity makes the problem of comparability more complex and acute in EU-SILC.

We begin by clarifying what “comparability” means and how it may be achieved in practice, and identify the basic characteristics and requirements of EU-SILC in their effect on comparability. Based on this framework, we identify a number of specific aspects where problems of comparability are likely to arise in EU-SILC, and elaborates methodologies for the study of some of the more important ones among them.

Comparability is increasingly becoming one of the central dimensions of data quality. It is particularly important in the context of a EU-wide undertaking such as EU-SILC. The need for genuinely comparable data arises not only because it is important in itself, but also because such data give Member States and the EU the possibility of bench-marking and defining best practices in terms of social and economic policy. Apart from its obvious relevance at the EU level, comparable information is also invaluable for policy at the national level, as it helps each country to judge its place relative to others in the EU.

Diverse issues concerning comparability have been discussed in-depth by the current author, and these will provide a framework for the present discussion[6].

To begin with, it is useful to explain the concept of 'comparability': (1) what comparability is; (2) how comparability may be achieved in practice, and the role of standardisation; and (3) how we may assess the extent to which comparability has or has not been achieved. This defines the framework for understanding and evaluating the performance of EU-SILC in this respect.

2.1. What is comparability?

Comparability of statistical data, i.e. their usefulness in drawing comparisons and contrast among different populations, is a complex concept, difficult to assess in precise or absolute terms independently of specific objectives of analysis. Nevertheless, it is a fundamental requirement for any data to be used in multi-population comparisons and contrasts, and is the major rationale in the launching surveys such as the ECHP and EU-SILC.

While comparability may defy precise definition, it is an important and useful concept. It is a relative concept: we can only have 'degrees of comparability', not absolute comparability. Furthermore, the same data may be sufficiently comparable for some purposes, but not so for others.

By comparability we mean that data (estimates) for different populations (whether countries or different groups within the same country) can be legitimately (i.e. in a statistically valid way) put together (aggregated), compared (differenced), and interpreted (given meaning) in relation to each other and against some common standards. Comparability permits results for these subpopulations to be (1) aggregated to construct the total picture; (2) contrasted to study differentiation; and (3) even for individual subpopulations, given meaningful interpretation, which can be done only on the basis of shared concepts, definitions and classifications. A degree of comparability is the essential basis for these purposes.

In an intuitive sense, comparability between different data sets (or different sources of information) implies that, in certain essential respects, the data measure the 'same thing'. The data sets lack comparability if they provide measures of different things (different concepts, phenomena, objects, reference periods, etc.) – even if each source provides the most accurate measure of the thing it refers to. Hence comparability as a dimension of quality is distinct from data accuracy[7]. Yet two data sets cease to be comparable if they are subject to measurement errors of different magnitudes and types, and in any case if such errors are large in either. Hence an 'adequate' level of accuracy is essential for comparability.

[6] See for instance:
Verma V. (2004). Comparability of statistics at the international level: concepts, approaches, methods. *Invited Lecture* at Comparabilité, harmonisation et intégration de données dans la construction de systèmes statistiques. Neuchatel: Swiss Statistical Society, Section of Official Statistics.
Verma V. (2002). Comparability in Multi-country Survey Programmes. *Journal of Statistical Planning and Inference*, vol. 102(1), pp. 189-210.
Verma V. (2002). Comparability in International Survey Statistics. Keynote Address, *International Conference on Improving Surveys*, Copenhagen, 25-28 August.
Verma V. (1998). Robustness and comparability in income distribution statistics. Invited paper, *European Union High Level Think-Tank on Poverty Statistics*, Stockholm.
Verma V. (1998). Data sources and access for comparative analyses. In *Information Dissemination and Access in Russia and Eastern Europe* (ed. Walker, R. and Taylor, M.). Amsterdam: IOS Press.
Verma V. (1997). Comparability in multi-country survey programmes. *American Statistical Association Joint Statistical Meetings*, Special Session in Memory of Professor P.V. Sukhatme, Anaheim, California, USA.
Verma V. (1993). Comparative surveys in Europe: problems and possibilities. *Bulletin of the International Statistical Institute* vol. 55.

[7] Of course, it is appropriate that EU-SILC encourages the Member States to use the best national sources in collecting income data, whether they be from surveys or registers. But for the reason noted above, sometimes this choice may not be the best for comparability!

2.2. Why comparability?

Internationally comparable information is needed because of the countries' need to:

- assess their place in relation to other countries
- increase the scope for learning from others' practices and join in co-operative ventures; and take advantage of financial and technical support from international programmes
- international and bilateral agencies need comparable information for their programmes and policies
- a major impetus is also provided by researchers who are increasingly looking for internationally comparable datasets

2.3. How comparability is achieved?

In relation to the basic requirements for generating comparable data, a distinction can be drawn between the measurement and estimation aspects of a data generation system.

Measurement aspects. These concern the obtaining of information on the particular set of units included in the study, such as a given sample of households and persons. These aspects include definition of concepts, variables and survey population; methods of measurement and data collection; and the related substantive analysis. These aspects should be strictly standardised so as to control (make similar) biases of measurement in the comparisons.

Estimation aspects. These concern drawing conclusions about the population which the observed units are meant to represent. These include sampling frames, sample size and design, many operational aspects, as well as weighting, estimation and other aspects of statistical analysis. Generally, these have to be chosen flexibly to suit the conditions and requirements of individual populations in the comparison. *What are required are not identical procedures, but the common standards to be followed.* Comparability requires control of the measurement aspects so as to ensure that the same type of information is obtained. In principle, the estimation aspects can be chosen flexibly without affecting comparability, as long as valid and common standards are followed.

Standardisation. In addition, there are in practice often powerful reasons for aiming at standardisation and control of many details in systems aimed at generating comparable data, going well beyond the development and provision of common concepts, definitions, statistical instruments and procedures, and the main statistical outputs. This is especially useful when existing technical capability of co-operating institutions is uneven, especially if some of the institutions have inadequate capacity. Standardisation is a useful tool for ensuring that conditions for comparability are actually met. There is often also a considerable economy of effort in adopting a common package of procedures and tools, in contrast to custom-designing for each case.

3. Inter-country comparability of EU-SILC data

3.1. Lessons from ECHP

A comparison with the situation of ECHP is very instructive in appreciating the issues relating to comparability as they are likely to arise in EU-SILC.

In ECHP comparability was achieved through a standardised design and common technical and implementation procedures, with centralised support and co-ordination of the national surveys by Eurostat. This included: (1) common concepts, definitions and classifications; (2) the use of a common 'blue-print' questionnaire, which served as the point of departure for the national surveys; (3) a common survey structure and procedures; (4) common sampling requirements and standards, coupled with flexibility in the actual designs to suit national conditions; (5) common standards and arrangements for data processing and statistical analysis; (6) the creation of standardised microdata sets - this was a crucial element of data comparability in practice; and (7) achieving the above in practice through centralised support and co-ordination of the national surveys by Eurostat.

Concerning (5), common standards and arrangements for data processing and statistical analysis, we should comment on two important aspects, namely imputation and weighting.

Imputation for missing income components:

Household income is composed of diverse components, and incomplete information for the construction of total income is a major problem in surveys. Complex and comprehensive procedures are required for good quality imputation of missing income components. In ECHP imputations were confined to missing income components and were done *centrally by Eurostat*. For this purpose a comprehensive methodology was adopted, following discussions at the ECHP Working Group and Task Forces. The method used was a variant of the estimation-maximisation (EM) algorithm, with the algorithm and programs developed at the University of Michigan.

Sample weights:

In complex panel surveys like the ECHP susceptible to high rates of non-response, the sample data have to be appropriately weighted. The weighting procedures can be elaborate and complex. In ECHP standard procedures were developed and implemented for the computation of sample weights, generally again *centrally at Eurostat*. Starting from ECHP wave 2 weights were developed on the basis of weights from preceding waves, modified to take into account unit non-response between the waves and adjustment of the achieved sample to external control distributions by various person and household characteristics.

Of course, there were limitations to comparability across countries in ECHP data. Nevertheless, each of the features (1)-(7) contributed much to the achievement of a fairly high degree of comparability across countries.

In order to adequately address the comparability issues in EU-SILC, it is necessary to identify how the differences between the EU-SILC and ECHP structure and arrangements make the problem of comparability more complex and acute in EU-SILC. For this purpose it is necessary to begin by clarifying the basic characteristics and requirements of EU-SILC in their effect on comparability[8].

3.2. Characteristics and requirements of EU-SILC affecting comparability

Flexibility is an essential feature of EU-SILC. This means that the EU-SILC dataset may comprise different types and combinations of data sources, with different designs.

8 Verma V. and Clemenceau A. (1996). Methodology of the European Community Household Panel. Statistics in Transition, 2(7), pp. 1025-1062.

Cross-sectional and longitudinal components

Data are required in both cross-sectional and longitudinal dimensions. Both cross-sectional and longitudinal micro-data sets need to be updated on an annual basis.

The first priority is given to the production of comparable, timely and high quality *cross-sectional* data. The cross-sectional component covers information pertaining to the current and a recent period such as the preceding calendar year. It aims to provide estimates of cross-sectional levels as well as estimates of net change from one period (year) to another.

The longitudinal component covers information compiled or collected through repeated enumeration of individual units, and then linked over time at the micro-level. It aims at measuring gross (micro-level) change and elucidating the dynamic processes of social exclusion and poverty. Longitudinal data are to be limited to income information and a limited set of critical qualitative, non-monetary variables of deprivation, aimed at identifying the incidence and dynamic processes of persistence of poverty and social exclusion among subgroups in the population. The longitudinal component is also more limited in sample size. Furthermore, for any given set of individuals, micro-level changes needs to be followed up only for a limited duration, such as a period of four years.

Diverse data sources

The cross-sectional and longitudinal data can come from separate sources, i.e., the longitudinal dataset does not need to be "linkable" with the cross-sectional dataset at the micro-level. Of course, such linkage is normally present in so far as the two types of data come from the same source. In principle, depending on the country, micro-data could come from:

1. one existing national source (survey or register)
2. two or more existing national sources (surveys and/or registers) directly linkable at micro-level
3. one or more existing national sources combined with a new survey – all of them directly linkable at micro-level
4. a *new harmonised survey* (termed an 'integrated survey') to meet all EU-SILC requirements
1. To-date, the integrated survey is the most common option adopted. This is because a majority of the countries are starting new surveys for EU-SILC.

Varied structures

Flexibility of EU-SILC means that EU-SILC dataset may comprise different types and combinations of data sources, with different designs. A *typology* has been developed of the structure and design of EU-SILC data sources, describing in particular aspects pertaining to sampling[9]. It identifies the following possibilities:

[A] A single integrated source covering all components – cross-sectional and longitudinal, income and social

[B] Two separate surveys, one cross-sectional and the other longitudinal, each covering both income and social (non-income) variables

[C] Two separate sources, one covering income variables and the other covering social variables, both cross-sectional and longitudinal in each case

[9] Verma, V. (2001). *EU-SILC Sampling Guideline*. Manual developed for Eurostat. Verma, V., and Betti, G. (2006). EU statistics on income and living conditions (EU-SILC): choosing the survey structure and sample design. *Statistic in Transition*, 7(5), pp. 935-970.

It notes two other possible arrangements, though likely to be rare:

[D] A single ECHP-type panel survey, providing all cross-sectional and longitudinal data, but primarily focused on the latter

[E] A separate source/arrangement for each component, cross-sectional vs. longitudinal, and income vs. social variables

More complex structure(s)

In practice, the most commonly used design is the integrated design, [A], as it is generally the most suitable one, especially for countries starting a new EU-SILC survey. In the integrated design, the cross-sectional sample at any year consists of four panels, one having been introduced afresh that year, and the others introduced, respectively, 1, 2 and 3 years ago. Clearly, this structure is more complex than that of ECHP. At any one time, panels of different ages constitute the total sample, which is likely to increase the complexity of both the cross-sectional and the longitudinal weighting and estimation procedures.

Another major source of complexity (and also diversity) arises from the choice between using a sample of 'complete' households (i.e., taking all members of a selected household into the sample), and using a sample of persons (essentially, selecting only one adult per household for the survey). This choice applies only to interview surveys aimed at collecting more complex non-income variables in countries where income information can be obtained from registers. Procedures need to be developed also for such samples of persons.

Income and social variables

In relation to the required survey structure the data covered in EU-SILC can be classified into the following types, for both the cross-sectional and the longitudinal components:

- household variables, covering variables measured at the household level
- household member variables providing information on basic characteristics of household members
- income variables, covering the set of target variables on income, income sources and related aspects; these are relatively complex variables measured primarily at the personal level, but aggregated to construct household-level variables
- social variables covering a range of target variables on living conditions, activities, attitudes and other non-monetary indicators, and may also include some closely related income variables; these are relatively complex variables collected and analysed at the person-level

Variables concerning the household and household members mainly include straightforward items, collected or compiled at the household level. The information may come from an interview survey with a single respondent in the household, from registers and other administrative sources, or from some combination of the above. These sets of variables require the same type of survey structure in all countries: a representative sample of households, covering all members of each household in the sample.

The choices concerning income and social variables are more complex and inter-related.

Income variables must be obtained for a sample of complete households, i.e. covering all income recipients (adults aged 16+) in each household. The information is too complex to be obtained by proxy, and must either: (i) be collected through personal interview with all adults in the sample households; or (ii) compiled from registers, thus replacing the interview survey altogether for these variables. All persons in the initial sample households need to be followed up (even if they move to a new address) over the duration of the panel for obtaining longitudinal data on income based on the full sample.

Social variables are also too complex or personal in nature to be collected by proxy. However, in contrast to income variables, these are generally not available from registers or other administrative sources, and must be collected through direct personal interview. Another crucial difference is that, from the substantive requirements of EU-SILC, it is not essential that these variables be collected for all persons in each sample household. It is possible to do this collection on a representative sample of persons (adult members aged 16+), such as by selecting one such person per sample household. Hence within EU-SILC objectives, the choice is between covering this set of variables: (i) on a sample of complete households, i.e. covering all adult members of each sample household; or (ii) on a subsample of adults, such as by selecting one adult per sample household.

In practice, the choice depends on the source of information for the income variables. The normal choice is to collect social variables on a sample of complete households if income variables are collected through personal interview, since the latter would then already involve detailed interviewing of all adults in the household. However, where income data are obtained from registers and involve no personal interviewing, it is more convenient and economical to collect social variables from a subsample, such as one adult per sample household.

Expanded coverage

In addition to all the above factors, the problems of comparability are made more complex and acute in EU-SILC simply as a result of the fact that more diverse conditions are to be covered. While ECHP was confined to the old EU15, EU-SILC covers the expanded EU25, and possibly also Norway, Iceland, Switzerland, and the Candidate countries including Bulgaria, Romania, Croatia and Turkey. Survey instruments and procedures have to be adapted such that comparable data are produced despite major differences in the prevailing structures and circumstances of the countries involved.

4. Assessment of achieved comparability

How may we assess the extent to which comparability has or has not been achieved across countries in the implementation of EU-SILC?

As noted, comparability is a complex concept and not easy to quantify. In order to assess the degree to which different bodies of data are ‘comparable’, it is necessary to examine them both from the input side and from the output side.

This parallels the distinction between ‘process’ and ‘product’ indicators of the broader concept of data quality.

- By examination of comparability from the input side, we mean an analysis of the methodology and implementation of the process of production of the data. From where and how the data were collected, statistically treated, processed, and analysed?
- By examination from the output side, we mean a comparison of the substantive results actually obtained, with reference to appropriate standards such as alternative data sources, prior knowledge, logical expectations, etc. How meaningful are the substantive results being compared in relation to each other and to appropriate external standards? How far can the estimates for different countries be put together, compared, and interpreted in relation to each other and against some common standards?

Both these aspects in the assessment are important, and must be taken into account in the implementation of the comparability assessment process.

4.1. Comparison of the production processes

A thorough examination of similarities and differences in the methodology of the production process of the data can provide very reliable indicators of the degree of comparability which may be expected. Even more strongly, it can indicate where the results are most likely to *lack* the required degree of comparability.

Frequently, reliable comparisons from the "output" side are simply not possible, and methodological comparisons from the "input" side are all that can be achieved.

Two important points need to be kept in view in comparisons of the data production methodologies. One is the distinction noted above between the *measurement aspects* which need to be the same or comparable, and the *estimation aspects* which can be chosen flexibly without affecting comparability. There are many examples of confusion arising as a result of unnecessarily requiring standardisation of not only the measurement aspects, but also of the estimation aspects.

Secondly, it should be noted that sometimes even the measurement aspects need to be *different* to obtain comparable results. A good illustration of this point is provided by the use of country-specific questionnaires to obtain the required information, as opposed to the use of common 'blue-print' questionnaires in all countries. Of course, a common questionnaire can ensure a common operationalisation of the concepts and content for the surveys. However, the requirement of comparability of the information generated does not necessarily imply the need to use identical questionnaires in all countries. On the contrary, because of differing legal and institutional frameworks, *different questions* are sometimes required in different countries to obtain the *same information*. An example is the enumeration of income from the diverse social protection schemes in different countries.

Hence it is important to compare EU-SILC data production methodologies among countries in a context-sensitive manner, rather than mechanically. Also, account must be taken not only of formal differences, but of actual differences in the implementation. Real differences can be much more important than differences in the formal procedures adopted; the converse is also possible – sometimes formal procedural differences having little consequence in their actual implementation.

4.2. Comparison of the substantive results

In principle, it is the comparison of the substantive results actually obtained (the "output") which is of interest in the assessment of comparability. Sometimes, comparisons from the "input" side may point to differences which appear serious, but the effect of which on the actual results obtained turns out to be unimportant. Equally, comparisons from the "input" side may fail to identify differences, which in fact damage the comparability achieved in significant ways. However, direct comparison of the substantive results is sometimes too difficult or even impossible. Hence it must be complemented by comparison from the "input" side.

For the same reason, it is often necessary to look for relatively large differences, for patterns which appear *implausible* in the light of all the available information. The dividing line as to which differences are "large" is, to a considerable extent, a matter of the analyst's judgement. In any case, to be of interest in the evaluation of comparability, the observed differences should be significantly larger than sampling and non-sampling errors involved in both the sources, and also larger than the differences between them expected on the basis of existing knowledge.

Hence, comparisons of the substantive results are also not a mechanical task. Researchers would need to use their analytical skills and subject-matter specific knowledge in this exercise.

Intermediate indicators between the input and output sides may also be useful in the assessment of comparability.

Consider for instance differences in the definitions of household and household membership. From the 'input' side, presence of conceptual and definitional differences point to their potential effect on comparability. As 'intermediate' indicators, we can examine the *extent* of the differences, for instance in terms of the numbers of individuals who get classified differently because of the conceptual and definitional differences. On the 'output' side we may examine, for instance, the *impact* of these differences on the resulting indicators of poverty and inequality.

5. Potential sources of non-comparability in EU-SILC

In this section we identify a number of specific aspects where problems of comparability are likely to arise, or where at least an investigation is called for. We also try to elaborate on possible directions of investigation for a few selected ones. In practice, one would begin from the development of a *comprehensive framework* for such analysis and assessment. Then on that basis, individual sources of non-comparability can be examined in a systematic and consistent way.

5.1. Some potential sources of non-comparability in EU-SILC

The following is a tentative list of sources of non-comparability, which may be modified or extended as a result of further study and feedback from those implementing EU-SILC. It is possible to identify many other topics of interest in the study and assessment of comparability in EU-SILC data.

1. Detailed analysis of the comparability of income distribution by component, with particular attention to self-employment income, imputed rent and housing costs, and sources of non-monetary income[10].
2. Analysis of differences in how income taxes are treated in different countries; assessment of the impact on comparability of the Gross-Net conversion procedures used; examination of how these different procedures can fit into the general micro-simulation model SM2, adopted by Eurostat; application of SM2 to check and replicate the gross-net conversion[11].
3. Assessment of the effect on comparability of the choice between annual vs. current income concepts[12].
4. Study of comparability of non-income items defining living conditions, deprivation and social exclusion, examining in particular the type of supplementary variables developed in Eurostat *Social Report* on income

[10] There are a large number of technical documents prepared by EU-SILC Task Force on Methodological Issues, covering diverse income components. All these documents are also very relevant to most other sections of this paper. Some other relevant references on this topic include the following:
Church J., Verma V. (2001). *Methodological Manual on Income Statistics for EU Member States*. Manual pepared for Eurostat.
Verma V. (2003). *Preparation, Follow-up and Evaluation of the Pilot Experiment for the EU-SILC Project.* Report prepared for Eurostat.

[11] An essential reference to this is the following: Verma V., and co-researchers (2004). *Income in EU-SILC: Net-Gross-Net Conversion; Common Structure of the Model; Model Description; and Application to ECHP Data for France, Italy and Spain.* Eurostat doc. EU-SILC 133/04. This provides a comprehensive description of the Siena Micro Simulation Model (SM2) and its application for the conversion of household and personal income data, as collected in diverse forms in different Member States under EU-SILC project, to the standard target variables on gross and net income required at the EU level.
See also:
Verma V. (2002). *Income in EU-SILC: Net/Gross conversion. An application to ECHP data.* Eurostat EU-SILC doc 113/02.
Verma V., Betti G., Ballini F., Natilli M., Galgani S. (2003). The Siena Micro-Simulation Model (SM2) for Income Data and Statistical Imputation in Conjunction with Micro-Simulation, presented to the *Workshop on Income and Labour Dynamics, WILD*, Siena.

[12] See Church and Verma (2001) mentioned above.

poverty and social exclusion[13].

5. Analysis of major differences in structure of the SILC instrument: fundamental difference between (i) use of registers for income, with a sample of persons for complex social variables; and (ii) income from the interview survey, with a sample of household for complex social variables[14].
6. Assessment of limitations of comparability between income data from registers and from interview surveys. Are there systematic differences in the measured levels, composition and distribution of income between registers and surveys?[15]
7. Examination of the extent and impact of national differences in the basic concepts for data collection and analysis, such as definition of the household, and household membership[16].
8. Documentation of the variations in modes of data collection (for instance, the use of CAPI, CATI and PAPI; different fieldwork and interviewing procedures), and studies of their impact on data comparability.
9. Comparison of the national survey questionnaires, including an overview of and commentary on coverage and content of the questionnaires[17].
10. Quantifying the effect of different rates of cross-sectional non-response, and different attrition rates of the panel components. As in the case of the ECHP, different countries may achieve very different response rates. The problem may be smaller in EU-SILC because of the limited duration of its panels. On the other hand, the overall impact on comparability may be increased due to very different data collection situations in countries using registers and countries using the personal interview survey for the collection of income data.
11. Study of comparability of imputation procedures: Eurostat had developed an elaborate procedure for the imputation of missing items on income in ECHP; in principle, similar procedures have been recommended for EU-SILC[18]. However, it is expected that generally detailed procedures will be developed and implemented only at the country level. This raises the issue of comparability of the results of imputations.
12. Study of differences in the weighting procedures used, and an assessment of the effects of such differences on comparability of the results. (As such, comparability does not require identical weighting procedures, but it is essential to have *common standards*.)[19]
13. Comparative analysis of the incidence of negative, zero and small values of the total disposable household income, how these are treated in the national data sets, and the magnitude of the impact of these differences on the poverty, inequality and other indicators produced from the data.

