Non-Cash Benefits and the Distribution of Economic Welfare

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Abstract: Non-cash benefits can have substantial effects on the distribution of economic welfare. Standard approaches to the inclusion of non-cash benefits in broader measures of resources have failed to take adequate account of the pattern of needs associated with the greater use of health and education services. Our results, for Ireland in the year 2000, show that it is possible to derive more appropriate measures of total resources than have been derived using standard methods. The results indicate that the greatest impact comes from the inclusion of imputed rent for owner occupation as part of the resource measure. When this is done, the rate of "resource poverty" for older people is substantially reduced, in line with results which use indicators of standard of living as well as cash incomes ("consistent poverty").

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1. Introduction

Studies of income distribution and inequality are based, for the most part, on cash incomes. Cash incomes, however, are only a partial measure of the resources that generate economic welfare. Non-cash incomes from different sources are substantial in aggregate terms, and vary widely across the population in a given country. Furthermore, the issue of non-cash income can be particularly important when undertaking comparisons between countries as the extent and nature of goods and services provided free or at subsidised rates can differ greatly from one country to another.

In this paper we re-examine the ways in which studies of economic inequality have taken non-cash resources into account. A number of influential studies follow a measurement approach which values the benefit of a non-cash service at the cost of its provision. This tracks the use of resources attributable to different individuals and households. However, the results on resource use are then interpreted as measuring the economic welfare of the households concerned. We argue that this is not appropriate, as it fails to take into account differences in need which are strongly associated with the variation in resources. We propose alternative measures which are applied to Irish data (from the Living in Ireland Survey, 2000). Our analysis covers three of the largest sources of in-kind income:

- imputed rent arising from owner-occupied housing
- benefits arising from free health services; and
- benefits arising from state-provided or subsidised education.

The remainder of the paper is structured as follows. Section 2 reviews key studies on the impact of non-cash resources on inequality, and points to the importance of keeping the end-goal of improving the measure of welfare in mind when deciding on the measurement approach. Sections 3, 4 and 5 deal with the issues involved in applying this approach in an Irish context. Section 3 covers the inclusion of imputed rent for owner-occupiers; Section 4 deals with the inclusion of health services; and Section 5 deals with issues arising in the inclusion of education. Section 6 combines

these analyses to provide a resource measure including cash incomes, imputed rent, health services and education. The main findings are drawn together in Section 7.

2. Conceptual and measurement issues

Standard practice in the analysis of the distributional impact of publicly provided services is based on two key assumptions (see, for example, Jones (2006), Marical et al. (2006) and Smeeding et al. (1993)):

1. The analysis of incidence is conducted on a static basis, and excludes externalities[1]

2. The value of the transfer to the beneficiary is assumed to be equal to the average cost of producing the relevant service.

Each of these assumptions has been questioned in the literature. For example, Smeeding et al (1993) note that the average cost of provision may overstate the value of the non-cash benefit, as recipients might, if they had the corresponding cash amount instead, prefer to spend some of it on other goods and services. O'Higgins (1981) provides an illustration of a further difficulty with the "cost per capita" method. If, for example, education benefits were measured on the basis of the cost of provision, then a rise in the wages of teachers would lead to a higher estimate of the value of the service to the individual. But under these circumstances, the "output" of the service could be unchanged, so that there would be no real gain to the beneficiary, despite the rise in the benefit as measured by the "cost per capita" approach. A further consideration, somewhat countering the first, is that economies of scale may mean that services purchased "in bulk" by the state are less costly that what individuals

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[1] Put another way, it is assumed that the only recipients of the relevant service benefit from it (though this may improve the household's position) – and that provision of the service does not create any benefits or losses to the non-recipients (e.g., through tax financing – so it is assumed that the taxes financing the transfers are already in place).

could purchase in the market – in which case the value could be greater than under the cost of provision approach.

Despite such criticisms, the attribution of benefit based on cost of provision has remained very common in this literature. There are, however, even more fundamental criticisms of the standard approach to which we now turn, and with which we try to deal in our empirical work.

In the case of public health care subsidies the imputation of non-cash income is often based on a risk-related insurance approach. Each individual is be assumed to receive a benefit from the state determined by the average spending on his/her age-sex group,[2] irrespective of what use was actually made of public health services. This approach (used by Saunders et al (1994), Donaldson et al (2002), Bonte et al (2003), Garfinkel et al (2004)) can be seen as an estimate of an actuarially fair insurance premium. These benefits are then added to cash incomes to provide a broader measure of resources.