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13 Giorgi L., Verma V. (editors; 2002). *European Social Statistics: Income, Poverty and Social Exclusion: 2nd Report*. Luxembourg: Office for Official Publications of the European Communities.
See also:
Commission Regulation (EC) No 1983/2003 of 7 November 2003 concerning EU-SILC as regards the list of target primary variables.

14 These aspects are examined in some detail in: Verma V. (2001). *EU-SILC Sampling Guidelines*. Manual developed for Eurostat.
See also:
Commission Regulation (EC) No 1982/2003 of 21 October 2003 concerning EU-SILC as regards the sampling and tracing rules.

15 See for instance:
Epland J. (2006). Challenges in income comparability: Experiences from the use of register data in the Norwegian EU-SILC. *VII International Meeting on Quantitative Methods of Applied Sciences*, University of Siena, Italy.
Rendtel et al (2004). *Quality of Income Data*. Report in CHINTEX project.

16 See Commission Regulation (EC) No 1980/2003 of 21 October 2003 concerning EU-SILC as regards definitions and updated definitions.

17 Verma V. (2002). *Pilot Experiment first EU synthesis-Overview of coverage and content of the questionnaires.* EU-SILC Doc 95/02. This is an extensive report examining the national questionnaires used in the various Member States for EU-SILC project for completeness and comparability, and makes recommendations to Eurostat for improvement of the survey instruments.

18 For the description of the fundamental requirements, see Commission Regulation (EC) No 1981/2003 of 21 October 2003 concerning EU-SILC as regards the fieldwork aspects and the imputation procedures.
See also:
Verma V., Betti G., Ballini F., Natilli M., Galgani S. (2003) quoted above.

19 The standard recommended procedures for cross-sectional and longitudinal weighting are developed in Verma V. (2006). EU-SILC *Weighting Procedures: An Outline*, document prepared for Eurostat. Individual countries may adopt or depart from the standard recommendations to varying degrees.

5.2. Example of study of comparability

(1) Assessment of the comparability of income distribution by component

Income of households is made up of diverse components received by different individuals in the household. Its elements may be compiled from different types of sources, which may differ in concepts and definitions and may not refer to exactly the same reference time. The different sources may be subject to differing patterns of response and recording errors, sampling errors, inconsistencies and incompleteness etc. All this affects comparability.

The assessment of comparability would require detailed analysis of the income distribution by component. The recommended definition of income for use in EU Member States specifies that gross income should include all regular receipts such as wages and salaries, income from self-employment, interest and dividends from invested funds, pensions or other regular receipts from social protection schemes, and any other current transfers received in cash which are regular rather than one-time. Income should not include any large, one-time or irregular receipts from inheritances and the like, which should be regarded as capital transfers since they are unlikely to be spent immediately upon receipt.

The EU income concept – definition[20]

1	Employee income
2	Income from self-employment
3	Imputed rent of owner-occupiers and others
4	Property income
5	Current transfers received
6	Interest payments
Gross income (1+2+3+4+5 less 6)	
7	Current transfers paid
Disposable income (1+2+3+4+5) less (6+7)	

Possibilities

1. As concerns problems of non-comparability, perhaps the main issue here concerns differences among Member States in the classification used for sources of income. A given type of income may not be classified under the same heading. While the major components may be similarly defined, differences often emerge when components are disaggregated more finely. That is, differences in classification tend to become more problematic when the major income components listed in the table above are disaggregated further. Generally, more detailed are the income components, the lower is the degree of expected comparability among the countries. Of course, larger components are also affected if their composition in terms of the set of the constituent smaller components is not the same in all countries.

   Furthermore, systematic differences may be expected between countries compiling information from registers and those collected it through personal interviews. Even if the desegregation of income by components in registers

[20] Based on Table 2.1, Church and Verma (2001) quoted above.

is very precise or detailed, this is not necessarily exactly the same as other registers in other countries, or the same as recommended by the EU-SILC Income Manual, or the same as implemented in interview surveys.

Assessment of comparability would require comparison of the income distribution by component in order to identify major and unexpected differences, followed by a careful study of the sources, concepts and definitions used by each Member State in order to identify the main sources of non-comparability.

Particular attention would need to be paid to self-employment income. In the context of enlarged EU, non-cash income - including imputed rent, housing costs, and other sources of non-monetary income – has also become more important. Another related issue is the effect on comparability of the choice between the annual income and the current income concepts, though so far the latter has been used only rarely in EU-SILC (Ireland; possibly the UK).

2. At a later stage, EU-SILC will include imputed rent of owner-occupied or rent-free dwelling as a target variable, and as a component to be included in the total disposable income. This is a major component and can change the relative situation of countries differing greatly in the proportion of households living in owner-occupied or rent-free accommodation. Excluding this components damages comparability. But on the other hand, its inclusion can also introduce lack of comparability, which may arise from the use of different procedures for imputing rent. While Eurostat may recommend particular procedures (or a strategy) for the purpose, individual countries may not be willing to – and what is more likely, may not be *able* to – use identical procedures.

3. A related issue is the assessment of housing costs. EU-SILC is not concerned with consumption patterns, but the importance of housing costs in the analysis of *income* arises from the presence of *housing assistance* as an important component of income, in particular at the bottom end of the distribution. Increases in housing assistance may simply reflect increases in housing costs (such as increased rent of accommodation provided by public authorities), rather than a real difference in the level of living of the concerned households. It becomes a moot point whether the income distribution is examined before or after deducting housing costs. The significance of the issue varies from one country to another, making it a source of non-comparability.

4. Income-in-kind can only be covered partially in any income survey. Furthermore, EU-SILC begins with a restricted coverage for practical reasons: including only some main and feasible components such as private use of the ‘company car’. It is expected that the importance of income-in-kind – in particular of ‘auto consumption’, i.e., consumption of own production – varies greatly across countries especially with the enlargement of the EU.

For the analysis and evaluation of comparability, it will be necessary to carefully study the *extent* of the differences across countries in the distribution of income by component in order to identify the main sources of non-comparability. The next step would be to try and quantify the *impact* of these differences on the inter-country comparability of EU-SILC data. Such assessment of comparability is an essential aspect in the implementation of EU-SILC, albeit a difficult and challenging one.

In conclusion, I would like to emphasise the following point. An examination of the distribution of income by component is an extremely important step in the evaluation of the data quality, especially data comparability across countries. This can begin from comparing simple indicators such as the proportion of households receiving income from each component, and the share of that component in the total income received by households. This has to be followed by the identification of any large or unexpected differences in the patterns across countries, and search for plausible explanations for those. In my view, *such an examination and investigation is a minimum requirement before public release of micro data from EU-SILC*, a requirement which must supersede considerations even of timeliness and punctuality. Without it there is a danger of the data losing their credibility in the eyes of the potential users[21].

(2) The incidence and treatment of negative and zero incomes

In principle, certain components making up the total household income can have negative values. These may also result in negative values for total net (disposable) household income, or even of total gross household income.

Many individual components of course have a zero value, simply implying that the household does not receive any income from that source. However, a proportion of households may report their total net income or even total gross income as zero.

Genuine negative or zero incomes can arise for a number of reasons, while negative or zero incomes may also result from errors either in what the respondent reports, how the information is recorded and processed, or what the information pertains to. In our view, it is likely that in a majority of the cases, negative incomes result from data errors of this type. This probably also applies to a large proportion of zero incomes.

Negative and zero incomes often result from under-reporting of income. Such under-reporting can lead to biased estimates of income levels, and also to biased estimates of the inequality[22].

Clearly, incomes reported as negative (or zero) purely in error cannot be accepted as such. However, the important point is that there are strong arguments for adjusting cases with negative (also zero) incomes, even where the negative amount is thought to be genuine. This is the case when incomes are used as a *proxy for living standards*, which can only be quantified as a positive number. People with genuinely negative incomes still have to maintain a 'positive' living standard by drawing on past income (in the form of savings and other capital) or future incomes (in the form of loans and other debt). Negative or zero 'total net disposable income of a household' cannot serve a meaningful proxy for living standards.

Consider total gross household income to begin with. All components making up the total gross must be positive or zero, except for the following two, for which negative values cannot be ruled out:

(a) Gross self-employment income. This is defined as receipts *minus* expenses, before taxes and other deductions;

(b) Interest paid on mortgage (EU-SILC variable HY100G)

Negative values in net income can arise from a number of additional sources:

[21] EU-SILC is still in the process of establishing its credibility.
As noted by Brackstone:
"There is another aspect of data that may be more important (even) than accuracy. That is credibility. Credibility, i.e., the degree to which data are trusted by users may be partly a function of accuracy, but even more a function of the producing agency's reputation, which in turn may be partly dependent on its ability to produce accurate data over a long period of time. (Brackstone G., 2001. How important is accuracy? *Proceedings*, Statistics Canada Symposium "Achieving data quality in a statistical agency: a methodological perspective").
Felligi identifies two 'survival issues' beyond quality: *respect for respondents* (privacy, confidentiality, data security, management of respondent burden); and *credibility of information* (accuracy, transparency, non-political objectivity, relevance). See Felligi (2001). Comment. *Journal of Official Statistics*, 17, pp. 43-50.

[22] Jenkins, S.P. (2000). The distribution of income by sector of population. ISER Working Paper 18.
Rigg, J.A. (1999). Income shares and income inequality in OECD countries since the late 1970s. Unpublished PhD thesis, University of Cambridge, UK.

(c) The deduction of taxes and social insurance contributions from the gross amounts[23].

(d) Regular inter-household cash transfers paid ('private transfers out'). Total net is defined as the sum of net income from all sources, *minus* private transfers out.

(e) The deduction of certain costs in defining a particular concept of income. For example, income 'after housing costs' (AHC), much used in the UK for instance:

income AHC = net disposable income, *minus* housing costs.

(f) The exclusion of certain components of income, but without taking into account the effect of that exclusion on various deductions related to the component concerned.Two important examples of (f) may be noted.

(f.1) Not including receipts from private pensions as components of income, but at the same time deducting any tax on those receipts from the gross.

(f.2) In constructing income 'before social transfers' (BST):

income BST = total net income, *minus* social transfers received, failing to take into account that certain private transfers out are sustained only from social transfers, and must therefore be disregarded in constructing the income variable if their source, namely social transfers, is disregarded[24].

Country data differ in the extent to which negative and zero values appear for particular components and for total net and gross incomes. While in part these no doubt reflect genuine differences in national situations, they may also be the result of factors which damage inter-country comparability of the data – factors such as the use of different types of data sources (e.g., registers versus personal interviews), different extents and patterns of reporting errors, and also different treatments applied to the collected data.

The last mentioned source – different data treatments – is an important one because its influence on the resulting data can be large, yet the source itself is largely controllable by countries adopting uniform procedures in the treatment of income data[25].

A study on comparability of these aspects may investigate areas such as the following:

- the extent of variation across countries in the incidence of negative and zero values for total (net and gross) household income;
- whether or not these differences appear plausible on the basis of comparison with exiting knowledge or logical considerations;
- if not, what are the possible sources of these differences; what are the main contributing components; whether these differences arise largely from reporting errors, or from differences in data treatment;
- what procedures can be adopted for dealing with negative and zero values so as to make the data more comparable;
- what is the impact of this type of adjustments on poverty, inequality and income distribution measures computed from the data.

23 We may also include here regular taxes on wealth (HY120). Employer's social insurance contribution (PY030) pose no problem in the present context, since they are first added into the total gross, and then exactly the same amount is deducted in computing the net – hence they cannot contribute to a negative value.

24 The same applies to variable 'total disposable household income before social transfers except old-age and survivors' benefits' (HY022).

25 Verma V. and co-researchers. "Some proposals on the treatment of negative incomes". Report to Eurostat, March 2006. "Treatment of negative income: empirical assessment of the impact of the method used". Report to Eurostat, June 2006.

(3) Impact on comparability of differences in the definition of household and household membership

The basic units of data collection and analysis in EU-SILC are the household and its members. How the household and household membership is defined is important for two reasons.

Firstly, as a unit for selection of the sample, the definition adopted influences the coverage of the population in the survey. The objective is to define the households such that each person in the study population belongs to one and only one household, so that a sample of households properly covers the entire population of interest.

The second consideration, particularly important in the case of EU-SILC, is the definition of the household as a substantive unit. Income of an individual person is defined on the basis of the total income of all members in the person's household (with that income equivalised to take into account the household size and composition). Hence how individuals are grouped into households determines the central variable – namely income – measured in EU-SILC.

The definitions of household and household membership, and how these definitions have been implemented in EU-SILC in different Member States, has consequences for the comparability between countries.

EU-SILC framework regulation provides a general definition of private household to mean "a person living alone or a group of people who live together in the same private dwelling and share expenditures, including the joint provision of the essentials of living"[26].

This general definition is supplemented in EU-SILC commission regulations by clarifying the treatment concerning household membership of certain special categories of persons in particular circumstances[27].

The special categories considered include: (1) persons usually resident, related to other members; persons usually resident, not related to other members; (2) resident boarders, lodgers, tenants; visitors; live-in domestic servants, au-pairs; (3) persons usually resident, but temporarily absent from the dwelling (for reasons of holiday travel, work, education or similar); (4) children of the household being educated away from home; persons absent for long periods, but having household ties (persons working away from home); and (5) persons temporarily absent but having household ties (persons in hospital, nursing homes or other institutions).

Such persons are included as household members if they share expenses and also satisfy certain additional conditions as follows. No additional conditions apply in the case of category (1). Concerning category (2), such persons must currently have no private address elsewhere; or their actual or intended duration of stay must be six months or more. In category (3), the persons must currently have no private address elsewhere and their actual or intended duration of absence from the household must be less than six months. In (4), irrespective of the actual or intended duration of absence, such persons must currently have no private address elsewhere, must be the partner or child of a household member and must continue to retain close ties with the household and must consider this address to be his/her main residence. Finally, in category (5), the person must have clear financial ties to the household and must be actually or prospectively absent from the household for less than six months.

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[26] Regulation (EC) No 1177/2003 of the European Parliament and of the Council of 16 June 2003 concerning Community statistics on income and living conditions (EU-SILC).

[27] Commission Regulation (EC) No 1980/2003 of 21 October 2003 implementing Regulation (EC) No 1177/2003 of the European Parliament and of the Council concerning Community statistics on income and living conditions (EU-SILC) as regards definitions and updated definitions.

The standard definition of household and household membership is not, or cannot be, followed exactly in all countries[28]. While the recommended formal definition of household has been followed by most countries, there are some cases of departure. For instance, Austria has used the dwelling-unit concept: a private household is defined as a dwelling unit with at least one person that has his/her principal residence in this dwelling, without reference to the sharing of expenses. This means that some households as defined in the survey would have been divided into more than one smaller household if the standard definition were used. In Finland, the private household is constructed of persons residing permanently in Finland in the end of the year (31.12.), who live alone, or who, related or not, reside and have their meals together or otherwise use their income together. In Italy, a household can only be composed of related persons in the following sense: "cohabitants related through marriage, kinship, affinity, adoption, patronage and affection".

Even when the formal definition of household is the same as the recommended standard, there are departures in the treatment of particular categories of persons and circumstances. For instance, France notes that the actual composition of households in the field was determined by the respondent and the interviewer without reference to too formal a definition of membership.

In particular, there are differences among countries both in the reality of the living patterns of students and the statistical treatment of such persons in the survey. Special issue arise in relation to the position of students living away from home. If students are regarded as separate households they are likely to represent a substantial group of poor households. However, the fact that many students have very low incomes may reflect the reality of the situation. Patterns differ by country.

There are also other special groups the condition and treatment of which needs to be compared – groups such as domestic servants, boarders and lodgers. Are they covered within households where they live and work? Or are they treated as separate households living at the same address? Or are they simply ignored (or covered only partly) in the survey?

Such comparative research would involve at least three aspects: identification of the conceptual and operational differences of the survey units; determining their extent (i.e., the number of persons in the population affected); and estimating the impact of these differences on poverty, inequality and other substantive measures.

28 Though the EU-SILC Framework Regulation (article 2) gives a definition of household, article 16 of this regulation notes that "small departures from common definitions, such as those relating to private household definition, shall be allowed provided they affect comparability only marginally".

The EU-SILC in comparative income distribution research: design and definitions in international perspective

Markus JÄNTTI

chapter 2

THE EU-SILC IN COMPARATIVE INCOME DISTRIBUTION RESEARCH: DESIGN AND DEFINITIONS IN INTERNATIONAL PERSPECTIVE

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1. Introduction

An important reason for creating micro datasets on income and other measures of living standards or well-being is to be able to make comparisons across countries. Cross-country comparisons are notoriously difficult to do in a way that does not leave some residual doubt (or doubters) as to the meaningfulness of such comparisons. For instance, influential academic economists have argued against the use of relative poverty as a criterion to compare poverty across countries.

Even if the meaningfulness of cross-country comparisons of typical measures of income inequality and poverty can be debated, there is less debate on the extent to which changes across time in living standards within a country are meaningful. While these, too, may suffer from problems that are similar to those that plague cross-country comparisons, especially if the time-span is long, studying change within a country is more widely recognized as being worthwhile.

To learn about progress (or a lack thereof), it is usually beneficial to have some perspective on what has happened in the recent past. Changes in income distributions, in particular, are often best understood in the context of what has happened in the past decade or so, at least, if not over longer periods. In examining the evidence based on the first wave of the EU-SILC, it will be helpful to use earlier data from other sources to place such evidence in context.

The three main sources of micro data-based evidence that predate the EU-SILC are the European Community Household Panel (ECHP), national data sources and data from the Luxembourg Income Study (LIS). Each of these sources has their own uses. For instance, the ECHP can be a valuable source for indicators of material deprivation and on longitudinal measures of well-being. National data sources, while by definition not comparable across countries can be useful for highlighting the longer-run trends in economic well-being, even though the comparability with EU-SILC-based estimates must be examined quite closely on a country-by-country basis.

The purpose of this paper is to examine the use of the third source, LIS, for comparisons with EU-SILC-based indicators of well-being based on disposable income. LIS is a widely used collection of harmonized data sets. It allows researchers to estimate within-country trends in some cases from the early 1970s at about 5-year intervals on income distribution and poverty statistics for several European as well as non-European countries. It is thus an important source for comparing recent developments in Europe with the changes that have occurred over the last couple of decades.

The paper is structured as follows. In the next section, I briefly discuss sample design issues in EU-SILC data and contrast them with the data in LIS. The section also compares income definitions and their measurement across the two sources. In Section 3, I take a closer look at inequality and poverty in the two sources. Section 4 concludes.

2. Survey design and income measurement

In this section, I discuss differences in EU-SILC and LIS data sets in survey design and in the details of income definitions and measurement. The materials are collected from the user documentation of both EU-SILC and LIS. This section also draws some lessons from a research project into various issues relating to the European Community Household Panel (ECHP), the CHINTEX project, which among other things used register data for Finland to explore issues such as the impact of using interview rather than register income components.

2.1. Survey design

The survey design in EU-SILC is regulated by the European directive governing the EU-SILC. The implementation is described in chapter 5 of Eurostat (2005). Since the EU-SILC attempts to gather both household- and person-level information, it has rules that apply to both types of units. Since part of the information is longitudinal in nature, there is also a substantial longitudinal component to the EU-SILC. However, only part of the data is longitudinal in nature. One deduces from this that the ECHP experiences may have led to this split in the design. What exactly those reasons are is not known to me.

The data sets in LIS have been provided by each member country and are typically the main source of income distribution information in each country. In Wave 5 of LIS – those datasets that measure income centered on year 2000 – a substantial number of the European countries have contributed their ECHP data (Wave 8). This has the benefit of having provided LIS with data which have very similar content for a substantial subset of its members. The drawback, however, is that whatever the problems with ECHP, such as quite substantial panel attrition in some cases, those problems are also inherited by the LIS data (see Behr, 2004).

Presumably some assessment of the desirability of continuing the ECHP was made within the European Union decision-making apparatus. Since the ECHP was discontinued, this indicates that the overall assessment was in the negative. However, I am not aware of any major problems which would definitively suggest that the ECHP datasets in LIS would have clearly superior and easily available alternative datasets. The ECHP data are used for cross-section purposes only and maybe getting the cross-sectional weights accurate enough works (LIS does not provide the longitudinal identifiers to link two datasets from the same country even if the ECHP were available twice). However, by Wave 8 many ECHP datasets have suffered through quite substantial panel attrition and doubts remain as to how representative the remaining respondents are of the general population.

On the other hand, several long running panel surveys have learnt to live with things like panel attrition. The German Socio-Economic Panel, for instance, has over the year added new parts so as to keep it representative. Thus, that a longitudinal data source underlies the cross-sectional data in LIS is not in itself a problem.

Most of the datasets in LIS Wave 5 stem from complex sampling designs. In most cases, sampling is based on choosing clusters from geographical strata. Within the first-stage sampling units, a list of dwellings or buildings is then chosen from a register of such units. The Nordic countries tend to use registers of persons which are stratified according to income. In principle, the sampling design could be taken into account in estimation. However, the use of a longitudinal data source makes it close to impossible to use the correct sample structure when estimating complex statistics, such as inequality indices, from the data and all statistical inference will have to rely on approximations and simulation methods. Moreover, the exact information needed to accurately take the sampling design into account is not available in the LIS datasets.

The EU-SILC consists of national implementations of the common structure. From the descriptions of the individual sampling designing in Annex 2 of the EU-SILC UDB description, it seems that Wave 5 of LIS and the EU-SILC have in each country implemented a reasonably similar sampling design. The exceptions mainly consist of the countries that rely on late waves of panel data as well as Denmark, Norway and Sweden. But even in these (mainly ECHP) the original sample were drawn using similar methods. The EU-SILC user database includes in its first wave information on the strata, so it seems to be at least in principle possible to take the true sampling structure into account in estimation.

Imputation and other data edits is an important issue in the analysis of empirical micro data. LIS does not make any imputations of its own and also keeps data editing to a minimum. In the main LIS relies on what country providers have done and attempts to inform through documentation users of those edits and imputations. The EU-SILC has been able to exploit the fact that data are collected specifically with cross-national comparisons in mind and having learned from the ECHP experience, it has rules about imputations that are to apply to all datasets. The actual imputation and editing is done in each country rather than centrally at Eurostat (see chapter 7 in Eurostat (2005)).

2.2. Measurement of disposable income

The definition of disposable household income in both the LIS and the SILC is much influenced by the so-called Canberra group report, itself an update of the provisional UN guidelines (Expert Group on Household Income Statistics (The Canberra Group), 2001; United Nations, 1977).

Two important definitional and measurement issues cut across both the EU-SILC and the LIS datasets, namely whether or not incomes are recorded net of taxes and whether or not income are measured using interview or administrative registers of different sorts (or, indeed, some combination of the two types of sources). Countries tend to be either “net” or “gross”, i.e., we have *either* net income sources or gross income sources. I have never quite understood the reason for the net/gross divide, but my understanding is that for some countries is difficult to overcome. Apparently serious efforts will be made in net countries to deliver gross data in later waves of the SILC. However, the fact that the traditionally “net” countries will become “gross” later on will mean that some kinds of comparisons within these countries may be difficult to make.

Similarly, countries tend to either collect their income information mainly from registers (in particular, the Nordic countries) or from interviews (the rest). The countries that mainly rely on registers tend to be the countries which also have the lowest levels of inequality and of relative poverty, which in part motivates suspicions that maybe differences in sources may account for part of the measured differences.

The most important limitation at this point of the SILC is that in initial waves, there are several exceptions to what exactly is recorded by the different countries. This means that even for disposable income, we will have to be quite careful in making comparisons within countries across time – an arguably important kind of comparison – in the future. Thus, there will be more inclusive, but shorter periods of more completely measured income, and longer, but less ideal measures of disposable income over longer periods.

2.3. Interview and register income: lessons from ECHP

There is a substantial literature on measurement errors in income, but much of this focuses on the errors that arise in interviews (CITATION) (Moore et al., 2000). There is far less research on errors in register incomes, although of course studies of tax evasion and so on are quite relevant to these. Errors in register incomes can arise because of tax evasion or e.g. errors, omissions or under coverage in the administrative processes that govern the income data in such registers. The kinds of errors that do occur in register income data probably vary substantially across countries depending on the precise nature of the underlying registers. However, it would probably be a mistake to suppose that register data accurately measure "true" income.

We do have some evidence about the errors in income data obtained in a few cases where countries that traditionally take their income information from registers have also gathered interview data on all rather than just a limited number of income sources. One instance of such comparisons is the Finnish ECHP data, which were studied in an EU-funded research project called CHINTEX (Ehling & Rendtel, 2004).

The findings of those reports contain both good and bad news. Below, I include some results from Jäntti (0044) that examined these data. The income variable in use in this paper is disposable money income, which includes all cash income from labor and capital markets, private and public cash transfers, fewer direct taxes (but not e.g. imputed rents). There are a number of alternative measures, differences among which are one of the main objects of this study. There are three ways in which the different disposable incomes differ: whether it is based on information from registers or from the interviews, what time interval the variable refers to (monthly or annual), and finally on whether income is assumed to be shared within the household or the dwelling unit (which are based on interviews and registers, respectively).

Finnish income data in e.g. the IDS is based on income information gathered from registers, although that register income is then aggregated within households, as defined through interviews. ECHP waves 3 and 7 gathered two types of disposable income information through *interviews*:

- The household head was asked about the *current monthly income* of the household. If he/she could name an amount [Q 84], that amount was recorded [Q 85]. If not, he/she got to choose from a number of income ranges [Q 86]. The amount named or, if the income range is named, the class mid-point, adjusted to correspond to annual income, is taken to be *current household interview income*[1].
- In Waves 3 and 7, each household member was asked about all components of disposable money income (in the previous year) [H 137–H388]. These amounts are summed across components and then within households to get the *household interview income*.

For every person who is included in the population census, Statistics Finland has defined their personal disposable money income. I use this variable to construct two measures of disposable income based on register income:

- I take the disposable income of each *household* member in the previous year as it is recorded in the relevant registers. This is then aggregated within households to generate *household register income*.
- I aggregated disposable income within *dwelling units* to generate *dwelling unit register income*.

The two register-based concepts of annual disposable money income are needed because I intend to examine both the effect of interview vs. register income and how non-response and attrition affect income distribution statistics. We should also

[1] The class midpoint is undefined in the top interval (which is open). If the respondent indicates that current monthly income is in the top interval, I assign the household the average current monthly income among those who responded to Q 85, i.e., who could name an amount, and for whom the amount was in the top interval.

note that, *household* disposable register income mixes interview and register income since who belongs to a household is asked in interviews whereas *dwelling unit* register disposable income is a purely based on registers. Differences between the two concepts may thus be due to differences in the two "household" concepts. While it is customary to assume that register incomes are a more accurate measure of income than interview income[2], there is no reason to assume that households are more accurately defined in registers than in interviews. I shall look into this issue also.

I use throughout the paper disposable equivalent money income, calculating a unit's number of equivalent adults using the so-called modified OECD scale, which assigns a weight of one to the first adult, a weight of 0.5 to each individual over the age of 14 and 0.3 to children who are less than 14 years old.(See Atkinson et al., 2002)

Table 1 shows the estimated mean, median and mean of log income for each of the income concepts described above in the two waves of data along with the change (as measured by the difference) across waves. The two interview income concepts have lower estimated central tendencies that the two register-based incomes. Current interview income (the one measured by querying only of the interview person the household current monthly income) being lowest, while household register income is highest. The two register-based concepts are very close to each other.

Turning to the changes in central tendency across time, the interview-based definitions display larger increases, both in relative and in absolute terms, than the register-based incomes. The ordering of the income concepts is unchanged, however.

Table 1. Central tendency of income variables

	Wave 3		Wave 7		Change	
	1995	1996	1999	2000	1999-95	2000-1996
mean						
Household, interview, monthly		12304		13966		1662
Household, interview, annual	13289		15138		1849	
Household, register, annual	15148		16512		1364	
Dwelling unit, register, annual	14970		16436		1466	
median						
Household, interview, monthly		11553		12810		1257
Household, interview, annual	12328		13669		1342	
Household, register, annual	13913		15096		1183	
Dwelling unit, register, annual	13788		14806		1018	
logmean						
Household, interview, monthly		9.34		9.45		0.107
Household, interview, annual	9.39		9.50		0.1050	
Household, register, annual	9.54		9.60		0.0640	
Dwelling unit, register, annual	9.52		9.58		0.0632	

Note: The numbers refer to 2001 euros of disposable equivalent money income using the income source indicated, estimated for the responding ECHP sample in each wave.
Source: Jäntti (oo44).

2 The implicit assumption is that grey income, i.e., income that is in fact received but is not for some reason included in the registers, such as in the case of tax evasion, is less than various errors that arise in interviews.

Selected percentiles of the income distributions are shown in Table 2. These suggest that the order displayed by the central tendencies holds (almost) throughout the distribution. The exception is dwelling-unit and household register income, for which in Wave 7 dwelling unit income overtakes household income by the 90th percentiles. Interestingly, the interview incomes increase much more across the waves than register-based income does. Indeed, the 10th percentile of dwelling unit register income declines a little across the waves.

Selected income inequality statistics are shown in Tables 3 and 4. The 90/50, 90/10 and 50/10 percentile ratios (measured as the difference in the log of the percentiles) shown in Table 3 suggest that, the 90/10 ratios of the interview based incomes are higher than for register incomes – e.g., 1.110 for current household interview income as opposed to 0.967 for household register income. The breakdown of this difference into the difference in the ln of the 90th and 50th, and 50th and 10th percentiles suggest that this overall difference is due to differences below the median, The 90/10 ln difference is very close to 0.5 for all four income measures but is higher for interview incomes for the 50/10 difference.

Further light is shed on the differences across the distributions by inspection of the relative inequality indices in Table 4. Current household income inequality is in Wave 3 clearly the highest, with the other three income measures being very close to .23. By Wave 7, current household income inequality has risen only marginally and is at the same level as household register income inequality. Household interview income and dwelling unit register income inequality have risen much more, being now both at 0.270.

If we examine the squared coefficient of variation instead, the ordering of inequality by income type is different. The interview incomes are for this statistic lower than the register incomes in Wave 3, a contrast with the Gini coefficient that is most likely driven by the relative absence of very high income reports for interview income. To further muddy the waters, by Wave 7 the incomes are re-ordered with current household income showing the by far lowest level of inequality and dwelling unit register income the highest.

Table 2. Selected percentiles of the income distribution

	Wave 3		Wave 7		Change	
	1995	1996	1999	2000	1999-95	2000-1996
p10						
Household, interview, monthly		6295		6855		560
Household, interview, annual	7032		7305		273.1	
Household, register, annual	8552		8560		8.1	
Dwelling unit, register, annual	8268		8244		-24.3	
p25						
Household, interview, monthly		8665		9657		992
Household, interview, annual	9487		9963		475	
Household, register, annual	10698		11266		568	
Dwelling unit, register, annual	10492		10870		378	
p50						
Household, interview, monthly		11553		12810		1257
Household, interview, annual	12328		13669		1342	

	Wave 3		Wave 7		Change	
	1995	1996	1999	2000	1999-95	2000-1996
Household, register, annual	13913		15096		1183	
Dwelling unit, register, annual	13788		14806		1018	
p75						
Household, interview, monthly		14812		17245		2432
Household, interview, annual	16167		18207		2040	
Household, register, annual	18060		19518		1458	
Dwelling unit, register, annual	17903		19348		1444	
p90						
Household, interview, monthly		19108		21843		2736
Household, interview, annual	20080		23988		3908	
Household, register, annual	22494		24820		2325	
Dwelling unit, register, annual	22453		25140		2688	

Note: The numbers refer to 2001 euros of disposable equivalent money income using the income source indicated, estimated for the responding ECHP sample in each wave.
Source: Jäntti (oo44).

Table 3. Percentile ratios of the income variables

	Wave 3		Wave 7		Change	
	1995	1996	1999	2000	1999-95	2000-1996
p90p10						
Household, interview, monthly		1.11		1.16		0.0486
Household, interview, annual	1.049		1.19		0.1397	
Household, register, annual	0.967		1.06		0.0974	
Dwelling unit, register, annual	0.999		1.12		0.1160	
p90p50						
Household, interview, monthly		0.503		0.534		0.0305
Household, interview, annual	0.488		0.562		0.0745	
Household, register, annual	0.480		0.497		0.0168	
Dwelling unit, register, annual	0.488		0.529		0.0418	
p50p10						
Household, interview, monthly		0.607		0.625		0.0181
Household, interview, annual	0.561		0.627		0.0652	
Household, register, annual	0.487		0.567		0.0806	
Dwelling unit, register, annual	0.511		0.586		0.0742	

Note: The numbers refer to 2001 euros of disposable equivalent money income using the income source indicated, estimated for the responding ECHP sample in each wave.
Source: Jäntti (oo44).

Table 4. Relative inequality indices

	Wave 3		Wave 7		Change	
	1995	1996	1999	2000	1999-95	2000-1996
gini						
Household, interview, monthly		0.247		0.255		0.00782
Household, interview, annual	0.234		0.270		0.0361	
Household, register, annual	0.228		0.253		0.0252	
Dwelling unit, register, annual	0.234		0.270		0.0362	
cv2						
Household, interview, monthly		0.226		0.25		0.024
Household, interview, annual	0.210		0.367		0.1570	
Household, register, annual	0.302		0.356		0.0539	
Dwelling unit, register, annual	0.313		0.524		0.2106	
iqrp50						
Household, interview, monthly		0.532		0.592		0.0603
Household, interview, annual	0.542		0.603		0.0613	
Household, register, annual	0.529		0.547		0.0175	
Dwelling unit, register, annual	0.537		0.573		0.0351	

Note: The numbers refer to 2001 euros of disposable equivalent money income using the income source indicated, estimated for the responding ECHP sample in each wave.

Source: Jäntti (oo44).

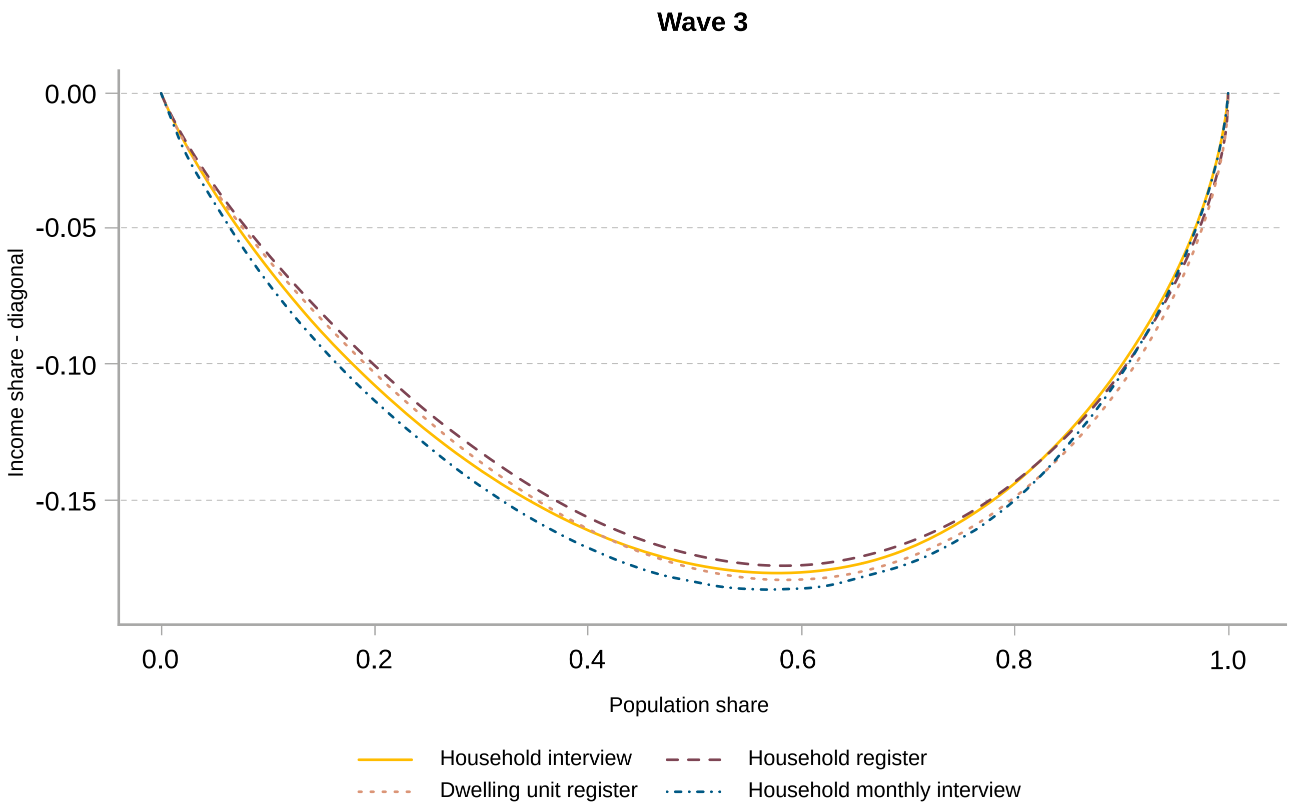
I have also estimated for all income types a “robust” income statistic based on the interquartile range, standardized by the median. This statistic suggests inequality measured in all four income types is virtually the same and while not interview income inequality increases more across the two waves, the levels recorded are still remarkably similar.

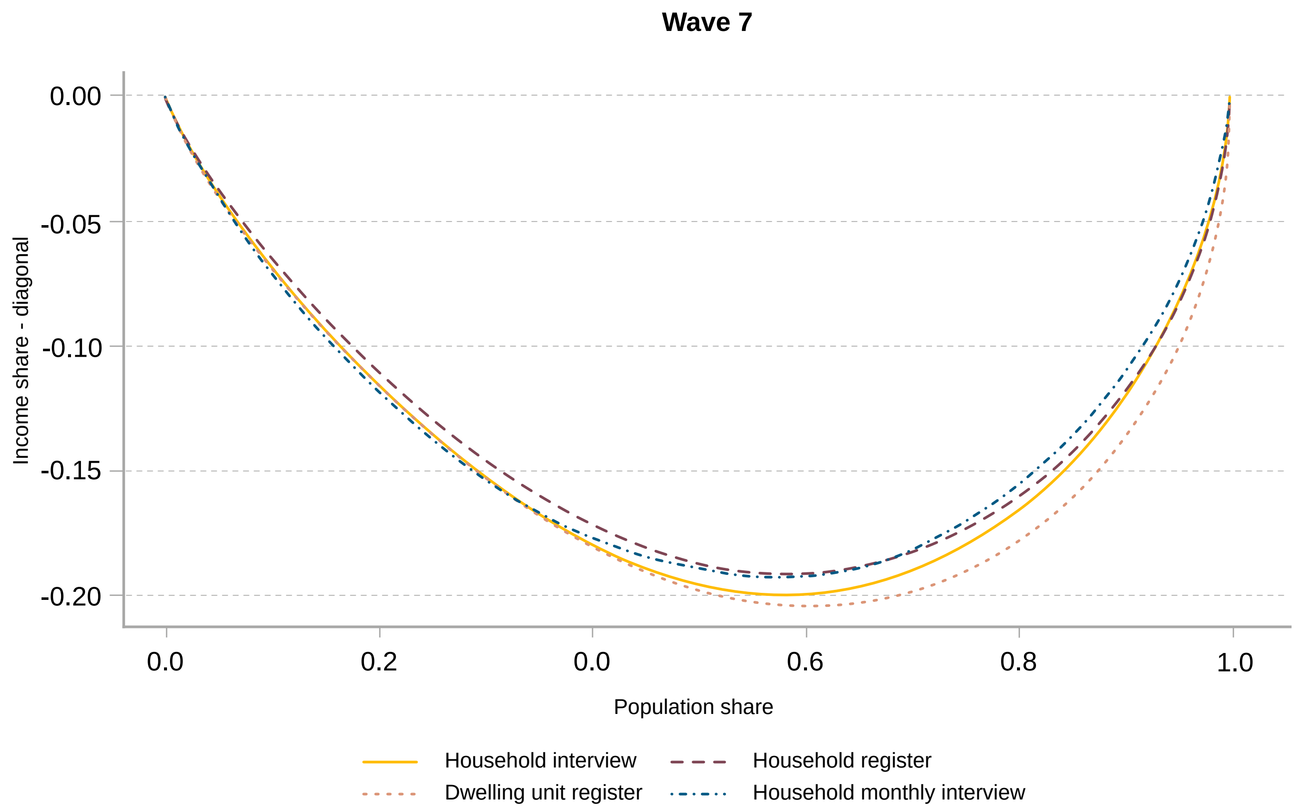
The differences across income inequality statistics reflect differences in where in the distribution the differences are largest. Since both the Gini coefficient and the squared coefficient of variation, CV^2, obey the Lorenz criterion, they generate different orderings only if Lorenz-curves cross. Visual inspection of the Lorenz curves, displayed in Figure 1, confirms this is the case. The graphs show the Lorenz curves less the population proportion to visually emphasize the differences across curves (this does not, of course, affect the ordering). In wave 3, it seems that all the curves cross, with the single exception that current household interview income and household register income do not appear to cross at any point. In Wave 3, even this exception is gone and none of the Lorenz curves either dominates or is dominate by another. We can therefore not say that inequality is unequivocally greater or less for any of the income sources against any of the others – -even absent considerations of statistical inference, which, while important, seem less interesting when Lorenz curves intersect than when there is dominance.

To examine the extent of poverty by each of the income sources, I use the TIP curve (Jenkins & Lambert, 1997). The TIP curve plots the cumulative average relative poverty gap against the (by income ordered) population proportion. At the point that it reaches its maximum, the horizontal axis shows the proportion who are poor and the vertical measures the poverty rate times the average relative poverty gap (see also Jäntti & Danziger, 2000). TIP curves generate poverty orderings that are robust with respect variations in both poverty lines and poverty indices, but generate partial orders (like Lorenz curves) in that when the TIP curves cross, further valuations need to be imposed.

The estimated TIP curves are shown in Figure 2 for Waves 3 and 7. In Wave 3, current household interview income displays most poverty and does not intersect any of the others. While household (annual) interview income is almost everywhere above the two remaining concepts, it intersects with dwelling unit register income fairly close to the origin. While incomes are notoriously hard to measure, in the absence of statistical inference we can but conclude that these two income concepts can not be ordered. Household register income is, on the other hand, dominated by the three other concepts. By Wave 7, things have changed, although household register income is still poverty dominated by all others. Household interview income is now dominated by both dwelling unit.