An insurance based approach is seen as preferable to one based on the actual use of services, under which the greatest benefit would be attributed to those who make greatest use of health services. An "actual use" approach would imply the individuals who are most often and most severely ill, and in need of health services, could have "total resources" many times greater than their cash incomes. The implication, when basing studies of distribution on such a measure would be that many very ill individuals would be ranked as higher in the distribution of "total resources" than their healthy counterparts. While this makes sense in terms of tracking the use of resources, it is not appropriate in terms of measuring welfare: it would not be

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[2] Adjustments may also be made with respect to the socio-economic group of the individual, or taking into account particular institutional features of the public health system and its interaction with private sector provision of health services and insurance.

reasonable to describe a person as 'better off' because they were sick and in need of medical treatment which they received for free. Studies of income and resource distribution aim to rank individuals in terms of welfare, and already take account of the needs of households of different sizes and compositions by means of adult equivalence scales. When health resources are taken into account, corresponding needs in terms of health must also be brought into the analysis.

Does the "insurance-based" approach manage to overcome this critique? We argue, following Radner (1997), that it does not. The insurance based approach, when linked to age, means that benefits vary sharply according to age group. Again, this is because health status and health service usage are closely linked to age. While there is some "smoothing" compared to the actual use approach, the fundamental point remains. Radner points out the inconsistency between income and needs when it comes to attributing non-cash resources to individuals. For example, the inclusion of Medicare in the income of the aged can result in an upward bias of their economic status. As certain non-cash incomes (e.g. healthcare, education subsidies) may be concentrated in certain subgroups of a population it may distort the economic status of such groups. He also discusses how the choice of equivalence scale may need to differ when non-cash income is included in the definition of resources, as needs associated with the non-cash income may differ. He modifies the equivalence scales to take account of increased need and concludes that the failure to adjust the equivalence scale to take account of additional needs tends to overestimate the economic status of the aged.

Parallel arguments can be applied in the case of education. If non-cash incomes are assigned on the basis of cost of provision in respect of each pupil or student in first-, second- and third-level education, then the relative position of families with children appears to improve. But the adult equivalence scales generally used do not take into account children's need for education. This is eminently reasonable, given that in most industrial economies, education is both compulsory and free, at least up to the mid-teens. How then should equivalence scales be adjusted to take into account children's need for education? One approach would be that for the years in which education is compulsory and free, children have a need for education which is equal to that provided by the free system. On this basis, state subsidies for the compulsory education years would not be seen as improving the relative welfare of students or

their families. But state subsidies to post-compulsory education (in upper second level and third level) would affect relative welfare.

What of results based on the standard approach? Here we limit our focus to the UK and Ireland. In the UK, Evandrou et al. (1992) use U.K. data and looks at public spending on education, health services and subsidies to local authority housing. They find that the three benefits combined are worth most in the middle of the distribution with education being mildly 'pro-rich', particularly that of tertiary education. Sefton (2002) estimates the 'social wage' for the U.K. using 1996/97 and 2000/01 data and compares it to 1979. It shows that poorer households receive a greater proportion of welfare non-cash benefits than richer households and the 'pro-poor bias' has increased over time. This has not succeeded in reducing inequality however.

In the Irish context, there are a number of studies based on the standard "cost of provision" approach, applied inter alia to health and education. O'Connell (1982) looked at the tax-benefit system in Ireland, including non-cash benefits such as education, housing, food subsidies and free public transport. In general it was seen to be progressive with households with more than two adults and children benefiting the most. Educational benefits were found to be regressive however. Nolan (1981) also looked at the Irish system and found that cash benefits appear to benefit the lower income households. The value of non-cash benefits (such as medical services, housing and education) appeared relatively stable across income groups falling only marginally as income rose. Nolan and Russell (2001) look at non-cash benefits in Ireland, in particular the 'free schemes' such as free travel, food vouchers, free electricity etc. They also looked at entitlement to the medical card and found that the medical card scheme was strongly concentrated towards the bottom end of the distribution with 61 per cent of medical card spending going towards the bottom 30 per cent of the income distribution.

Our results, provided in the following sections, are based on a different approach to the estimation of benefits, with a careful eye to the overall implications for economic welfare, and for a more recent period.