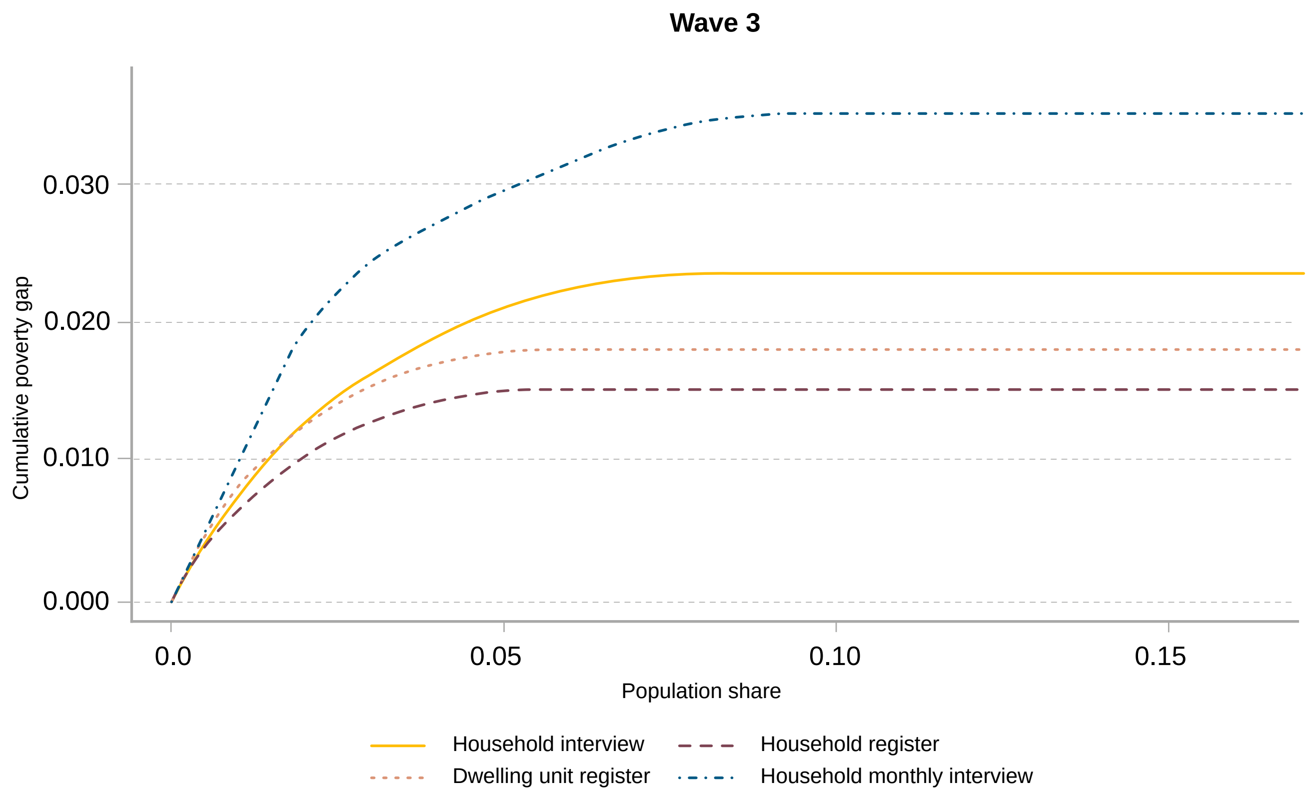
Figure 1. Income inequality for different income concepts – Lorenz curves

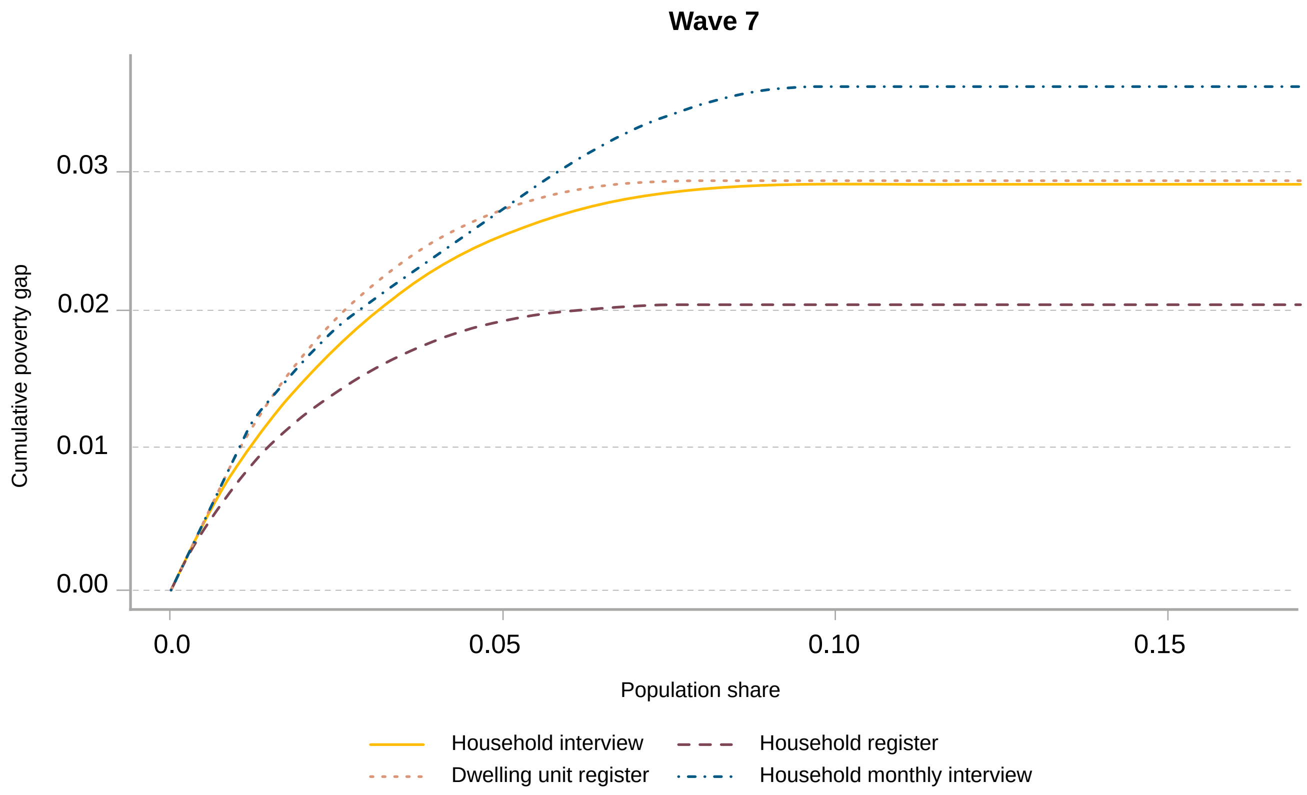




Note: The numbers refer to 2001 euros of disposable equivalent money income using the income source indicated, estimated for the responding ECHP sample in each wave.
Source: Jäntti (oo44)

Figure 2. Poverty for different income concepts – ECHP Wave 3





Note: The numbers refer to 2001 euros of disposable equivalent money income using the income source indicated, estimated for the responding ECHP sample in each wave.
Source: Jäntti (oo44)

register income and by current household income, and the latter two intersect. Thus, not even for the (by and large) same population in two different years do these different concepts generate the same patterns.

To conclude this section, I would suggest that the underlying data in LIS and the EU-SILC are reasonably similarly structured, except that many of the European datasets in LIS in Wave 5 are based on late waves of the ECHP. Those datasets that provide mainly net income variables are pretty much the same in the two sources. Also, the datasets that mix registers and interviews for their incomes sources are the same in the two sources. I would also argue, based on Jäntti (0044) and Ehling & Rendtel (2004) that while income distribution statistics tend to be larger in interview than in register sources, the differences are unlikely to be large enough to significantly affect country rankings according to inequality.

3. Income inequality and poverty

This section examines both income inequality and poverty across the two data sources based on the full (covered) population and selected population breakdowns, such as household type, age and other socio-economic characteristics. To keep things focused, I only include the adult population (18+) and mainly examine equivalent household disposable income. I discard observations with negative disposable income from the inequality and poverty statistics and use the square root of household size as the equivalence scale.

The section starts by looking at the economic context that characterizes the each country in the income year of each survey source.

A comparison of income distribution statistics from the SILC with LIS data is problematic, since differences are likely to reflect changes in the underlying distribution of income rather than differences in the survey instruments. The comparisons below should thus be thought of as being illustrative. To give some idea of the extent to which one should expect income distributions to have been, Table 5 shows macroeconomic data for the countries at the year 2000 and 2003, the relevant years for each data source.

The connection between income distribution and macroeconomic indicators is not clear cut (see Parker, 2000). While it could be expected that unemployment would lead to a lowering of the incomes of the low end of the distribution, the evidence on that is in fact quite mixed. It is also not clear what to expect across countries to happen when income growth slows down – it might well be that the incomes of those whose main income sources are from transfers would be insulated from cyclical turn downs and this their relative income might increase.

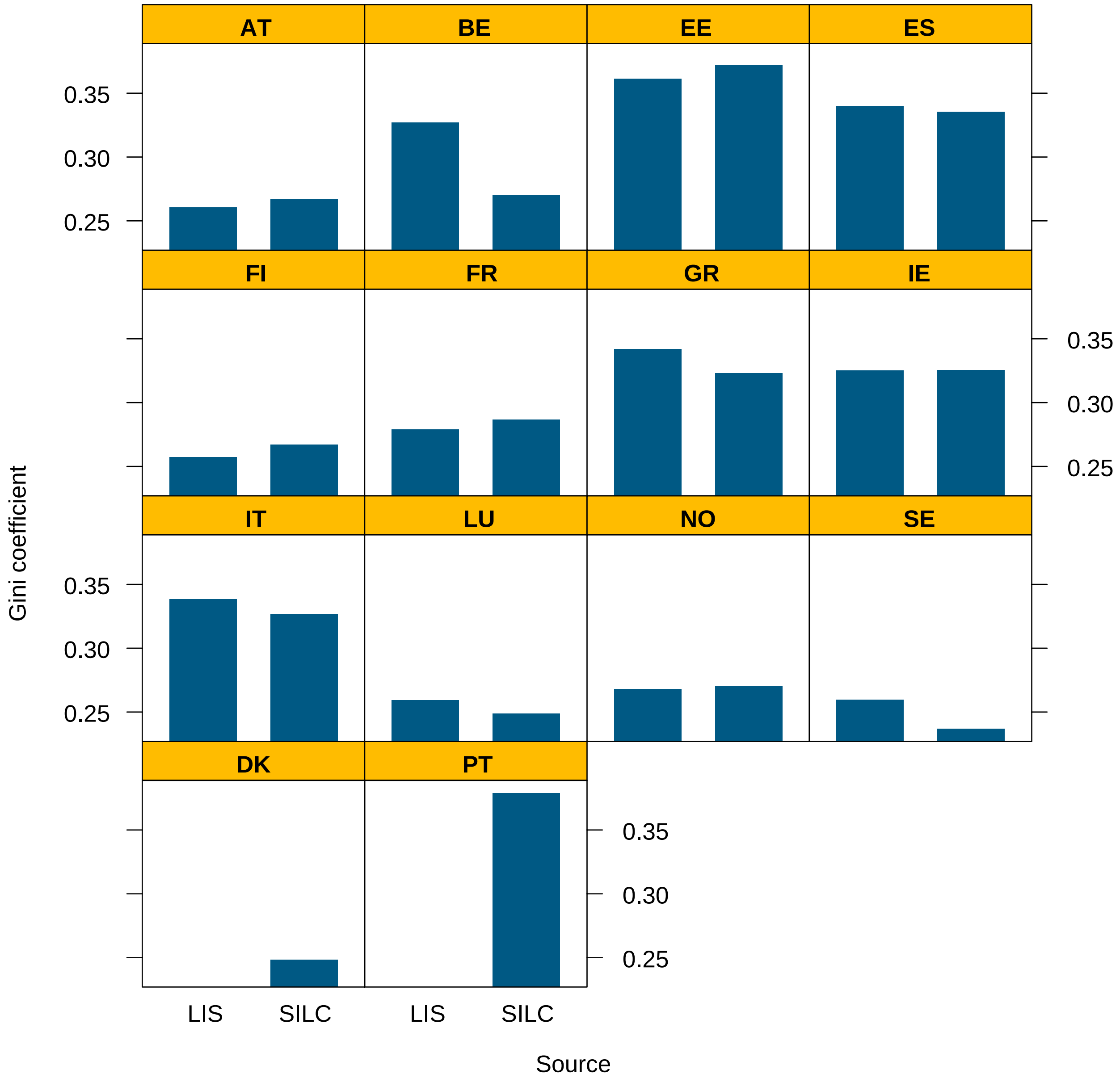
It is noteworthy that GDP growth was slower in 2003 than in 2000 in every country except Greece. The difference was in some cases quite substantial. For instance, the growth rate of Luxembourg declined from 8.4 per cent to only 1.3. In most countries, the growth rate of GDP.

Figure 5. The economic context

Country	LIS (ca. 2000)			EU-SILC (ca. 2003)		
	GDP growth	Unemployment	Inflation	GDP growth	Unemployment	Inflation
AT	3.4	3.6	2.0	1.1	4.3	1.3
BE	3.9	6.9	2.7	0.9	8.2	1.5
EE	10.8	12.8	3.9	7.1	10.0	1.4
ES	5.0	11.1	3.5	3.0	11.1	3.1
FI	5.0	9.8	2.9	1.8	9.0	1.3
FR	4.0	9.1	1.8	1.1	9.5	2.2
GR	4.5	11.3	2.9	4.8	9.7	3.4
IE	9.4	4.3	5.3	4.3	4.7	4.0
IT	3.6	10.1	2.6	0.0	8.4	2.8
LU	8.4	2.3	3.8	1.3	3.7	2.5
NO	2.8	3.4	3.0	1.1	4.5	2.0
SE	4.3	5.6	1.3	1.7	5.6	2.3

was between 2 and 4 percentage points lower in 2003 than in 2000. For unemployment, the difference is not as systematic. Unemployment rates decreases in Estonia, Finland, Italy and Greece, remained unchanged in Spain and Sweden and increased, but by only about 0.5 to 1.3 percentage points in the rest. The inflation rate was also lower in most (but not all) cases in 2003 than in 2000.

Figure 3. Income inequality as measured by the Gini coefficient of disposable income in EU-SILC and LIS



Conjecturing that slower growth may be associated with lower inequality, I would expect inequality to have declined. In the cases where unemployment also declined, I would again expect this effect to be quite strong, while where unemployment increased, on would expect a less pronounced impact. On the other hand, it is possible that no impact from macroeconomic fluctuations is to be expected.

3.1. Income inequality

The Gini coefficients for each country, shown in Figure 3, suggest that for the most part, changes were quite modest. The most substantial difference is for Belgium, with a measured decline of around .05 points in the Gini coefficient.

Estonia, Spain, Greece, Italy and Ireland have quite high Gini coefficients (as does Portugal based only on the SILC), and the Northern European countries lower. A noteworthy difference in these data is that Sweden and Denmark (SILC only) have substantially lower inequality than Finland and Norway.

Next I show the Lorenz curves (drawn as the difference between the Lorenz curve and the main diagonal) for each country in the two data sources (see Figure 4). For a little added clarity, Table 6 shows the Lorenz dominance of each pairwise comparison. As the table shows, there are many crossings of Lorenz curves, making inequality orderings depend on the specific measure chosen.

Even Estonia, which from the figure appears to have quite substantially higher inequality than most other countries turns out to have a Lorenz curve that crosses than of many other countries. Estonia has unambiguously more inequality than Belgium, France and Sweden (LIS data) and Austria, Spain and Luxembourg (SILC data). It would also appear from the table that the orderings are not necessarily very consistent across the years. For instance, Luxembourg Lorenz dominates many countries in the SILC data but none in LIS. Sweden also turns out to have quite different patterns of dominance in the two cases.

It is important to recall that changes in these orderings can be due to both changing differences in underlying inequality across the years and in changes to the measurement instruments. It is not possible, based on the comparison of these two sources, to conclude that inequality orderings really are very different across the years.

3.2. Poverty

I next turn to examine poverty, defined as having income less than one half of the national median. The differences in poverty as measured by the head-count ratio appear to be quite large in contrast with those for inequality (at least as measured by the Gini coefficient). Ireland and Greece, both of which have substantially higher poverty in the SILC than in the LIS data, and Spain, Italy and Estonia have high relative poverty. The broad groups of countries are similar but the ordering does shift around a little but once we take into account also the poverty gap – by using the FGT index with $\alpha = 1$ (Foster et al., 1984). For instance, poverty now appears to be a worse problem in Ireland than in Italy. The Nordic countries seem to have the lowest poverty rates. This contrasts with the ordering based on the Gini coefficient, where the Nordic and northern European countries had reasonably similar levels.

However, the issue of interest here is whether LIS and SILC lead to different results on poverty orderings of countries. On this score, there is reasonably little to say. Poverty is lower in the SILC than in the LIS data in some of the high poverty countries, such as Ireland, Italy and Greece. The lower level of these countries' overall poverty rate in SILC allows for Estonia and Spain to change their ranking relative to these countries. Among the countries with fairly low levels of poverty, again, it appears that the increase in relative poverty in Luxembourg changes its relative position.

Figure 4. Lorenz curves for LIS and SILC data

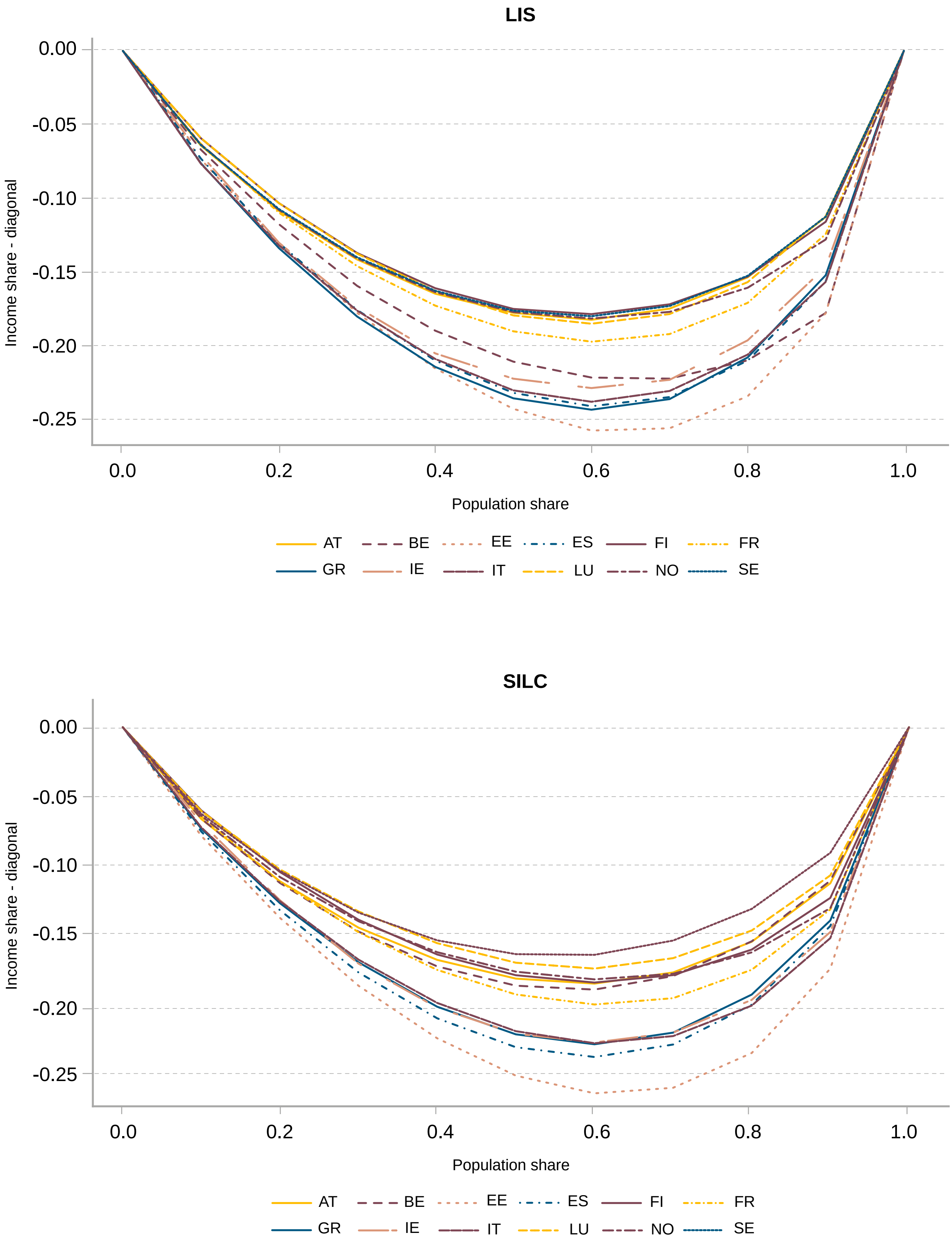


Table 6. Lorenz dominance in LIS and SILC data

A. LIS

	AT	BE	EE	ES	FI	FR	GR	IE	IT	LU	NO	SE
AT		0	0	0	0	0	0	0	1	0	0	-1
BE			1	0	0	-1	0	0	0	0	0	-1
EE				0	0	-1	0	0	0	0	0	-1
ES					0	-1	0	-1	0	0	0	-1
FI						0	0	0	0	0	1	0
FR							1	1	1	0	0	0
GR								-1	0	0	0	-1
IE									1	0	0	-1
IT										0	0	-1
LU											0	0
NO												0
SE												

B. SILC

	AT	BE	EE	ES	FI	FR	GR	IE	IT	LU	NO	SE
AT		0	1	0	0	0	1	1	1	-1	0	0
BE			0	0	0	0	1	1	0	-1	0	0
EE				-1	0	0	0	0	0	-1	0	0
ES					0	0	0	0	0	-1	0	0
FI						0	0	0	0	0	0	0
FR							1	1	0	-1	0	0
GR								0	0	-1	-1	-1
IE									0	-1	0	0
IT										-1	0	0
LU											1	0
NO												-1
SE												

Note: A "1" indicates the row country lorenz dominates the column country, a "-1" that the column Lorenz dominate the row and a "0" indicates crossing Lorenz curves.

Figure 5. Poverty comparisons − head count poverty ratio in EU-SILC and LIS data

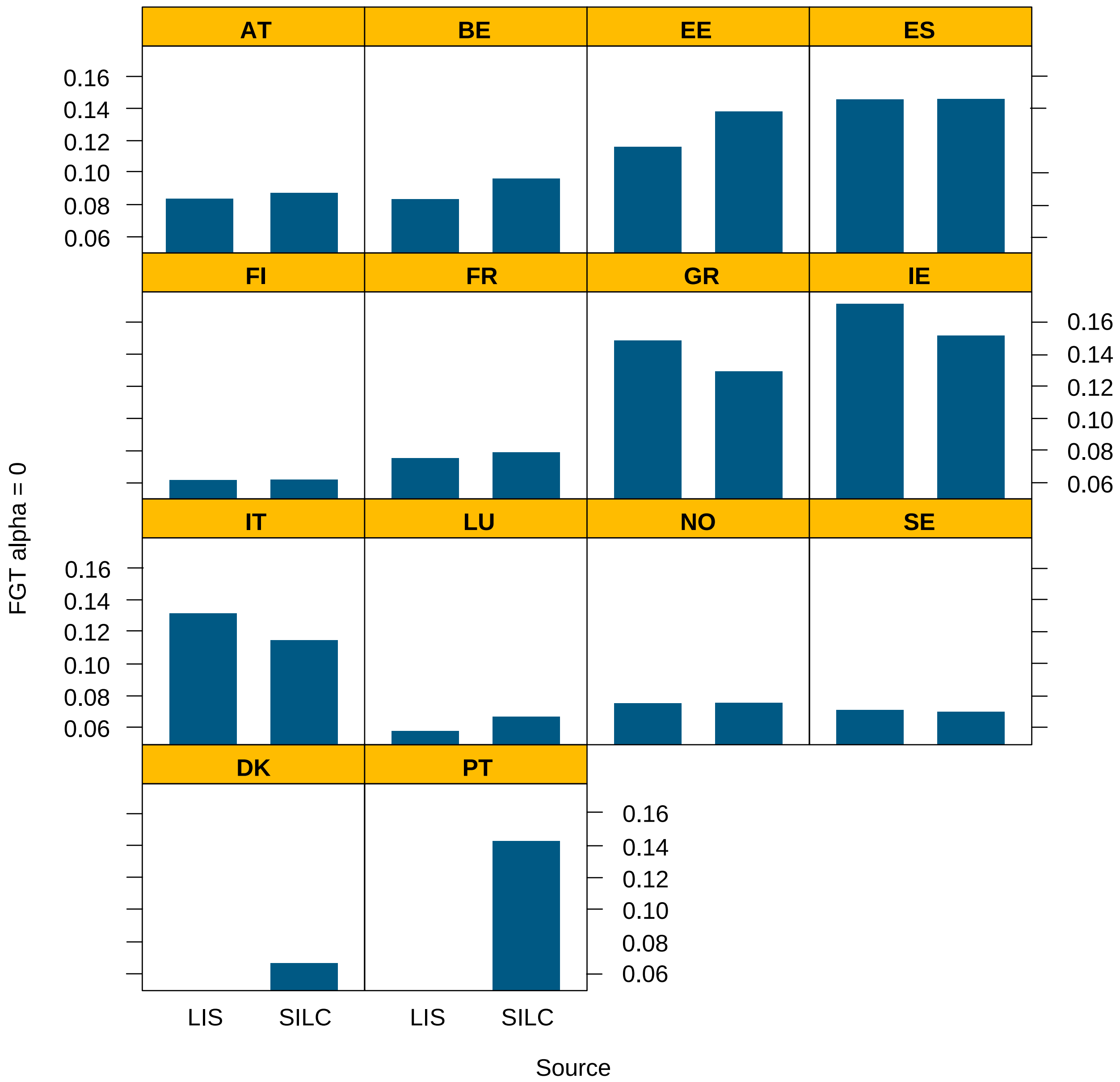


Figure 6. Poverty comparisons − the poverty gap ratio in EU-SILC and LIS data

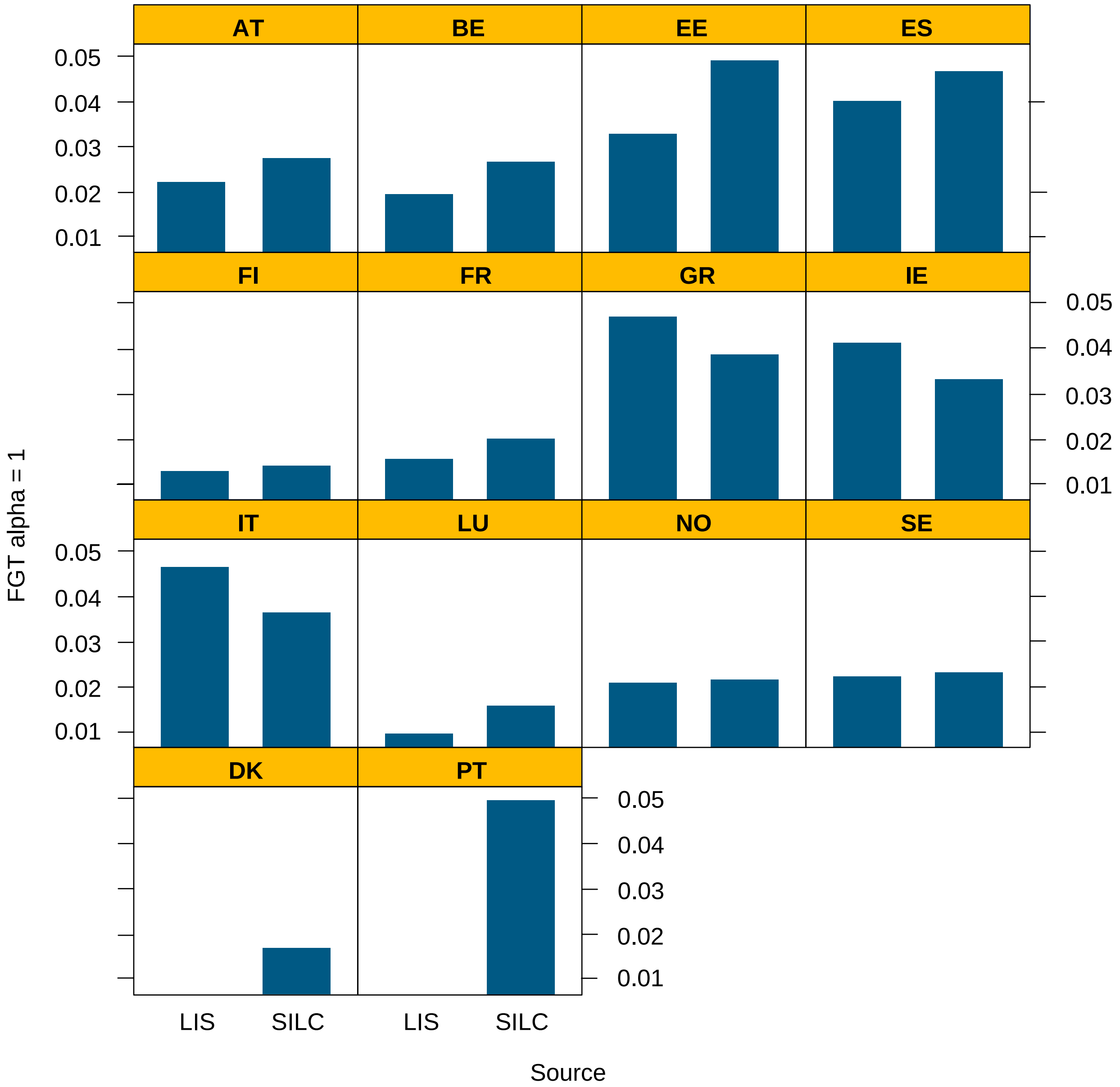


Figure 7. "TIP" dominance in LIS and SILC data

A. LIS

	AT	BE	EE	ES	FI	FR	GR	IE	IT	LU	NO	SE
AT		-1	1	1	-1	-1	1	0	0	-1	0	1
BE			1	1	-1	-1	1	1	1	-1	1	1
EE				1	-1	-1	0	0	0	-1	-1	0
ES					-1	-1	0	0	0	-1	-1	-1
FI						1	1	1	1	-1	1	1
FR							1	1	1	-1	1	1
GR								-1	-1	-1	0	0
IE									0	-1	0	0
IT										-1	0	0
LU											1	1
NO												1
SE												

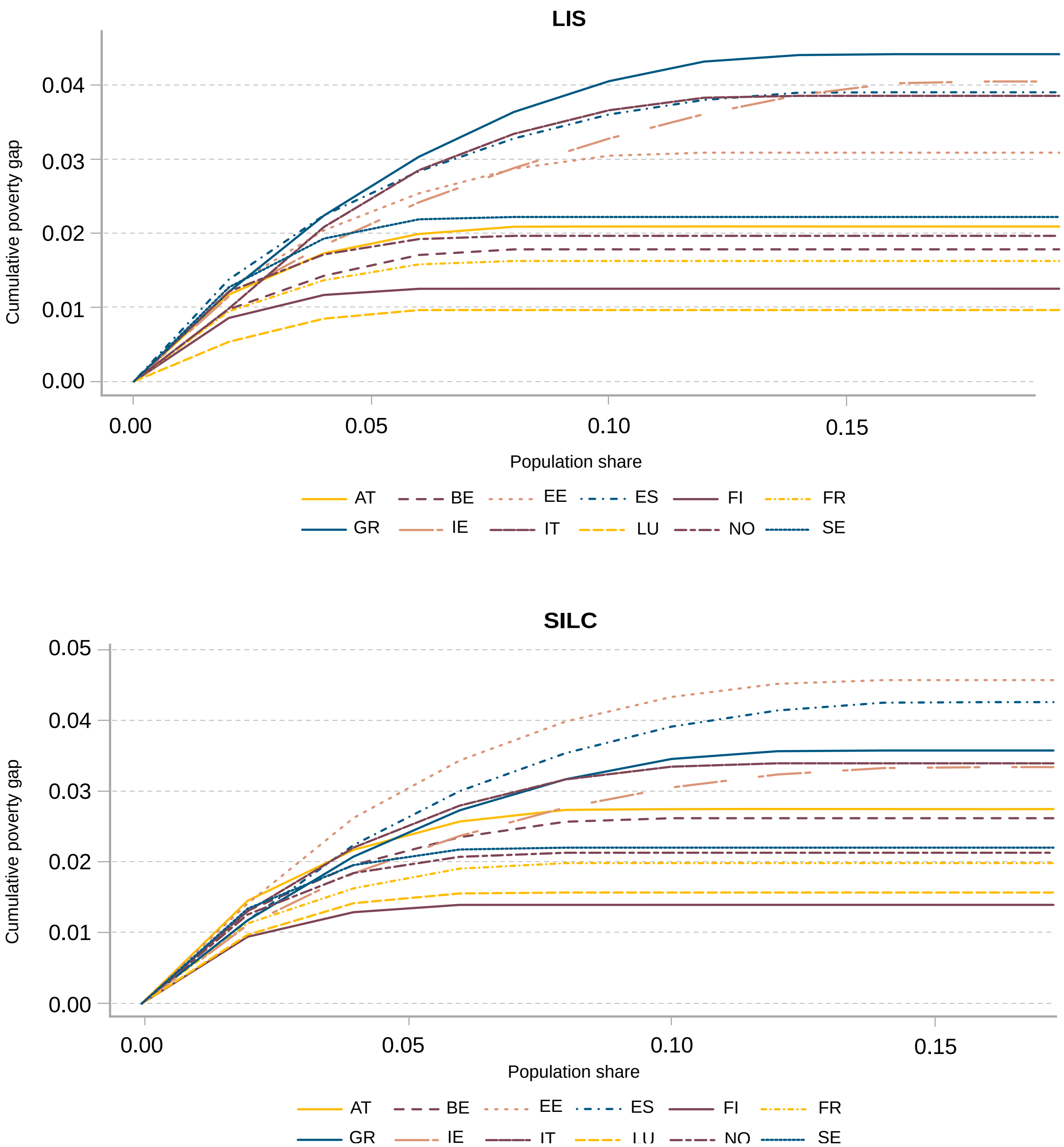
B. SILC

	AT	BE	EE	ES	FI	FR	GR	IE	IT	LU	NO	SE
AT		-1	0	0	-1	-1	0	0	0	-1	-1	-1
BE			1	0	-1	-1	0	0	0	-1	-1	0
EE				-1	-1	-1	-1	-1	-1	-1	-1	-1
ES					-1	-1	0	-1	0	-1	0	0
FI						1	1	1	1	1	1	1
FR							1	0	1	-1	1	1
GR								-1	0	-1	0	0
IE									1	-1	0	0
IT										-1	-1	0
LU											1	1
NO												1
SE												

Note: A "1" indicates the row country "tip" dominates the column country, a "-1" that the column "tip" dominate the row and a "0" indicates crossing TIP curves.

To examine the extent of poverty by each of the survey sources, I use the "Three I's of Poverty" – incidence, intensity and inequality – or "TIP" curve (Jenkins & Lambert, 1997). The TIP curve plots the cumulative average relative poverty gap against the (by income ordered) population proportion. At the point that it reaches its maximum, the horizontal axis shows the proportion who are poor and the vertical measures the poverty rate times the average relative poverty gap (see also Jäntti & Danziger, 2000). TIP curves generate poverty orderings that are robust with respect variations in both poverty lines and poverty indices, but generate partial orders (like Lorenz curves) in that when the TIP curves cross, further valuations need to be imposed.

Figure 7. Poverty comparisons – the three I's of poverty in LIS and SILC data



The TIP curves in each of the two survey sources are shown in Figure 7 and the corresponding matrix of "TIP" dominances is shown in Table 7. Here, perhaps somewhat surprisingly, many dominance relations do arise. The patterns appear to be reasonably similar across time, even if a number of re-rankings do occur.

4. Concluding remarks

The EU-SILC is an important new source for comparisons of economic well-being and distributional analysis for countries in the European Union. Studies of income inequality and poverty are often comparative, comparing changes within countries across time or comparing countries with one another. Many of the countries EU members are compared with lie outside the European Union. For such comparisons, as well as for understanding longer run changes in inequality and poverty, the EU-SILC data need to be compared with other sources. The main source for such comparisons consists of the datasets collected in the Luxembourg Income Study (LIS). Therefore it is important to have a clear idea of how the datasets in LIS compare with those collected within the EU-SILC.

For the most part, the news are good. The income definitions are very similar across the two sources and, while minor differences in sample design and ways in which incomes are measured can be pointed at, such differences are quite standard in looking across data sources. Analysts have a responsibility to emphasize the importance of the ability to study longer run changes in income distribution, as a deeper understanding of what affects poverty and inequality will in part be informed by changes across longer periods of time. Thus, resources need to be used to both developing better and more comparable data sources and in ensuring backwards comparability across often quite heterogeneous sources. As this can add to the already substantial costs associated with substantial data undertakings, we need to keep these needs on the agenda.

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Discussion

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DISCUSSION

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The papers by Vijay Verma (2007) and Markus Jäntti (2007) raise important issues on data comparability – a central concern of a project like the European Union Statistics on Income and Living Conditions (EU-SILC) which involves over thirty countries that differ widely by institutional setting and level of development. Before reviewing various dimensions in the assessment of the comparability of the EU-SILC, two general remarks are in order.

First, as noted by Verma, comparability is a relative concept: data may be comparable for some purposes, but not for others. For instance, the harmonisation of income definitions in order to maximise international comparability may sometimes lead to construct new series that exclude some income sources and are imperfectly comparable to existing, more comprehensive national series. This is an important warning for data users. Double comparability across both nations and time is rarely attainable, and caution is needed in econometric studies based on time series for a panel of countries: using whatever information is available may bias the results, as discussed by Atkinson and Brandolini (2007).

Second, comparability does not mean uniformity. As put by Verma, "the requirement of comparability of the information generated does not necessarily imply the need to use identical questionnaires in all countries. On the contrary, because of differing legal and institutional frameworks, *different questions* are sometimes required in different countries to obtain the *same information*". In other words, we should aim at achieving *substantive* comparability rather than *formal* comparability. This point has recently been much discussed within a task force of the Eurosystem – the central banking system of the euro area, comprising the European Central Bank and the national central banks of those EU Member States that have adopted the euro – created to study the feasibility of a euro-wide survey on household finance and consumption. The task force concluded that it is necessary to adopt a common definition of concepts: while a common questionnaire is desirable, allowance should be made for country specific features (Gropp 2006). In the case of the EU-SILC, this view provides a justification for the choice of adopting a more decentralised approach than it was the case with the European Community Household Panel (ECHP). Yet, we may wonder whether decentralisation has not gone too far, to the point of jeopardising the comparability of the EU-SILC. The main reason for concern is the variation in underlying sources: sample surveys, administrative archives, or a combination of the two. Verma remarks that "systematic differences may be expected between countries compiling information from registers and those collecting it through personal interviews", while Jäntti observes that "the countries that mainly rely on registers tend to be the countries which also have the lowest levels of inequality and of relative poverty, which in part motivates suspicions that maybe differences in sources may account for part of the measured differences". Hence the need of assessing systematically the EU-SILC comparability.

[1] Revised version of the discussion at the Eurostat and Statistics Finland's international conference on "Comparative EU Statistics on Income and Living Conditions: Issues and Challenges", Helsinki, 6-7 November 2006. The views expressed here are solely mine; in particular, they do not necessarily reflect those of the Bank of Italy.

How should the assessment be performed? Comparability can be evaluated both on the input side (the production process) and the output side (the statistical results). The National Intermediate Quality Reports discussed by Verma exemplify the former approach. In 2004 they were prepared for 15 countries by collecting information on survey structure, sample design, unit and item non-response, and mode of data collection. These reports are important not only to statisticians to improve survey quality and comparability, but also to data users interested in the extent to which their findings are affected by statistical differences. Another example of a test on the input side is the CHINTEX project described by Jäntti, which matched ECHP and administrative data for Finland. This is a valuable exercise, worth repeating for other countries insofar as possible. If registers are reputed to be more reliable than surveys, this type of comparison can provide useful insights on the structure of reporting errors. Knowing the pattern of non- and under-reporting along the income distribution can help to evaluate possible biases in measures of poverty and inequality. If, on the other hand, both registers and surveys suffer from deficiencies, the choice may be that of relying on a combination of data from both sources, like in Italy (Di Marco 2007). It is important to provide information on the results of the matching in this case too, in order to show weaknesses and strengths of each source.

Comparability exercises on the output side can also take various forms. First, the EU-SILC can be compared with the evidence from other sources on household incomes. Table 1 provides an example for Italy, where the ECHP is compared with the Survey of Household Income and Wealth (SHIW), a sample survey conducted by the Bank of Italy since the late 1960s. The table shows some noticeable differences between the two sources, both on the items comprising household income and on estimated mean values. Similar national comparisons can be performed in other countries, such as Germany, Spain and the United Kingdom. At the international level, a natural reference is represented by the archive assembled at the Luxembourg Income Study (LIS; see http://www.lisproject.org), as discussed by Jäntti. The LIS database is useful not only for it contains alternative sources for many countries, but also because it enhances cross-country comparability by applying to the data a procedure of ex post harmonisation, the so-called “LIS-ification”.

A second line of analysis on the output side is to check the coherence of the EU-SILC with external sources not specifically concerned with household income. Regular comparisons with population registers, national accounts and labour force surveys are important to understand the EU-SILC characteristics, although we should bear in mind that all sources have their own informative content and there is no intrinsic ranking by quality. These comparisons are also important for comparative analysis. For instance, the ordering of EU countries by income level differs between sample surveys and national accounts: mean disposable income is generally lower in the former, but the size of the shortfall varies across countries and tends to be negatively associated with the level of real per capita income (Brandolini 2007). As well known from studies reconciling micro and macro sources (e.g. Atkinson and Micklewright 1983, for the United Kingdom; Brandolini 1999, for Italy), only part of the discrepancy is due to underreporting and sampling errors in surveys, while some part originates in the many conceptual differences. A markedly different pattern between sample surveys and national accounts complicates our reading of the distribution of income within Europe, but it may also have an effect on policy when mean income is an indicator used in the allocation of European funds. A second example relates to the employment structure. Torrini (2006) finds that in many countries the share of the self-employed in the ECHP understates that in the labour force survey (LFS) and shows how this impinges on measured inequality: since the earnings of the self-employed tend to be more dispersed, when the ECHP observations are re-weighted using the LFS shares the mean logarithmic deviation of individual incomes increases in all countries, but by rather different proportions. (The mean logarithmic deviation is an index exactly decomposable by population sub-groups.)

Comparability has, however, a broader meaning than those discussed so far. According to Verma, “by comparability we mean that data (estimates) for different populations (whether countries or different groups within the same country) can be legitimately (i.e. in a statistically valid way) put together (aggregated), compared (differenced), and interpreted (given meaning) in relation to each other and against some common standards". Verma does not elaborate further on interpretation and aggregation but these aspects deserve some comment here.

Surveys can be fully comparable in a statistical sense, but their results may not be so in a substantive sense. I suggest two examples that are not considered in the papers by Verma and Jäntti, but nonetheless seem to me relevant for our discussion: the institutional population and the equivalence scale. The EU-SILC aim at measuring the standard of living of the European population, but cover only persons living in households. Generally speaking, we might wonder whether it is appropriate to ignore altogether those living permanently in institutions like nursing homes, residential schools, prisons, and military bases – even if the evaluation of their living conditions might require different statistical tools. What matters here, however, is that their exclusion may also affect cross-country comparability. This is the case of the indicator "At-risk-of-poverty rate after social transfers, among people aged 65 years and over" when the proportion of the elderly living in institutions differs among nations. With regards to equivalence scales, Eurostat recommends the use of the modified OECD scale. This certainly enhances cross-country comparability, as measured poverty and inequality are known to be sensitive to the choice of the equivalence scale (e.g. Buhmann *et al.* 1988). On the other hand, the modified OECD scale may be too rigid. The assumption that economies of scales in consumption are the same everywhere has been questioned by researchers from Eastern Europe. Szulc argues that the original OECD scale is more appropriate than the modified OECD scale for Poland and "less developed countries" since they have "relatively high expenditures on food (characterized by low economy of scale) and relatively low expenditures on housing (characterized by high economy of scale)" (2006: 427; see also Éltetõ and Havasi 2002). A possible solution could be to modify the common equivalence scale to make it dependent on the income level of the household, or the region where the household lives. If comparability implies meaningful interpretation of results, the institutional population and the equivalence scale are issues worth further investigation.

The last consideration relates to aggregation. The EU-SILC project is a coordinated effort at the European level and national surveys must be seen not in isolation, but as components of the EU-wide undertaking. This task poses new challenges. First, there is a more stringent issue of mutual coherence across national surveys. Both Verma and Jäntti see the definition of household as causing problems for comparability. One problem may derive from the treatment of those Europeans, like students or persons employed in elderly care, who live temporarily, but for a sufficiently long period of time, in another EU country. How can it be assured that a person is not counted twice or, conversely, that is effectively counted, either in the home country or in the host country? "Having no private address elsewhere" may be an instruction too vague and difficult to check. Similar and possibly quantitatively more important problems arise for remittances and other money transfers across EU states. The rule on whether such money flows are to be recorded as income of the donor or the receiver, and in the latter case whether they are to be deducted from the donor's income, must be consistently implemented by all countries. A second challenge is raised by the estimation of EU-wide measures of poverty and inequality. This ultimate aggregation exercise may not be a priority of the EU-SILC project, but is implicit in many comparisons of the EU as a whole with other geographical entities, the United States in particular. It can shed light on the importance of methodological choices on the currency conversion rate, the purchasing power parity index, the adjustment of survey data to national accounts, and the equivalence scale, as shown by Brandolini (2007). One important finding is that the degree of inequality measured for the EU as a whole is higher than the "population-weighted average of national values" reported for instance in European Commission (2006), especially when differences in real income are as large as in the enlarged EU. Taking population-weighted averages as a proxy of the level of inequality in the EU may be misleading and is not to be recommended.

In conclusion, the EU-SILC project is going to shape our understanding of the social situation of Europe. It is a fundamental but difficult endeavour, for the traditional problems of gathering information on household incomes are compounded by the need for this information to be comparable across many diverse countries. (I have focused here on income data, but analogous problems arise for non-monetary variables.) Assessing and improving the EU-SILC comparability must not be conceived as a mechanical one-for-all exercise, but as a continuous process. I draw the following recommendations:

- It is important to perform regular comparisons of the EU-SILC with other income distribution surveys and external sources like population registers, national accounts, labour force surveys. The impact of "sensible" adjustments to these external sources (e.g. post-stratification procedures) should also be examined.
- In order to portray a more complete picture of the social situation of Europe, the information currently available in the EU-SILC should be integrated with data on the population living in institutions; this is particularly important for monitoring the condition of the elderly population.
- A great deal can be learnt from studying the EU as a whole. This perspective provides new insights on old problems. Can a single and relatively simple equivalence scale like the OECD modified scale capture very different economic and social contexts? Are the purchasing power parity indices estimated in national accounts a satisfactory way to account for differences in the local cost of living?

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Table 1. Comparison between ECHP and SHIW means in Italy (thousand lire and per cent)

Income component (a)	1993			2000		
	ECHP	SHIW	ECHP / SHIW	ECHP	SHIW	ECHP / SHIW
Wages and salaries	16,305	16,140	101	20,724	18,558	112
Income from self-employment	4,462	7,044	63	6,645	9,758	68
Pensions	7,333	8,492	86	11,375	11,836	96
Other transfers	582	252	231	656	360	182
Capital income	774	2,226	35	699	2,126	33
Rental income	259	468	55	442	768	58
Total disposable income (comparable definition)	29,716	34,622	86	40,541	43,407	93
Private transfers received	396			300		
Adjustment for non-response (b)	96			228		
Fringe benefits of employees		100			185	
Depreciation of capital goods of the self-employed (–)		697			902	
Pension arrears		126			84	
Interest payable (–)		539			350	
Imputed rents on owner-occupied dwellings		6,275			9,089	
Total disposable income (survey definition)	**30,208**	**39,887**	**76**	**41,068**	**51,513**	**80**

Source: Brandolini (2005: Table 5), on microdata from the ECHP (Waves 1–8, December 2003) and the SHIW (Historical Archive; Version 4.0, January 2006). (a) The symbol (–) indicates that the component must be subtracted. (b) This adjustment makes up for unit non-response if no questionnaire was answered by some persons in the household. The missing income is estimated on the basis of the personal income from the previous year or of the total household income from the current or the previous year.