3. Imputed rent from owner occupation

Housing represents a substantial element of household's wealth, and households that own their own accommodation have an income advantage over those that have to pay rent. As part of our investigation of aspects of non-cash income, therefore, we seek to adjust income measures to take into account the "imputed rent" enjoyed by owner-occupiers. One method used for such adjustment is the 'before housing costs' and 'after housing costs' measures of income, as used in the UK's official analyses of poverty and income distribution (*Households Below Average Income)* and by Fahy et al. (2004). Expenditure on rent and mortgages is deducted from household income, doing away with the need to estimate the "imputed income" derived from owning your own house mortgage free or receiving rent subsidies. While this method has the merit of simplicity, and can be used to identify some of the key features, it fails to take account of the fact that households vary in the strength of their preferences for housing, so that a post-housing costs measure is also an imperfect measure of welfare.

Census data show high rates of home ownership in Ireland. As a result, the issue of imputed rent from owner occupation is particularly important in an Irish context. Within the Living in Ireland Survey sample almost 85% of people in the sample are living in owner-occupied accommodation (whether owned outright or owned with a mortgage).

Frick and Grabka (2003) identify three methods for calculating imputed rent
- The capital market approach
- The market rent approach
- The opportunity cost approach

Frick and Grabka assess the three approaches, and conclude that the opportunity cost method offers significant advantages. In the Irish context, the dominance of owner occupation as a mode of tenure and the size of the sample (3,463 households) means that there are just 114 (unweighted) cases of private sector rented households on which the opportunity cost method depends to establish relationships between indicator variables and market rents. This would be a rather shaky basis on which to construct empirical estimates. By contrast, information on the capital value of the

house is gained for more than 80% of the sample. In these circumstances it seems prudent to apply the capital market approach Therefore, analysis here is based on the capital market approach. We use an imputed rent of 3% of the homeowner's net equity in the property, following the procedures of Frick and Grabka.[3]. The fact that owner occupation is the predominant mode of tenure means that analysing just owner-occupiers will capture about 90 per cent of the total impact of imputed rent across all tenures.

Table 1 shows the income shares by quintile before and after imputed rent is considered. Column two shows the shares per quintile of equivalised disposable income and column three shows the income shares once imputed rent has been taken into account. The income share of the lowest and middle quintiles increase with a fall in the income share at the top of the income scale. We can see from the last column that the percentage increase in equivalised disposable income is largest for the bottom quintile and decreases as we move up the income distribution. Similar patterns are observed if a higher rate of return to housing of 5% is used, with imputed rent then forming almost 17% of average income, and close to 30% of the initial cash income of the bottom quintile.

Table 1: *Changes in Income Shares by Quintile due to Imputed Rent*

Quintile	Equivalised Disposable Share	Income Share Post-Transfer	% Change in Equivalised Disposable Income
1	7.8%	8.2%	17.4%
2	12.9%	12.9%	12.2%
3	17.9%	18.0%	10.1%
4	23.6%	23.5%	10.0%
5	37.8%	37.4%	8.0%
Total	100%	100%	10.1%

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[3] Given the prolonged housing boom, we also considered a higher rate of return to housing in Ireland of 5%, and report on these results in the text below.

Table 2 shows the effects on various poverty and inequality measures. All the inequality indices show a fall, albeit no more than 3 per cent in the case of the Gini, which is particularly sensitive to changes in the middle of the distribution. But the Atkinson measure with the index of 1.5, and the poverty measures (FGT) are more sensitive to changes at the bottom of the distribution and show a greater fall – of between 11 and 15 per cent in the case of the FGT indices. A higher rate of return to housing of 5 per cent makes little difference to these measures of inequality and poverty, as the changes involve substantial re-ranking of households.

Table 2: *Impact of Imputed Rent on Inequality of Resources*

Index	*Value of the Index*		
	Disposable cash income	*Disposable income plus imputed rent*	*Change*
Gini	0.302	0.293	-3.0%
Atkinson 0.5	0.074	0.070	-6.0%
Atkinson 1.5	0.247	0.219	-11.5%
FGT0 (poverty head count)	0.219	0.194	-11.4%
FGT1 (poverty gap ratio)	0.053	0.046	-13.3%
FGT2 (depth and distribution sensitive measure)	0.019	0.016	-14.8%

4. Health services and the distribution of economic welfare

In 2000, the year our data comes from, total Irish healthcare spending stood at 6.3% of GDP with 73% of this funding coming from the government. We first apply the insurance-based approach and attribute a value to the health transfers made. Table 3 shows the value of the healthcare transfer made by income quintile. The value of the transfer is greatest for the lowest income quintile, falling somewhat for each higher quintile. The income share of the bottom two quintiles increases slightly if the "health transfer" is included as a part of income. There is a slight fall in the income share of the third and fourth quintiles but the income share of the top quintile remains unchanged.