EU-SILC to be used for national and comparative EU monitoring of some key aspects of social protection and social inclusion

VIII

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Using the EU-SILC for policy simulation: prospects, some limitations and some suggestions

Francesco FIGARI, Horacio LEVY and Holly SUTHERLAND

chapter 1

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USING THE EU-SILC FOR POLICY SIMULATION: PROSPECTS, SOME LIMITATIONS AND SOME SUGGESTIONS

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Abstract

We explore the prospects for using the EU-SILC as the underlying micro-database for policy simulation across the EU. In particular we consider the issues to be addressed, and the advantages arising, from building a database from the EU-SILC for the EU tax-benefit model, EUROMOD. In order to identify the issues and illustrate their importance a trial database for Spain is constructed. It is used within EUROMOD to calculate some selected social indicators as well as indicators of work incentives and the effects of fiscal drag in Spain between 2003 and 2006. We conclude that, although transforming the EU-SILC into a database for EUROMOD would require a significant amount of effort, this is likely to be worthwhile because of the consequential improvements in comparability across countries, efficiency in developing and maintaining the model for many countries and simplification of access arrangements. We therefore offer some suggestions for how to improve the User Database for this purpose.

Acknowledgments

We are grateful to Joachim Frick for comments on a first draft. The errors that remain are the authors' responsibility.

1. Introduction

In this paper, we explore the prospects for using the EU-SILC as the underlying micro-database for policy simulation across the EU. In particular we consider the issues to be addressed, and the advantages arising, from building a database from the EU-SILC for the EU tax-benefit model, EUROMOD.

Many of the issues are also relevant for policy simulation models covering single nations. However, the great advantage of the EU-SILC for EUROMOD is that it potentially supplies the micro-data foundations for a model for the whole EU-25, thereby reducing the amount of effort that must be made in harmonising data from diverse national sources, in understanding the impact of remaining cross-country differences on model results, as well as in negotiating access to many datasets and ensuring that diverse access conditions are met.

Nevertheless, the case for adopting the EU-SILC as the database for EUROMOD is not entirely clear-cut as the model has particular requirements for data input that are distinct from those that usually apply to policy-related analysis using the EU-SILC (or other sources of household micro-data) directly. These are discussed in section 3 of this paper. This is followed by a short summary of the perceived advantages of the EU-SILC over the existing database (section 4). In order to place our interest in exploiting the EU-SILC into context, these discussions are preceded, in section 2, by a summary of the added value from connecting a policy simulation facility such as EUROMOD to the EU-SILC. This is done by providing examples of the types of statistics, indicators and analysis that it can generate, which would not be possible with the EU-SILC alone.

The best way to establish the suitability of the EU-SILC as a EUROMOD database is to construct a trial database, compare its performance with existing data and take note of advantages and drawbacks that are encountered in practice. This is what we have done, using Spain as a case study. The EUROMOD database has particular requirements and the amount of transformation necessary from the original data is considerable. Section 5 first describes what was done for Spain. It then compares some social indicators calculated using incomes simulated by EUROMOD using EU-SILC with other sources. A further step simulates income under 2006 tax and benefit policies, providing estimates of risk-of-poverty, income inequality and incentives to work in the current year[1]. Finally, we discuss an illustration of what would have happened to income in 2006 in Spain under an alternative policy regime.

Section 6 then sets out in concrete terms the problems and challenges encountered in building the database from the EU-SILC, offering some suggestions for improvements and speculating on the issues to be addressed if EUROMOD (eventually) uses EU-SILC for all EU Member States. The final section concludes by summarising some specific recommendations for improvements to the EU-SILC that would aid its adoption as a policy simulation database, as well as outlining a plan for building on the present case study.

2. What does policy simulation add?

The role of policy simulation methods in complementing social indicators calculated directly from data such as the EU-SILC, particularly in the social inclusion process, has been described in Sutherland (2002) and discussed extensively in Atkinson et al. (2005) where the establishment of a “common analytical framework” to complement the common social indicators is advocated. This framework would encompass analysis using the model family approach such as carried out by the OECD (OECD, 2004) as well as micro-simulation approaches based on representative micro-data such as the

[1] 2006 was the current year when the first draft of this paper was written!

EU-SILC. Here we summarise how EUROMOD can add value by providing illustrations of the sorts of calculations that might contribute to this framework. While many of them do not depend on the adoption of the EU-SILC as the source of a database for EUROMOD, their coherence and compatibility with many of the indicators calculated by Eurostat and others for the EU would be enhanced if this were the chosen data source. The list is intended to be suggestive, not exhaustive.

Understanding and measuring the redistributive roles of tax-benefit policies

The re-distributive role of taxes and contributions as well as cash benefits can be examined using EUROMOD. This is often difficult directly from survey data because information about taxes and contributions is often not collected directly[2]. For examples of such analysis using EUROMOD see Immervoll et al. (2006) who examine the equalising properties of the 1998 tax-benefit systems of the EU-15, Verbist (2004) who explores the distributional effects of components of the income tax systems and Verbist (2005) who estimates the specific distributional effects of taxes levied on benefits. Dang et al. (2006) map the varying effects of tax and benefit systems by age.

Understanding the evolution of poverty or inequality indicators between two periods can be aided by using information on the redistributive effects of different systems on the same population, or the same systems on samples taken at different times. Tax-benefit calculations allow for the decomposition of the direct effects of policy changes from the other changes (e.g. in demographic composition) happening at the same time[3].

The impact of income-based policy changes on income-based social indicators and related statistics

EUROMOD can re-calculate household incomes following changes to tax and benefit policies and hence assess the impact of a change on risk-of-poverty rates, indicators of income inequality and other income-based social indicators. It can also estimate the budgetary effect of the policy change. The policy changes in question might be

- Actual or proposed policy reforms
- Policy ideas “borrowed” from other countries[4]
- Whole systems used in other countries, as a way of distinguishing the effects *level* of spending, the *structure* of policy instruments and the *national context*[5].
- Alternative potential policy reforms, with the aim of designing reform packages with particular budgetary and distributional effects[6].

Typically the policies might apply at the national (or sub-national) level but may also be modelled at the level of the EU, to establish the national effects of hypothetical common policies[7].

[2] Although it is planned to collect information of taxes paid in the EU-SILC from 2007, it will still require policy simulation methods to isolate the redistributive effects of components of the tax structure (such as particular credits or allowances).

[3] Callan and Walsh (2006) examine the distributional implications of uprating the tax-benefit system from one year to another.

[4] See for example Bargain and Orsini (2006) who investigate the effects of the UK Working Families Tax Credit in other EU countries.

[5] See for example, Levy et al. (2007a) who compare the effects of a revenue-neutral implementation of the systems of child support in UK, Austria and Spain in each of the other two countries.

[6] See for example Mantovani et al. (2006) who explore revenue-neutral changes to pension systems.

[7] See for example Levy et al (2007b) who examine the within- and between- country effects of an EU guaranteed income for all children.

The impact of other factors on social indicators

EUROMOD has been used to quantify the impact of certain macro-economic changes on risk-of-poverty rates (Immervoll et al., 2006a) and to calculate the value of net benefits and tax concessions received by households by virtue of the presence of children, and the impact of this on child risk-of-poverty rates (Corak et al., 2005).

The impact of policy changes on other relevant outcomes

As well as telling us how much a particular reform reduces the risk-of-poverty for in aggregate and on average for groups in the population, EUROMOD can also tell us about the proportions and characteristics of those affected who gain and lose from the reform. This can be important in establishing the political acceptability of a reform, as well as helping to understand its net aggregate effect.

The impact of policy changes on work incentives

Taxes and benefits do not only have an impact on disposable incomes, they also affect the incentive to earn income (as well as the incentive to save, have children, retire and so on). A benefit system that targets the poor may have an adverse effect on poor people's incentive to take up paid work, especially if this is low paid or they have dependents. EUROMOD can be used to calculate indicators of the incentive to work at all (replacement rates) or to work more (marginal effective tax rates) either under existing tax and benefit systems or under policy reforms. Such calculations can also be done using stylised or "model" families. In this case they provide valuable insights into the effects of complex tax and benefit systems on the net gain from paid work or additional paid work (see for example, the Technical Annex to the Joint Report on Social Protection and Social Inclusion for 2006 (Commission of the European Communities, 2006)). However, in order to find out how many people actually face high withdrawal or replacement rates calculations of the sort done by EUROMOD based on representative data, such as the EU-SILC are required[8].

It is also possible to use EUROMOD as the basis for estimating whether people actually do change their labour supply behaviour when work incentives change. EUROMOD does not itself estimate such effects but once this has been done econometrically in some way, EUROMOD can be used to generate incomes received under a range of counter-factual labour supply scenarios to show the combined direct and behavioural effects of policy reform.

Extending the scope of income measurement through policy simulation

EUROMOD simulates employer liability for contributions to social insurance schemes for employees in its database. This information is not routinely included in primary incomes nor deducted from disposable income in analysis using EUROMOD, although either or both are possible when appropriate to the research question. Thus information on these liabilities is generated using the existing database and would also be available based on EU-SILC.

In addition, while not part of the income that is simulated showing the impact of policy change, current development work on EUROMOD is aiming to include estimates of the value of important sources of non-cash incomes imputed into the database. These will include imputed rent, public health and education spending, home production, and employer-provided fringe benefits. Extended definitions of household income, incorporating these components, will eventually be available for the assessment of the distributional effects of policy reforms[9].

[8] See Immervoll and Sutherland (2006) and Immervoll and O'Donoghue (2003).

[9] This work is being done by the AIM-AP (Accurate Income Measurement for the Assessment of Public Policies) project, funded by the European Commission's Framework Programme 6 (CIT5-2005-028412).

3. The data requirements of EU policy simulation

The standard output from EUROMOD is currently measures of household disposable income under alternative scenarios: original (or "primary") incomes with cash benefits added and direct taxes and social contributions deducted. In order to generate such output, the database input by the model must fulfil some essential requirements:

1. It must be a recent, representative sample of households, large enough to support the analysis of small groups and with weights to apply to population level and correct for non-response.
2. It must contain information on primary gross incomes by source and at the individual level, with the reference period being relevant to the assessment periods for taxes and benefits. In some circumstances certain benefits cannot be simulated. In these cases information on the amount these benefits, gross of taxes, is required for each recipient.
3. It must contain information about individual characteristics and within-household family relationships.
4. It must contain information on housing costs and other expenditures that may affect tax liabilities or benefit entitlements.
5. Specific other information on characteristics affecting tax liabilities or benefit entitlements (examples include weekly hours of work, disability status, civil servant status, private pension contributions) is usually also necessary.
6. The same reference period(s) should apply to personal characteristics (e.g. employment status) and income information (e.g. earnings) corresponding to it. In principle this implies the recording of status variables for each period within the year.
7. There should be no missing information from individual records or for individuals within households. Where imputations have been necessary; detailed information about how they were done is necessary.

All these criteria are rarely, if ever, met in one data source and typically a significant amount of work must be done to transform available data into the required database. In particular, with regard to requirement 2, there are a number of important adjustments that often have to be made.

First, incomes are often collected and recorded net of income taxes and social contributions. The starting points for tax-benefit calculations are primary incomes gross of personal direct taxes and contributions so conversion of net-to-gross income must be performed such that each income source can be identified gross.

Secondly, incomes are often measured with a year as the reference period. This is appropriate for assessment of the income tax base, but typically not for social contributions or income-assessed benefits when a shorter reference period is usually required. In this case it is helpful to have information on the number of months of receipt of each income source within the reference year. Then, it is possible at least to estimate the average amount of each income source in each month it is received, rather than averaging over the year.

Thirdly, the level of aggregation is critical in two ways. First, income received by individuals should be attributable to individuals, not aggregated over the household. Only income paid on a household basis (such as housing benefits or some social assistance benefits) should be attributed at the household level. Second, incomes should not be aggregated across income types and in particular benefits should be recorded separately, even if they have a similar function. There are several reasons for this. In some countries certain types of benefits cannot be fully simulated (e.g. contributory benefits depending on contributions made before the survey reference period) so these must be separated from benefits that can be simulated. Furthermore, benefits may be treated differently by the rest of the tax-benefit system (e.g. taxed or not). Finally, identification of each benefit is essential to analyse the take-up behaviour of social benefits. So in cases where benefits are aggregated, some imputation must be carried out to split them appropriately.

Typically too, in relation to requirements 4 and 5, there are some areas where no adjustments are possible and whatever is available must be used or the specific feature of the tax-benefit system must be ignored in the simulations.

Where information is missing, survey datasets often provide imputations of one kind or another. Given the need for individual, disaggregated information for EUROMOD these imputations need to be at the level of each relevant variable rather than be in the form of a single, household-level adjustment factor. Moreover, the imputations need to provide consistent results across variables. For example, the value of imputed housing benefit should not exceed the value of rent (imputed or otherwise).

A many-country model such as EUROMOD has some data requirements that are common across countries and others that are specific to particular national tax-benefit systems. Thus a fully harmonised data source is not necessarily the ideal database for EUROMOD. For example, the aggregation of different income sources (in particular benefits) into one single variable harmonises the decomposition of disposable income across countries into common income categories (for example, the ESSPROS benefit function). However, the interaction of each of these sources with the tax-benefit system may be different. For example, in Spain some family/children related allowances (EU-SILC variable HY050G/HY050N) are taxable while others are tax exempt. Therefore, as explained above, for the purposes of simulation it is necessary to identify, separately, each source of income. However, the precise requirement differs across countries because not only are the benefits themselves nation-specific (the motivation for the harmonisation in the first place) but their treatment by the tax-benefit systems differs too. Generally, aiming for comparable outputs may require inputs that are somewhat different across countries.

The current EUROMOD database (for EU-15) makes use of micro-datasets from a number of sources including waves the ECHP UDB (4 countries) the national ECHP PDB (1 country), national panel surveys (5 countries), an income and wealth survey (1 country), register data (2 countries) and household budget survey data (2 countries)[10]. The reason for this diversity is that in some countries there are a number of alternative data sources. The choice among them was made by national experts on the basis that the selected dataset was the most appropriate for the purpose while at the same time being available for scientific use. The decision was made NOT to adopt the ECHP in all EU-15 countries because in some there were alternatives that were considered preferable on scientific or statistical grounds. One might argue that this diversity reduced the level of comparability across countries while increasing quality of outputs in some. As will be discussed in the next section, it is now clear that there are significant advantages in adopting a database from a common source (to the extent that the EU-SILC can be described as such). As EUROMOD has matured it has become obvious that a *choice* of datasets can be offered to the user: either the EU-SILC or, in some cases, some national alternative. There will be differing advantages and limitations and these will need to be made clear to the user.

However, in assessing the merits of the EU-SILC, relative to the currently-used dataset it is evident that the advantages and disadvantages will not be the same in all countries: both because the underlying data requirements are different, depending on the tax-benefit systems, and because the currently-used dataset has particular merits and limitations. Thus our case study for Spain, described in section 4, cannot be expected to illuminate all the issues that would arise for the EU-15 (or EU-25). The data currently used for Spain are the ECHP (2000 and 1999 data in combination). Thus our exercise is particularly relevant to the other countries using ECHP (Greece, Portugal, Denmark, and Austria).

[10] See Appendix 1.

4. The promise of the EU-SILC for EUROMOD

In advance of a detailed assessment of the EU-SILC's suitability as a EUROMOD database it is worthwhile to rehearse the likely advantages at a more general level of using EU-SILC (for the 25 MS) as the future database of EUROMOD-25[11]. These advantages include:

Homogeneity and comparability

While it is the case that EU-SILC is not fully harmonised, its purpose in providing the basis for measuring the value of social indicators in a comparable manner also provides *some* assurance that *some* of the relevant variables are collected in a way that will enhance comparability across countries. EUROMOD will not use aggregate measures of household disposable income that are the basis of some of the headline (and other) indicators. Instead it requires data on some components which may well be problematic to measure precisely with the EU-SILC. However, in practical terms, creation of databases in 25 countries will have significant tasks in common, reducing the risk of accidental non-comparable treatment of some variables and increasing *some* economies of scale in data transformation processing.

Relevance

Some of the areas in which the EU-SILC is extending the scope of income measurement are also areas of interest for the types of analysis conducted by EUROMOD. We have not yet carried out a full review of the possibilities offered by the new information but two examples can be given which indicate the potential.

- Imputed rent will be measured from 2007 and this has potential both to extend the income concept used in poverty and inequality measurement and also as a potential component of taxable income or indeed a factor influencing housing-related support. Even if these are not major components of tax-benefit systems in many or any countries, they may be of interest to explore as part of policy reforms.
- The value of company cars is already included in the EU-SILC and this not only has potential for inclusion in a wider income concept, but is also an appropriate, and potentially rather interesting, subject for exploration in tax simulations. The EU-SILC includes the net value of the car(s) and associated costs met by employers but in some countries the taxation treatment of this form of non-cash income is much less stringent than if the corresponding income were given in cash rather than kind. The distributional effect of such tax concessions and its difference across countries is a subject worthy of study in its own right, as well as an aspect of income tax that could be included in standard redistribution calculations. It would require that the gross value of the in-kind benefit, rather than the net, be collected or imputed.

In addition, the use of EU-SILC as the EUROMOD database will narrow the gap between analysis using EUROMOD and complementary analysis using the EU-SILC directly. It will permit, among other things, the possibility of evaluating the impact of a policy change on those shown to be deprived or poor on the basis of non-monetary indicators as defined by Eurostat and derived from EU-SILC variables. More generally, the use of a common database will make integrating policy simulations into policy analysis less difficult than it would otherwise be. It also has the potential to encourage the use of EUROMOD within the Commission, and by those engaged in the policy monitoring processes at the European level.

[11] Currently EUROMOD covers the EU-15. Work is underway under the FP6 RIDS project "Improving the Capacity and Usability of EUROMOD" to explore the feasibility of adding the 10 NMS to the model and to construct prototype models for four of the NMS (Poland, Hungary, Estonia and Slovenia). This project will be completed in 2008 and, subject to securing suitable funding, it is planned to follow this up with full implementation of all NMS in EUROMOD.

Regularity and Timeliness

Collection of the EU-SILC on an annual basis means that EUROMOD could have a database using the same year of collection in every country which could, in principle, be updated each year. This represents a significant improvement over the current situation. Some of the datasets in the existing database are not collected each year and there is no mechanism to ensure that a common data year is, or can be, adopted in any particular analysis. While adjustments are made to partially correct for this, it would be greatly preferable to use a common year database. Furthermore, being able to anticipate the availability of successive waves of data for all countries would facilitate planning of the comprehensive updating of EUROMOD.

Longitudinal effects

Incorporation of each wave of the EU-SILC into the database would – with some additional adaptations to EUROMOD – permit the exploitation of the panel element of the data to measure the effects of policy changes on (for example) persistent risk-of-poverty. In addition it would make possible studies of how policies and policy changes might moderate or exacerbate the effects on income of changes in individual circumstance on a year-to-year basis. While the existing EUROMOD database does use single waves or pairs of waves from panel surveys for some countries, this is not uniformly so and any potential for longitudinal or year-to-year analysis has not been exploited[12].

In addition, the potential for fully simulating short-term contributory benefits (such as those associated with unemployment or sickness) using several waves of the panel element should be explored. The possibility of simulating (short term) contribution histories comprehensively across the EU using the EU-SILC offers the opportunity of extending the scope of simulations, and hence the applicability of EUROMOD.

Data access permission

Currently the use of the EUROMOD database and hence EUROMOD itself for EU-15 is governed by 12 different contracts, all with different requirements and restrictions. It will greatly facilitate access to EUROMOD to enable one contract to be negotiated by users, and for the EUROMOD developers to have to monitor the access terms and conditions set by one contract rather then many. This has the potential to substantially enlarge the number of EUROMOD users.

5. A case study: an EU-SILC database for Spain

5.1. Building the database

This section summarises the most important transformations and adjustments carried out on the original EU-SILC UDB to construct a trial database for Spain in order to carry out tax-benefit calculations using EUROMOD[13]. First we consider the sample, some exclusions due to missing information, and the weights. This is followed by descriptions of preliminary attempts to (a) impute necessary information for the units missing within responding households, (b) impute information supplied at the household level to individuals, (c) impute gross incomes from net and (d) disaggregate some specific

[12] In some countries two waves of panel data are used together in order to construct a database containing income and characteristics variables applying to the same reference period.

[13] Further information about the transformation of EU-SILC variables into EUROMOD database variables can be found in the latest edition of the Spanish EUROMOD Data Requirements Document (DRD), available from the authors on request.

income variables into the more detailed categories required. The variables that are missing altogether are noted and the way in which the 2003 income data are updated to 2006 for EUROMOD analysis is described.

Sample selection and weighting

The 2004 Spanish EU-SILC sample consists of 44,647 individuals in 15,355 households. The individual non-response rate is 14.7 % (Eurostat, 2006). The way that these missing individuals are dealt with involves using the "non-response inflation factor" provided with the data. In a few cases this information is missing and the household as a whole is excluded from the EUROMOD input database. The final sample size consists of 42,107 individuals in 14,640 households.

The household cross-sectional weights have been scaled-up to offset these exclusions from the original sample, grossing up to population level (42.2 million people in 2004). Table 1 presents some basic descriptive statistics of the grossing-up weights.

Table 1. Descriptive Statistics of the Grossing-up weights

Observations	Mean	Median	Minimum	Maximum
42,107	1001.75	922.53	15.99	7257.59

Imputation of data for missing individuals

As a consequence of the very high individual non-response rate, 20.3% of households have at least one non-respondent adult individual. Response rates are lower amongst persons aged 17-29, with lower levels of education, who are employees, living in Madrid or, in general, in densely populated areas. The EU-SILC database provides a single household level "non-response inflation factor", with which to adjust household income to account for the missing person(s). EUROMOD requires income to be specified at the individual level and by source. The adjustment income has been split equally among non-respondent adult individuals within households but attribution by source is less straightforward. The information provided in the EU-SILC is less useful than that provided in the ECHP. In the latter most sources of income were provided at both individual and household level. Therefore, deductive imputation of individual income by income source for non respondents was possible. In the EU-SILC the non-response factor applies only to total household income. So assumptions about how to split "non-respondent income" across income sources are needed. We assume that non-respondent income all comes from whatever is the main income source in the particular household. Clearly, this is a rather arbitrary way of attributing income.

Furthermore, the EU-SILC "non-respondent income" refers both to individual non-response and item non-response in a single variable and there is no way to distinguish between them. If there are non-responding adults in the household we assume that all the non-respondent income is attributed to them (in equal shares if there is more than one) and in cases where there are no non-respondent individuals in the household, the income is allocated among respondent adult individuals, again according to the main household income source.