Table 3: *Changes in Incomes and Income Shares by Quintile due to All Health Transfers*

Quintile	Household Equivalent Income	Health transfer	Household Equivalent Income Including Health Transfer	Income Share Pre-Transfer	Income Share Post-Transfer
	€	€	€		
1	121.80	44.94	166.74	8%	10%
2	198.50	40.43	238.93	13%	14%
3	275.47	38.00	313.47	18%	18%
4	363.93	36.30	400.23	24%	23%
5	584.38	34.27	618.65	38%	36%
Total	309.07	38.78	347.84	20%	20%

All of the poverty and inequality measures listed in Table 4 show a fall if the health transfer is included as part of income. The fall in the poverty indices is particularly marked, with a reduction of between one-third and half for the poverty rate (head count measure) and the depth and distribution sensitive measure respectively.

Table 4: *Impact of Health Expenditure on Inequality of Resources*.

Inequality and poverty indices	Value of the Index		
	Pre health transfer	Post Health Transfer	Change
Gini	0.302	0.264	-12.6%
Atkinson 0.5	0.074	0.056	-23.7%
Atkinson 1.5	0.247	0.158	-36.0%
Poverty Rate (FGT0)	0.219	0.148	-32.4%
Normalised Poverty Gap (FGT1)	0.053	0.030	-43.2%
FTG2 (Depth and distribution sensitive measure)	0.019	0.009	-51.9%

As noted above, the insurance-based approach used here still has some of the drawbacks associated with the "actual use" approach (cf Radner, 1997). This approach overstates the welfare of the elderly in particular, as it attributes high benefits to them but does not take account of their greater health needs.

An alternative is to focus on those elements of health system that do genuinely affect the distribution of resources and welfare. Chief among these is the medical card system (latterly supplemented by the GP Visit card, though this was introduced well after the year 2000 analysed here).[4] The medical card entitles the holder to free GP services, prescription medicines, in-patient hospital services, out-patient services, dental, optical and aural services, maternity and infant care services as well as some personal and social care services. People aged 70 or over are automatically entitled to a medical card. Otherwise a means-test is carried out and those within the financial guidelines can receive a medical card. Those whose income falls above the guideline amount but for whom the cost of medical care would cause 'undue hardship' can also be entitled to a medical card. We focus on the 35 per cent of the population who receive a medical card and use the cost per capita basis to attribute a value to the them. This is done by taking the total spent per capita in 2000 by the government on the medical card scheme (reducing the amount spent on drugs and medicines in line with that allowable under the Drugs Payment Scheme which is open to all non medical cardholders). Table 5 shows us the income shares per quintile before and after the medical card value is taken into account.. As expected, the income shares of the lower quintiles increase with a reduction in the middle and top quintile. We see very small increases (less than half a per cent) in the equivalised disposable income of the top two quintiles, while the bottom and second quintile see average increases of 11.9 and 4 per cent respectively.

Table 5: *Changes in Incomes and Income Shares by Quintile due to Medical Card Expenditure*

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[4] Nolan and Nolan (2007) find that the higher usage of GP services by medical card holders is related to differences in health status as well as differences in the price faced. For this reason, the results reported here should be regarded as an upper bound on the value of health transfers to low income individuals – but one which improves on the most commonly used estimates by abstracting from age-related differences in health need.

Quintile	Equivalised Disposable Income Share	Income Share Post-Transfer	% Change in Equivalised Disposable Income
1	7.8%	8.6%	11.9%
2	12.9%	13.2%	4.0%
3	17.9%	17.5%	1.6%
4	23.6%	23.5%	0.5%
5	37.8%	37.3%	0.1%
Total	100%	100%	1.9%

Table 6 shows the inequality and poverty indicators before and after the transfer is taken into account. A fall is observed in all the inequality and poverty indices, in particular those more sensitive to changes at the bottom of the distribution (Atkinson measure with an index value of 1.5, and the FGT poverty measures).

Table 6: *Impact of Medical Card Expenditure on Inequality of Resources*

Inequality and poverty indices	Value of the Index		Change
	Pre M.C. transfer	Post M.C. Transfer	
Gini	0.302	0.288	-4.6%
Atkinson 0.5	0.074	0.067	-9.3%
Atkinson 1.5	0.247	0.207	-16.1%
FGT0	0.219	0.189	-13.7%
FGT1	0.053	0.039	-25.6%
FGT2	0.019	0.013	-32.8%

5. Education

The Irish educational system is organised into three levels:

Primary schooling operates on an eight-year cycle, typically from age 5 to age 12. Primary schooling is compulsory. Second level schooling is compulsory for three years (the "Junior Cycle" or lower secondary), with a "Senior Cycle" (upper secondary) typically taking a further three years. Third level education includes university primary degree courses (of 3 or 4 years duration), diploma courses of shorter duration, and postgraduate qualifications.

We exclude the compulsory education years from our analysis, as it can be argued that the fact that education in these years is compulsory implies that the transfer of resources simply corresponds to a socially defined "need" for education. (See Section 2 for details).

Figure 1: *Current public expenditure per student in third level education (constant 1995 prices)*
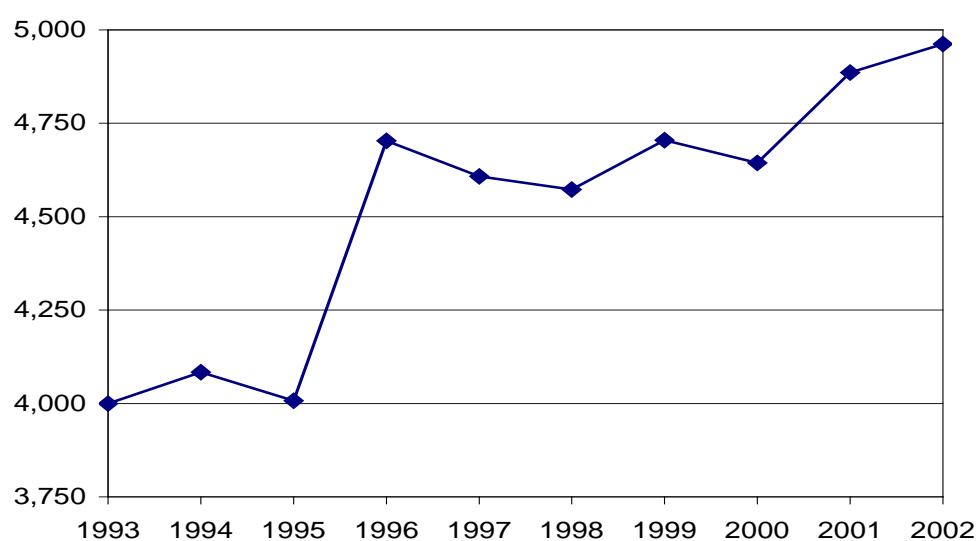
As can be seen from the graph above government expenditure on third level education increased greatly in 1995 with the abolition of fees for undergraduate courses. The table below shows the effect the inclusion of non-compulsory education has on various inequality and poverty measures.

Table 7 shows the changes in income shares per quintile once non-compulsory education is taken into account. We observe a rise in income shares of the bottom two

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quintiles with a slight fall in income share for the top quintile. Although the bottom two quintiles see increases in equivalised disposable income of 3.9 and 4.6 per cent the third and fourth quintiles also benefit with increases of more than two per cent. The top quintile sees an increase of around one per cent.

Table 7*: Changes in Income Shares by Quintile due to Non-Compulsory Education.*

Quintile	Equivalised Disposable Income Share	Income Share Post-Transfer	% Change in Equivalised Disposable Income
1	7.8%	8.0%	3.9%
2	12.9%	13.1%	4.6%
3	17.9%	17.9%	2.4%
4	23.6%	23.6%	2.1%
5	37.8%	37.4%	0.9%
Total	100%	100%	2.2%

Table 8 shows the impact spending on non-compulsory education has on inequality and poverty indicators. We see relatively small falls in all the indicators.