We then proceed using the demographic characteristics reported in the personal register file for the non-respondent and the attributed income, to impute all other EUROMOD-relevant characteristics of the non-respondent using several stages of deductive and rule-based imputation. Whenever this is not possible, a mean imputation within classes has been implemented. Obviously, this preliminary process could be improved upon.

Adjustments to variables

Except in the case of variables that apply naturally to the whole household, such as those relating to housing, EUROMOD input data must be at the individual level. In particular, this applies to personal and labour market information, incomes, taxes, benefits, certain expenditures and some assets[14].

Where the EU-SILC aggregates personal-level information on income into household variables, we have generally attributed this to the adults (people aged 16 or more) in the households in equal shares. The main variables to which this applies are:

- income from rental of a property or land
- capital income from interest, dividends, and profit from capital investments in unincorporated business
- social exclusion allowances
- housing allowances
- regular inter-household cash transfers

In the cases of "family / children related allowances", attribution is to those adults potentially entitled to receive them. This includes, by assumption, parents of children and other adults if their parent(s) are not present in the household[15].

Income received by people aged under 16 has been attributed equally to children between 14 and 16 years old if present in the household, otherwise to all children. The income reference period is the previous calendar year (i.e. 2003) and the lag between the end of this period and the time of data collection ranges from 2 to 5 months. At the moment no adjustments have been carried out to take account of changes that may have happened during this period or within 2003.

Net-to-gross conversion

Income variables in the original EU-SILC dataset are net of Spanish withholding tax and, where applicable, social insurance contributions. In order to obtain gross figures, self-employment incomes and income from net capital have been imputed according to the legislation of the income tax withholdings for the year 2003. In the case of employment incomes, this conversion is not a trivial matter. For this reason, a fixed-point algorithm has been developed taking into account the legislation concerning income tax withholdings and social insurance contributions (Levy and Mercader-Prats, 1999). An adaptation of this method has been used in this exercise[16].

Splitting of Social Benefits

Social benefit variables in the original EU-SILC dataset contain more than one benefit (for example, variable PY090 contains all unemployment-related benefits: insurance and assistance). This aggregation is a limitation for the purpose of analysing the benefit system in detail, and a serious problem if only one part of the aggregation of benefits is to be simulated by the model. To overcome this drawback some imputation methods have been used to split the aggregated variables into the benefits needed (Levy and Mercader-Prats, 2003). A detailed exploration based on the information

[14] For a complete list of EUROMOD variables for Spain, see Appendix 2.

[15] This definition is distinct from all adults in that it excludes grown up children without their own children who are, by assumption, unlikely to be in receipt of family benefits.

[16] A practical alternative, which uses a similar methodology, would have been to use EUROMOD itself to generate gross incomes by source and individual. This requires that the income data year rules are implemented in EUROMOD (which is the case for 2003 in Spain). See Immervoll and O'Donoghue (2001) for a description of how this was done, using the case of Luxembourg as an illustration.

provided in the survey and legislation has been done to identify the type of pension or benefit that the individual in fact receives. Once identified, the value of the benefit has been imputed to the recipient. This procedure has been applied to 4 different EU-SILC variables as described below and as result of this 10 EUROMOD variables have been created.

Unemployment benefits (PY090)

In Spain, unemployment insurance benefit cannot be lower than 75% of the minimum wage. On the other hand, the amount of the unemployment assistance benefit is 75% of the minimum wage. Therefore, unemployment benefits recorded in the EU-SILC dataset can be easily split into the two benefits using 75% of minimum wage as the cut-off to distinguish them.

Some beneficiaries of unemployment benefits report, in the EU-SILC, an amount that is lower than 75% of minimum wage per month[17]. According to the rules, no one can receive less than this amount. For this reason, we assume that these individuals have underreported their benefit and we impute the benefit as equal to 75% of the minimum wage.

Old-age benefits (PY100)

Old age insurance pensions in Spain cannot be lower than a minimum amount (“Minimum old age social insurance pension”). If the pensioner is eligible for an insurance pension that is lower than this minimum amount and fulfils some further eligibility conditions then she/he receives the difference as a supplement. Moreover, in Spain there is also an income-tested old-age assistance benefit. Given that the amount of this assistance benefit is lower than minimum insurance pension and that the eligibility conditions are much more restrictive, there is no overlap between old-age assistance and pension supplement.

Therefore, identifying beneficiaries of ‘pure’ insurance pensions, insurance pension’s supplements and old-age assistance is possible. All that is done is to check the amount of the old-age benefit and the fulfilment of each benefit’s eligibility condition. For those individuals identified as recipients of ‘pure’ old-age insurance pension or old-age assistance the imputation is automatic: the whole amount is classified as the identified benefit. However, in the case of supplement recipients the imputation is more complex. One part of the benefit is paid as insurance pension and the other as supplement. Since there is no information in the database to know which part is which, we impute these amounts according to the average share of the supplement on total old-age insurance pension of supplement recipients[18].

Survivors’ benefits (PY110)

The procedure to split survivors’ benefits into widow insurance pension, widow insurance pension supplement and orphan pensions is similar to the one used on old-age benefits. The only difference, beside differences in policy rules, is the identification of orphans. Instead of using policy rules, these individuals were identified according to personal characteristics such as age, marital status and number of children[19].

[17] The annual amount reported was compared with each of the 12 possible amounts (i.e., 75% * #months) taking into account the number of months the person reports being unemployed during the year.

[18] This share is estimated as the overall expenditure on old-age supplements, which is published by the Ministry of Labour and Social Affairs, divided by the overall expenditure on old-age benefits among the individuals that are identified as supplement recipients in the data. In 2003, this share is estimated as 24.1 percent.

[19] For 2003, the share of supplements in widow’s insurance pension is estimated as 36.1 percent.

Family / Children related allowances (HY050)

As noted above *Family / Children related allowances* have been attributed to the adults potentially entitled to receive them. However, the resulting weighted number of individual recipients of such allowances is well below the number of beneficiaries reported by official sources. The most important component of these allowances is the means-tested child benefit. Our hypothesis is that since the amount of this benefit is so low (291 euros per year) and it is paid only every six months most families forget to report the benefit during the survey interview. For this reason we impute the amount of this benefit to all families that are eligible. We also include a new variable in the EUROMOD database: "Other Family benefits" which includes any positive difference between original EU-SILC data *Family / Children related allowances* and imputed *Child benefit*.

There are also some non-benefit aggregations of income that reduce the precision of the EUROMOD calculations. One example is the inclusion of irregular lump sum earnings in the same variable as regular earnings. In some instances this is non-problematic but when the lump sum income is to compensate for redundancy then this should be distinguished as (a) the tax treatment may be different and (b) we may wish to exclude large one-off payments from our measure of disposable income.

Lack of data

Due to limitations in the original EU-SILC dataset, some EUROMOD variables have not been derived. In particular it was not possible to identify:

- civil servants and apprentices who are subject to specific social security regimes in Spain,
- value of financial capital, main residence and other property (these may be relevant for the simulation of social assistance means tests and for certain property taxes; necessary in 1998 in Spain but not in 2003 or 2006),
- child care costs and medical insurance premia (these expenditures are potentially tax-deductible; relevant in 1998 in Spain but not in 2003 or 2006)
- mortgage payments[20]
- housing costs without including compulsory service charges

It is worthwhile to explain what has been done in constructing the EUROMOD database for Spain in view of these deficiencies, to indicate how the simulation results might be affected:

- Civil servants and apprentices are assumed to be subject to the main employee social security regime in calculating liability for contributions
- Financial capital, value of main residence and other property all assumed to be zero.[21] This does not affect Spanish tax-benefit calculations for 2003 or 2006. It could have a major effect in other countries
- Child care costs and medical insurance premia are assumed to be zero. This does not affect the tax-benefit calculations for Spain in 2003 and 2006. It could have a major effect in other countries
- The assumption of zero mortgage payments results in tax that is higher than it should be for those who actually have a mortgage, due to the relevant tax credit not being simulated. This is obviously an important omission[22]

20 From 2007 mortgage payments will be covered but will only include interest, not the principal re-payments.

21 An alternative would be to impute, rather approximately, the value of capital from information on income and current interest rates.

22 Using EUROMOD with the existing ECHP database which includes information on mortgages, indicates that ignoring this tax credit reduces the Gini coefficient by 0.1 percentage points, the headcount poverty rate by 0.2 percentage points (from 18.5% to 18.3%), and increases revenue from income tax by 4%.

- Housing costs are used, where relevant, inclusive of service charges

Updating

The monetary variables recorded in the EU-SILC dataset and used as input in the tax-benefit calculations or as components of household disposable income (if they cannot be simulated) have been updated to the common base year 2006 by using updating indexes derived from various appropriate sources. For example, earnings are updated using the growth in "compensation of the resident employed" from National Accounts; rent is updated using the rent component of the CPI and social benefits are updated according to the actual change in the nominal value of the benefit in the period concerned[23].

5.2. Some social indicators for 2003 and 2006 using simulated incomes

Having constructed a preliminary EUROMOD database using 2004 EU-SILC (2003 incomes) for Spain, EUROMOD can be used to calculate disposable incomes, not only for 2003 but also for 2006, using 2006 policy rules. In each case household disposable income is made up of elements taken from the EU-SILC (with imputations, as described above) together with elements that are calculated by EUROMOD (taxes and benefits) based on either the 2003 or 2006 policy rules. Table 2 contrasts a few selected indicators based on 2003 incomes calculated using the previous version of EUROMOD for Spain (using ECHP, updated) with those calculated from our experimental EU-SILC database (first and second columns).

The EU-SILC version of EUROMOD shows a slightly higher risk of poverty rate overall than the ECHP version. The poverty threshold is significantly lower suggesting that the updating procedures applied to the ECHP may be over-estimating income growth, at least at the median.

Table 2. EUROMOD estimates of selected indicators in 2003 and 2006 for Spain

	EUROMOD			Eurostat[2]	EUROMOD
	ECHP[1] 2003	EU-SILC 2003	EU-SILC* 2003	EU-SILC 2003	EU-SILC[3] 2006
Risk of poverty	18.5%	19.6%	20.7%	20.0%	19.2%
Risk of poverty age 65+	21.1%	27.7%	29.4%	30.0%	nc
Poverty threshold (single person) Euro/month[4]	562	517	479	528	588
Gini coefficient	0.31	0.30	0.32	0.31	0.30

Notes: Risk of poverty is measured as living in a household with equivalised income below 60% of the median (using the modified OECD equivalence scale).
* restricted to households without individuals for whom income information is missing; nc – not calculated
1. EUROMOD results based on ECHP use data from 2000 updated to 2003
2. Commission of the European Communities (2006, table 5)
3. EUROMOD results based on 2003 EU-SILC incomes updated to 2006.
4. Not adjusted for purchasing power differences

[23] The data have not been re-weighted to take into account socio-demographic changes between 2003 and 2006. To do this appropriately would require more information on the construction of the survey weights than is currently available.

Another possibility is that our EU-SILC-based simulations somehow under-estimate incomes, although the same indicator calculated directly from the EU-SILC (column 4) shows a threshold that is only slightly higher than the threshold based on simulated incomes. This also shows a higher risk of poverty rate for the elderly than previously shown by the ECHP simulation, but this is similar to that shown by the EUROMOD simulation in column 2. Generally income distributions based on simulated incomes tend to be slightly less unequal (typically with lower relative poverty headcounts) than those taken directly from recorded information in surveys. See Mantovani and Sutherland (2003) for a discussion.

The third column of the table shows the indicators calculated from simulated household incomes excluding those households where information on one or more individuals is missing and their information has been imputed, rather roughly, based on the non-response inflation factor provided with the data. These estimates show higher poverty risk and inequality (as measured by the Gini coefficient) as well as a much lower median (poverty threshold). Thus these households make a difference, although it is unclear whether it is preferable to include the problematic households or not. Our rough and ready imputations bring the results close to those obtained directly from the data, but this does not necessarily mean that the households should be included, or that the imputations could not be improved upon. Further investigation is required.

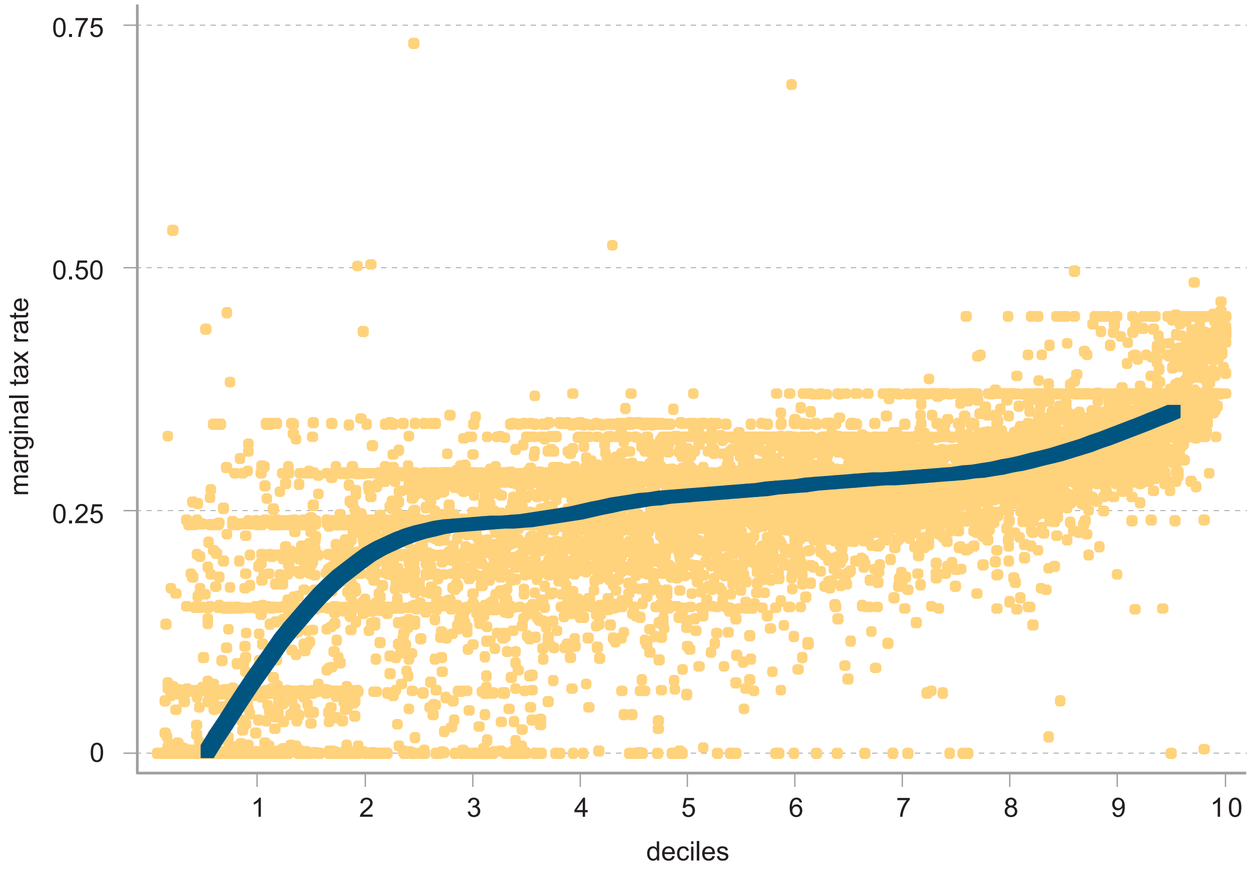
We now turn to illustrating the ways in which EUROMOD can be used to add to the information that can be extracted directly from the EU-SILC. First of all, as shown in the final column of Table 2, it is possible to project incomes to a date later than the income reference year. Here, we simulate incomes under the 2006 tax-benefit system in Spain which results in the poverty threshold being 14% higher than in 2003. This is due to inflation, income growth and changes in the tax-benefit system since we are holding population characteristics constant at those indicated by the 2004 EU-SILC. To the extent that demographic and employment (and other) changes in characteristics influence household incomes, risk of poverty rates might actually move differently than the modest reduction (19.5% to 19.2%) shown by comparing the two shaded columns of Table 2. Nevertheless, the capacity to calculate the direct effects of changes in policies under assumptions about the level of average change in other incomes does provide a first indication of how indicators might look when the EU-SILC for 2007 (with 2006 incomes) is available. If the indicators move differently, then this is due to changes in household characteristics and their interactions with the tax-benefit system.

5.3. Work incentive indicators

The second illustration is to show how EUROMOD can be used to calculate indicators of work incentives, given the particular systems of taxation of work income and withdrawal of benefit incomes for those in work. Our particular illustration for Spain under the 2006 tax-benefit system is the calculation of effective marginal tax rates (EMTR) for all households with some employment income. We ask what would be the proportion of an extra small amount of earned income that would be deducted as income tax and social insurance contribution or withdrawn from benefit income. Figure 1 shows the average EMTR by quantile of the household income distribution, plotted as a solid line. On average, the higher the income the higher the EMTR, but the scatter plot shows that there is also substantial variation in EMTR within income groups. The effects of the tax and benefit system depends on the mix of sources of income within the household, as well as who receives them and the characteristics of the household.

Assessment of the work incentive effects of tax-benefit systems using model family calculations involves choosing particular characteristics. This may be misleading because the result may not correspond to the average effect at that income level. Furthermore, any manageable selection of model family calculations would fail to capture the diversity of effects as shown in Figure 1.

Figure 1. Effective marginal tax rates by quantile of equivalised household disposable income in Spain under the 2006 tax-benefit system



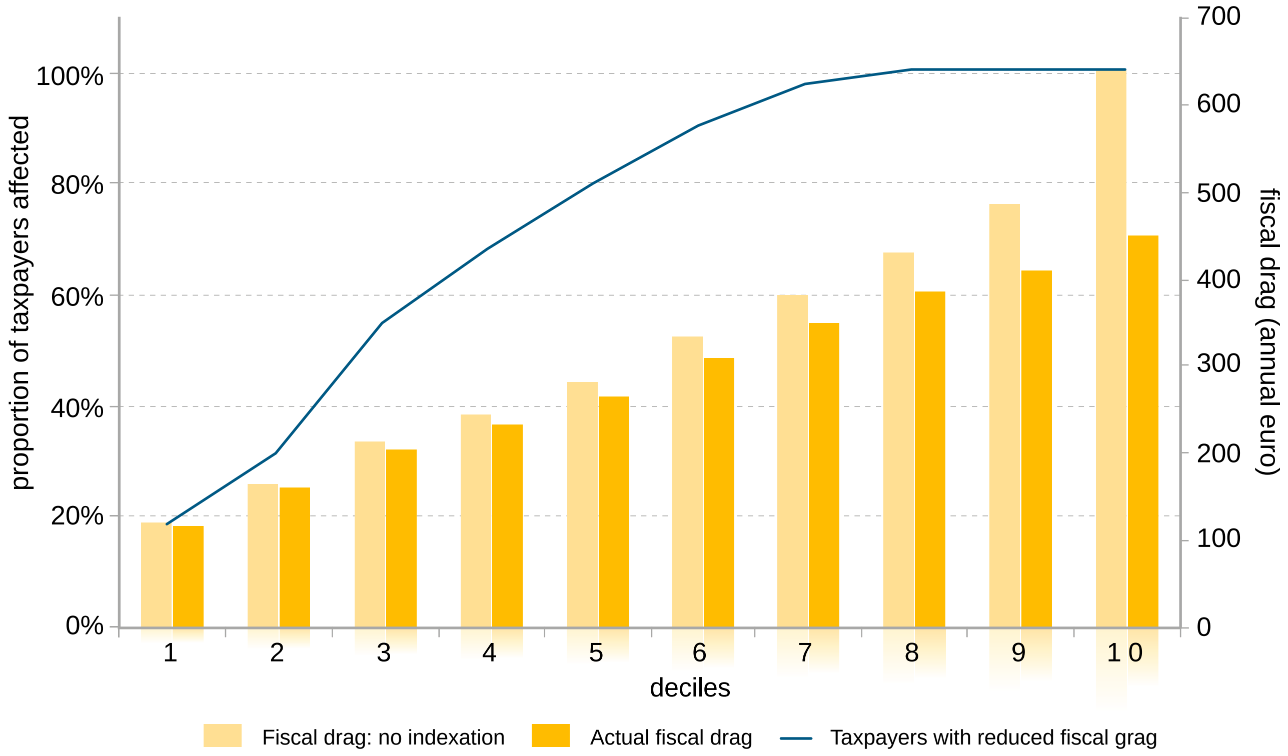
Source: EUROMOD using EU-SILC 2004

5.4. An illustrative alternative policy scenario for 2006: the effect of fiscal drag

This final illustration shows how EUROMOD can be used to look at alternative policy scenarios. According to the Spanish National Statistics Institute (INE) the Harmonised Consumer Price Index increased by about 10% between January 2003 and January 2006. Therefore, in order to keep pace with the rise of prices some indexation needed to be applied to benefit rates and tax thresholds. In general (with the exception of contributory and non contributory pensions) there is no formal indexation rule in Spain. Up to 2005 no regular indexation was applied within income tax. Tax bands and other monetary elements were revised as part of occasional income tax "reforms" every few years (the last of these reforms was carried out in 2003). Since 2005, tax bands have been indexed in line with "expected" price inflation (assumed to be 2%). However, outturn inflation has been significantly higher than 2% and, in addition, key elements of the income tax (including the personal and family tax allowances that determine the threshold for paying tax) have not been indexed at all. As a result, there is a general shift of taxpayers from lower to higher rate bands. This "fiscal drag" has distributional consequences that have implications for social indicators and movements in them (Callan and Walsh, 2006).

Focusing on the period 2003-6, we analyse what has been the effect of the current tax band indexation in the Spanish income tax in contrast to a "full" income tax indexation using real consumer price indexes. This is done by comparing three alternative policy scenarios: (a) no indexation (i.e., 2003 income tax rules are applied to 2006 incomes), (b) actual indexation (i.e., 2006 income tax rules are applied to 2006 incomes), and (c) full indexation (i.e., 2003 income tax rules with all monetary elements updated in line with price inflation in the 2003-2006 period are applied to 2006 incomes).

Figure 2. The incidence of fiscal drag in Spain 2003-6 under current indexation and no indexation, by household income decile



Source: EUROMOD using the 2004 EU-SILC

Compared with full indexation, no indexation would tend to increase the tax burden for existing taxpayers and bring some new taxpayers into the tax net. Actual uprating practice in the period we consider lowered this increase in tax for some more than others. This is shown in Figure 2 where the grey bars show the extra tax that would have been paid had there been no indexation. It increases in amount with increased levels of (household) income (right-hand axis). Given the actual indexation that happened in practice, the extra tax due is lower at all income levels on average (black bars), but the effect is proportionately more at higher income levels: the indexation that did occur particularly benefited the better off, relative to no indexation at all. The proportion of taxpayers benefiting from the partial indexation is shown by the black line: it varies from 18% in the bottom decile group to 100% in the top three decile groups.

Given the relatively short time period and low levels of inflation the effects on social indicators are very small. Had there been full indexation the risk of poverty rate would have been 18.85% instead of 19.22%. On the other hand, given the progressivity of the Spanish income tax, the effect of fiscal drag tends to be larger at higher income levels. Therefore, EUROMOD results indicate that full indexation would mainly benefit the better off and increase income inequality. (However, the results are not statistically significant)

6. What are the main limitations of EU-SILC and what could be improved?

Just a few of the requirements listed in section 3 are met using the EU-SILC without any transformation at all. Thus significant effort must be deployed in transforming the EU-SILC data into the EUROMOD input micro database and it is clear that the work done so far on the Spanish database can only be regarded as preliminary. Nevertheless, this is not surprising and it is clear that the EU-SILC does represent a recent, representative and large sample of households (requirement 1), with information about individual characteristics, within-household family relationships (requirement 3) and (much) other relevant information on characteristics affecting tax liabilities or benefit entitlements (requirement 5). In what follows we list the main limitations that we have identified for Spain, suggest what might be done about them, either in the production of the UDB in the future or by the developers of the EUROMOD database, and also discuss how far our findings based on a case study for one country might apply across the whole EU.

Gross incomes

Information on gross incomes (requirement 2) will not be provided in the Spanish EU-SILC dataset (or those of Greece, France, Italy, Portugal, Latvia and Poland) until 2007. This means that for such countries is it necessary to use EUROMOD parameters to implement a net-to-gross procedure according to the legislation for the income reference period. On the one hand, it would be better to have information on both gross and net incomes in order to either avoid the net-to-gross procedure entirely or to validate the results. On the other hand, it is not clear how the conversion from net to gross will be done for Member States that will not actually collect income data in gross form (European Commission, 2004). It may be that the detailed EUROMOD net-to-gross procedure, which produces conversion factors by income source and by individual, may still be required in place of, or as a complement to, the grossing-up information provided in the UDB.

Level of aggregation within the household

As already noted, EUROMOD input income variables must be available at the individual level but in the EU-SILC some of them are made available only at the household level. In these cases they must be assigned, sometimes in a quite arbitrary way, to individuals. This places limits on the ways in which the individual simulations can be used, for example inhibiting any investigation of non take-up of social benefits or distribution of resources within the household (including by gender). It is relevant to note that in some countries questions are in fact asked and variables collected at the individual level. In Spain, for instance, this is true for *capital income* (distinguishing between income received by an individual in his own name and with other people) and for *family and children related allowances*. For EUROMOD it would be helpful if these variables could be provided at their original level of disaggregation. When considering other countries, similar issues will arise, although not necessarily for the same variables that are relevant in the Spanish case.

Level of aggregation of income variables

Similarly, EUROMOD needs income variables – particularly, although not exclusively, benefit incomes - to be reported by detailed income (benefit) type, not by harmonised class of income or benefit (requirement 2). Imputing the individual income components is either impossible or extremely arbitrary or, even if something plausible is possible as in the case of the Spanish benefits described in section 5.1, very prone to error in particular cases if not on average. Again, this limits the applications of EUROMOD to those where the precise source of income is not important, as well as reducing the accuracy of all the simulations. Again, the issues and their degree of importance may differ in countries other than Spain.

Where information on amounts of income is collected by individual source (e.g. benefit-by-benefit) it would be very helpful for EUROMOD to be able to make use of the original variables, rather than the harmonised aggregates.

Missing variables

As noted in section 3, some of the characteristics affecting tax liabilities or benefit entitlements (requirements 4 and 5) are either not available in the EU-SILC dataset or provided in a way that is not really useful for the purpose of EUROMOD. Among these variables, mortgage interest payments and housing costs as a whole deserve special mention.

Interest repayments on mortgage on the main residence is not provided in the Spanish EU-SILC 2004 data. It is relevant to note that in the Spanish questionnaire there are already a number of detailed questions on mortgage interest and principal payment. In general it is important to distinguish the repayments of the principal or capital sum, and the interest payment. From 2007 interest payments will be included in the EU-SILC, but not capital repayments. This will be appropriate for the calculation of tax relief in many countries but not in Spain because, since 1999, income tax relief has been allowed against the total payment.

Housing costs are reported with a level of aggregation that does not allow us to distinguish between mandatory services and charges, local taxes, insurance, cost of utilities, maintenance and repairs expenditures and mortgage interest payments (where applicable). Again, in the Spanish questionnaire all these expenditures are collected in a disaggregated way at household level and it would be preferable for EUROMOD to have access to the components as well as the aggregate.

Reference time period

Personal and household characteristics and income information do not refer to the same reference periods (requirement 6). In most of the countries the fieldwork operations are done within two quarters after the end of the income reference period. However in other countries (i.e. Italy, Belgium and Ireland) fieldwork operations are done within four quarters after the end of the income reference period. Imputations in order to take account of changes that may happen during this period may be either very demanding or impossible. However they could be important since some variables (e.g. hours worked per week) may be very sensitive to these lags. On the other hand, some adjustment for change within the income reference year may be possible using the EU-SILC information on changes in activity by month.

More generally, it may be possible eventually to use the longitudinal element of the EU-SILC to match the characteristics of the interview period collected in year t-1 with the annual income for the same year, collected in year t. The drawback of this, given the limits of the design and scope of the panel element of the EU-SILC, would be that either the sample size would be reduced (not all the households in the sample in year t[24] will have been interviewed in year t-1) or that waves of EU-SILC would need to be combined.

Missing values

For most of the countries the within-household non-response rate for the personal interview (requirement 7) is really low, mostly below 1%. Table 3 shows these rates for countries which provided such information: Estonia (5.6%) and Spain (14.7%) show the highest rates.

[24] Our experience of the ECHP indicates that this is a feasible strategy but not entirely straightforward.

Table 3. Individual non-response rates (%)

AT	BE	EE	FR	EL	IR	IT	LU	PT	ES
0.6	2.0	5.6	0.8	0.3	0.0	0.0	0.0	0.5	14.7

Source: Eurostat (2006)

When the within-household non-response rate is quite high, the imputation of data for the non-respondent adult individuals is not a trivial matter. However it remains a necessary step since the EUROMOD database must take account of the whole household income in detail. The way we have done it for our case study could certainly be improved upon. This does raise the question whether such imputations are best done in a "customised" way for EUROMOD or whether Eurostat itself might do more with its own expertise. This depends at least to some extent on the demand for such detailed imputations by users of the EU-SILC in general. It is also affected by the extent to which within-household non-response remains a problem in Spain in later waves of EU-SILC, and whether it emerges as such a serious issue in any other countries.

An alternative – perhaps most appropriate in datasets with low levels of unit missing cases - would be to exclude the households with missing individuals and recalibrate the weights. Our case study shows the effect of exclusion on results (Table 2) but we were not able to recalibrate the weights, which is important given the large number of households affected and the high probability that they are not a random sub-sample. This is because in the documentation provided with the EU-SILC dataset (European Commission, 2006a; 2006b) there is not enough detailed information about the construction of the weights to recalibrate them appropriately.

7. Recommendations and conclusions

First we summarise our main recommendations for changes to the EU-SILC UDB, to facilitate its use as the main database for EUROMOD and to improve the precision of EUROMOD calculations using it. In doing so we recognise that this first release of EU-SILC data on which our case study and experimental database are based, does not fully represent what will be available by 2007 and beyond. We must also emphasise that there may be additional issues not highlighted by Spain in 2004 that may apply in other countries or at other times.

a. Information about incomes (and assets) collected at the individual level should be made available at the individual level.
b. Information about benefits and other income sources should be made available at the most disaggregate level possible (e.g. by individual (national) benefit) as well as in harmonised aggregated form.
c. Housing costs variables should be provided in the detail in which national questionnaires collect the information: service charges should be separated from rent.
d. Mortgage payments should be included: for some countries both interest and capital repayment elements are needed, separately.
e. Households with missing information on individuals should be kept to a minimum; the household income adjustment factor for non-response should distinguish between whether it applies to the missing individual(s) only, or to missing values on some income sources for responding individuals. Ideally income variables should be provided both at individual level and as household aggregates, including and excluding adjustments for non-response.
f. Information on how the household weights were calculated should be provided, such that they can be re-calibrated.

Some of these recommendations are simply requests for more variables to be retained in the database from the national sources, or for more information. This applies to some extent to recommendations a., b., c., d. and f. If this is not possible for some reason, particularly in relation to recommendations a. and b., our imputation methods for splitting aggregate variables would need to be refined. One option that could help considerably in the development of useful EUROMOD-appropriate imputation methods would for the raw data (i.e. original variables) to be provided on a one-off basis so that the methods can be validated by comparing imputations with the original data.

In other cases we need more imputation to be done, with the needs of policy simulation in mind. These needs may be similar to those of other prospective EU-SILC users and one possibility is that Eurostat be asked to apply their expertise to an extended list of such pieces of missing information.

We wish to conclude on an optimistic note. We believe that the very significant advantages of adoption of the EU-SILC as the main database for EUROMOD outlined in section 4 of this paper outweigh the technical disadvantages highlighted by our case study. Some of them also apply to alternative data sources. There is also a potential advantage in seeking to carry out imputations, adjustments and transformations on data from a partly harmonised source. Not only will some methods and processes be common or adaptable across countries, differences in assumptions will be more transparently visible. At the same time, work on our case study for one country has demonstrated that comprehensive adoption of the EU-SILC as a EUROMOD database will represent a considerable effort in the first instance, which will need substantial resources to support it. Updating each year, not only the database but also the policy rules (necessary to maintain the results as "current"), will involve an ongoing need for support.

However, as well as laying the basis for timely estimates of the effects of policies and policy changes on incomes and income-based social indicators, incorporation of the EU-SILC into the EUROMOD database offers the promise of more: the consistent calculation of work incentive indicators, the extension of policy simulation into new areas (e.g. contributory benefits), joint analysis with other EU-SILC variables (e.g. deprivation indicators), a longitudinal perspective on the effects of policies (e.g. persistent poverty).

Finally, and perhaps most significantly, granting access by the scientific community to the EU-SILC will facilitate access to EUROMOD (once it is based on EU-SILC) by a much wider group of users than is currently possible using multiple datasets.

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Appendices

Annex

eurostat

Appendix 1. EUROMOD Datasets

Country	Base Dataset for EUROMOD	Date of collection	Reference time period for incomes	Sample size households
Austria	Austrian version of European Community Household Panel	1999	annual 1998	2,672
Belgium	Panel Survey on Belgian Households	1999	annual 1998	3,653
Denmark	European Community Household Panel	1995	annual 1994	3,215
Finland	Income distribution survey	2001	annual 2001	10,736
France	Budget de Famille (HBS)	1994/5	annual 1993/4	11,291
Germany	German Socio-Economic Panel	2001	annual 2000	7,020
Greece	European Community Household Panel	1995	annual 1994	5,168
Ireland	Living in Ireland Survey	1994	month in 1994	4,048
Italy	Survey of Households Income and Wealth	1996	annual 1995	8,135
Luxembourg	PSELL-2	2001	annual 2000	2,431
Netherlands	Sociaal-economisch panelonderzoek	2000	annual 1999	4,329
Portugal	European Community Household Panel	2001	annual 2000	4,588
Spain	European Community Household Panel	2000	annual 1999	5,048
Sweden	Income distribution survey	2001	annual 2001	14,610
UK	Family Expenditure Survey (HBS)	2000/1	month in 2000/1	6,634

1 Calculated using weights.

Appendix 2. EUROMOD variables for Spain

Variables with "co" as the first two characters of the name are common across all EUROMOD country databases; those starting "sp" are Spanish-specific.

* indicates a variable that is not derived (and the value set to zero) due to limitations in the original dataset.

Variable	Description
Personal Information	
cohhid	Household ID
copid	Individual ID
copartnr	Partner ID
coparent	Parent ID
cogender	Gender
coage	Age
comarst	Marital status
cocured	Current education
coeduach	Highest education achieved
cocntry	Country code
spcitizn	Citizenship
Labour Market Information	
coempst	Employment status
coocc	Occupation
coindust	Industry
cofirmsz	Firm size
cocivsrv *	Civil servant
cohours	Hours worked per week
sptypcon	Type of contract
spminwrk	Number of months in employment in income reference period
spmoutwrk	Number of months out of employment in income reference period
Income, Benefits and Taxes	
coempy	Employment income
spmthemy	Number of months receiving employment income
coinvy	Capital income
coprvpen	Private pension
copropy	Income from rent
comainty	Received maintenance payments
coslfemy	Self-employment income
spmthslf	Number of months receiving self-employment income
columpy *	Lump sum income

Variable	Description
coregy	Other regular cash payments
coedy	Student payments
cohb	Housing benefit
comatery	Maternity payments
spbe001a	Unemployment insurance benefit
spbe001b	Unemployment assistance benefit
spbe002a	Old-age insurance pension
spbe002b	Old-age insurance supplement pension
spbe002c	Old-age assistance
spbe003a	Widow insurance pension
spbe003b	Widow insurance supplement pension
spben004a	Sickness benefit
spben004b	Invalidity benefit
spben005	Social assistance
spbenfam	Family benefit
spmth001	Number of months receiving unemployment benefit
Value of Financial capital and other monetary variables	
cofincap *	Value of Financial capital
coothcap *	Value of other property (jewels, car, property)
copencon	Pension Contributions
cochildc *	Child care costs
spmedins *	Medical insurance premia
comaint	Maintenance payments
Household level Information	
coimprnt *	Imputed rent
spnoroom	Number of rooms in house
cotenure	Housing tenure
codate	Date of interview
coregion	Region at the NUT1 level
coweight	Grossing-up weight
spmorpri *	Mortgage principal repayment
comorint *	Mortgage interest payment
coohcost *	Other housing costs
corent	Rent
cosvchrg *	Compulsory service charges
cowtax	Regular taxes on wealth
covalres *	Market value of main residence

CONFERENCE CONCLUSIONS: USERS' RECOMMENDATIONS AND NEEDS

The conference was a unique opportunity to collect opinions, recommendations and needs from (potential) key users concerning the EU-SILC instrument. The main recommendations for the future of EU-SILC that were expressed by speakers, discussants, panel participants and/or the audience can be structured and summarised as follows:

- The EU-SILC project achievements are substantial. However, there is a need to carry out regular evaluations and to inform about the results of these in order to increase the confidence in the EU-SILC instrument. The confidence is critical at EU and country levels, so that EU-SILC data can be used as an important element for the monitoring and evaluation of policies fighting poverty and social exclusion and also for cross-country comparisons.
- In the short term, the attention is to be devoted primarily to consolidation (evaluation, streamlining and reporting). Changes in the content should occur parsimoniously and extension of the list of variables cannot be envisaged (i.e. if there is a need for a few new variables, these additional variables should be "compensated" by dropping some of the existing ones).

The text below presents the conference conclusions and recommendations prepared by the three conference session's chairs. They also include the input of the final conference's panel.

Coverage and content of EU-SILC

- EU-SILC is a most impressive statistical data source, but it should not be seen as a "miracle source" covering all aspects of income and living conditions. In order to guarantee data quality, choices need to be made as to which (micro-data) information is to be collected through EU-SILC and which should rather be collected through other instruments of the European Statistical System. Basically, EU-SILC primary aim is to collect data on income distribution and living conditions with the necessary auxiliary information required to derive relevant classification variables for analysis.
- The relevance of the current content of EU-SILC is unquestionable: policy making should be evidence-based and the refocusing of the Lisbon strategy on employment and growth (in March 2005) has made it only more important to have reliable and timely data on poverty and social exclusion.
- The EU-SILC framework follows closely the Canberra framework and is thus particularly suited for international comparisons. Some improvements could however be recorded in the detailed definition of specific components like the definition of property income.
- Some important income components to be available from 2007 need to receive much attention in the next years. This includes in particular self-consumption and imputed rent.
- On the complex issue of imputed rent, there was agreement among conference participants on:
  - the importance of collecting/ producing the required information; and thus also
  - the urgent need to agree a clear set of common guidelines for calculating it in the context of EU-SILC and to carry out in-depth analyses of the robustness and comparability of the information.

  Opinions were however split on the exact "status" to give to imputed rent once robust and reasonably comparable information would become available, even though there was a clear preference for not automatically considering it as part of the total household income. It should be up to individual data users to decide whether or not to include imputed rent in the total household income depending on the purpose of their analysis and on the indicators concerned.
- The instrument could be adjusted to better meet emerging issues, in particular child poverty (by adding child specific items and more detailed demographic information) and the sharing of resources between household

members. Deprivation items specific to children could usefully be added. For child care, the children access dimension could be developed. The need for access to health care and mental health which has been negatively prioritised in favour of unmet needs for health care variables may have to be reassessed.

- The thematic modules that are added each year to EU-SILC since 2005 are useful. However, their focus should be more linked to the primary variables included in the core questionnaire. The modules should therefore not be used to address new issues. As much as possible, the module process should not hamper the development of secondary indicators at national level.
- EU-SILC does not cover certain groups of the EU population. It is important to keep this limitation in mind when carrying out analysis on EU-SILC data, and to emphasise it when presenting EU-SILC results (see below: *Presentation*).

Income-based indicators and treatment of extreme values

- The sensitivity of some income indicators to extreme values can be quite important. Parametric-tail imputation seems to offer a good trade-off between robustness and information withholding. "Winsoring" (i.e. top and bottom coding) is appealing for its simplicity. Trimming is less recommendable.

Comparability of EU-SILC

- A key issue, that will always require regular methodological monitoring, is the assessment of the impact of using different sources and esp. register information versus interview information. The use of administrative data records is considered a positive factor (following the example of Nordic countries) because it can resolve item and unit non-response problems and lead to more accurate data. However, administrative data are not exempt of problems because the administrative framework can lead to non comparability even between register countries.
- In this context, it is important to develop systematic cross-comparisons/ validations of EU-SILC results with other data sources: registers, National Accounts, ESSPROS data, other household surveys...
- There is a clear need for an increased level of standardisation of some aspects of the EU-SILC project (e.g. self-employed -including farmers- income; capital income; imputation; weighting…). While it is important that EU-SILC remain a flexible instrument in order to anchor it in each national statistical system, it is equally important that this flexibility be accompanied with clear and detailed guidelines to be strictly followed by countries so as to ensure a satisfactory level of comparability.
- More thoughts should be given to the links that can be made between statistics based on the old reference data source (European Community Household Panel – ECHP) and those based on the new one (EU-SILC – Community Statistics on Income and Living Conditions). Policy monitoring requires long time series which EU-SILC will not be able to offer before a few more years of data collection. Furthermore any significant forthcoming change in the methodology would need backward reconstruction of series.
- Non-monetary deprivation should receive closer attention in EU-SILC. The list of items aimed at covering it and the international comparability of these items need to be analysed.
- The quality of the translation of the questions/ items in the different EU languages has to be more carefully looked after (e.g. deprivation items, but also health questions…).

Timeliness

- Timeliness is a key requirement for institutional users such as the Commission and national ministries despite the fact that EU-SILC has met the original target. The timeliness needs to be further improved to better cope with the deadlines imposed by the *Joint Report on social protection and social inclusion* to be available each year for the Spring European Council. However, the methodological workshop has demonstrated that EU-SILC process is complex because of the necessity to deal with different year processes at the same time. The level of standardisation achieved by countries at their 2nd or 3rd wave (depending on when they launched EU-SILC) is quite high. Significant timeliness improvements will probably rely more on innovative solutions than streamlining.

Accuracy

- The reporting on the accuracy and reliability of the EU-SILC indicators used in the context of the OMC should be systematic. Standard errors should be made available and visible. On this issue, the methodological workshop showed that despite very encouraging results obtained by Eurostat for the first wave in order to benchmark national calculations, it is not yet clear which method could be used for routine production once the complexity of combining several waves will have to be addressed. The variance estimation in presence of imputation will remain a major challenge as well as how to communicate on this issue when publishing EU-SILC based indicators.

Analysis

- Regional variation in prices is potentially important and needs to be considered as part of a sensitivity analysis. This refers to the adjustment of incomes by region for comparison with a given national standard; it does not refer to the use of separate standards that vary by region.
- It is worth exploring the potential of EU-SILC with respect to individual-based as opposed to household-based analysis; the same logic applies to the importance of analysing within-household distribution of income and resources. This is one way in which to investigate the gender dimension (at present not sufficiently highlighted).
- The EU-wide approach (e.g. EU-wide at-risk-of-poverty line) should receive more attention provided that the micro comparability of data is satisfactory.

Accessibility and presentation of EU-SILC results

- The offer of statistics computed from EU-SILC should reflect the unique richness of the instrument. In general, statistically unreliable results should not be published for the sake of political credibility. The communication to the public should be enhanced at EU-level by the publication of a pocketbook oriented to the public.
- EU-SILC results (and in particular indicators) should be accompanied by some basic, descriptive statistics on the population not covered by EU-SILC. It is particularly true of the population living in institutions (e.g., when studying poverty among the elderly). It is also true of the homeless.
- Basic, descriptive statistics should also be provided on those groups that are under-represented in EU-SILC (e.g. certain groups of migrants, some ethnic minorities…) and ways of improving their coverage should be explored.
- The way in which the evidence is presented needs to be modernised, in order to allow more incisive analysis and increase the visibility of the findings. Some useful concrete tracks were proposed in some of the conference papers.

- Regarding the accessibility of EU-SILC micro data for research purposes, participants clearly indicated that a reduction in prices and the release of non critical constraints on micro data access will always have a positive impact on the degree of use of the data, the quality of the data and the development of new indicators. The access to confidential micro-data, the remote on-line access as well as access for non-EU bodies should be fostered.
- The value added of EU-SILC anonymised users' data base could be increased if techniques like micro-simulations, micro data linking for imputation or micro data linking with other institutional databases were authorized. In the case of micro-simulation for instance, taxation simulation requires information about incomes (and assets) available at the individual level and with more details then currently available in EU-SILC. The same holds for social benefits (and income sources in general) which should be made available at the most disaggregate level possible. Furthermore, housing costs variables should be provided in the detail in which national questionnaires collect the information. Separate income adjustment factors for non-response, for missing individuals and for missing values for responding individuals should be supplied.
- The importance of the contact with the scientific community and the users in general was stressed. There was a call for regular research conferences to be organised. It was suggested that the next one could take place once EU-SILC longitudinal data are available. Ideally, yearly meetings similar to the Helsinki one but that would also include policy makers at EU and national levels would be useful to maintain EU-SILC in line with emerging needs. The setting up of a users' group for analytical research and for instance a working paper series would be very valuable. There is also a need for training interested users on how to use the EU-SILC dataset. The EuroPanel Users Network (EPUNet)[1] concept developed in the context of the ECHP will provide a good basis to start from.

Longitudinal dimension of EU-SILC

- The longitudinal dimension of EU-SILC could not be reviewed at the conference because data were not yet available. The message is however clear that it is important to keep on developing longitudinal data to support dynamic analysis of poverty and social exclusion and to catch persistent poverty.

[1] http://epunet.essex.ac.uk/

European Commission

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