Table 8*: Impact of Non-Compulsory Education Expenditure on Inequality of Resources.*

Inequality and poverty indices	Value of the Index		
	Pre NC Education transfer	Post NC Education Transfer	Reduction in index
Gini	0.302	0.297	1.7%

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Atkinson 0.5	0.074	0.072	3.2%
Atkinson 1.5	0.247	0.242	1.9%
FGT0	0.219	0.212	3.3%
FGT1	0.053	0.051	3.4%
FGT2	0.019	0.018	5.3%

6. Non-cash resources and the distribution of economic welfare: combined results

Table 9 shows the changes in income shares per quintile when we take into account imputed rent, medical card expenditure and non-compulsory education provision. Overall we see the largest increase in equivalised disposable income in the bottom quintile and the smallest increase in the top quintile, the increase falling consistently as we move up the income distribution. We can therefore say that the non-cash benefits looked at in this paper are 'pro-poor'.

Table 9: *Changes in Income Shares by Quintile due to All Transfers*

Quintile	Equivalised Disposable Income Share	Equivalised Income Share Post-Transfer	% Change in Equivalised Disposable Income
1	7.8%	9.0%	33.2%
2	12.9%	13.5%	20.7%
3	17.9%	17.9%	14.1%
4	23.6%	23.3%	12.6%
5	37.8%	36.4%	9.0%
Total	100%	100%	14.2%

As we can see from Table 10 all the inequality and poverty measures listed all fall by substantial amounts, in particular those sensitive to movements at the bottom of the income distribution.

Table 10: *Impact of All Transfers on Inequality of Resources*

Inequality and poverty indices	Value of the Index		
	Pre transfers	Post Transfers	Change
Gini	0.302	0.276	-8.6%
Atkinson 0.5	0.074	0.061	-16.9%
Atkinson 1.5	0.247	0.173	-30.0%
FGT0	0.219	0.163	-25.5%
FGT1	0.053	0.032	-39.6%
FGT2	0.019	0.010	-47.1%

7. Conclusions

Non-cash benefits can have substantial effects on the distribution of economic welfare. Standard approaches, however, have failed to take adequate account of the pattern of needs associated with the greater use of health and education services. Our results, for Ireland in the year 2000, show that it is possible to derive more appropriate measures of total resources than have been derived using standard methods. The results indicate that the reductions in inequality for health and education are substantially less than suggested by previous estimates, which do not adjust for differing needs for health and education services. Nevertheless, there are significant reductions in poverty and inequality measures arising from the imputed rent from owner occupation and from income-related health services, though the impact of post-compulsory education transfers is much more limited.

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Appendix: Valuation Methods & Workings

Imputed Rent:

There are three methods for calculating imputed rent; the market rent approach, the opportunity cost approach and the capital market method. The market rent approach looks at the rent paid on similar dwellings and attributes this value to imputed rent. The opportunity cost approach is similar but deducts owner related costs (such as interest, maintenance costs etc.) from the rental cost of similar properties. Finally, the capital market method recognises that investment in property results in the owner foregoing other investment opportunities that result in real income flows such as dividends from shares, interest from savings, etc. The capital market approach calculates a value for imputed rent by applying an 'interest rate' to the net equity value of the house (i.e. the market value of the house minus the outstanding mortgage amount, if any.)

Due to the small number of private renters in the sample (see Table A1 below), standing at only 6.2%, computing an accurate imputed rent figure using the market rent or opportunity cost approach would be difficult and unreliable. Therefore, we have used the capital market approach. For the purpose of our analysis we adopt a rate of 3% in line with the rate chosen under the AIMAP (Accurate Income Measurement for the Assessment of Policies) project to facilitate cross-country comparison.

Table A1: *Distribution of Tenure, Living in Ireland 2000.*

Tenure	%
Own outright	39.7
Own with mortgage	44.8
Local authority tenant	7.7
Private tenant	6.2
Other	1.6
All	100.0

Note: Sample size for Living in Ireland Survey was 3,463 households

Due to the small number of local authority tenants in the sample (7.7%) and issues involved that can make it difficult to value the property (thus calculating the net equity value needed under the capital market approach) we focus only on owner-occupiers. In doing this we calculate an imputed rent figure for more than 90 per cent of the sample. As can be seen from Table A2 the percentage increase in equivalised disposable income is highest for the poorer quintile and decreases as we move up to the higher quintile. As eligibility for local authority housing is income dependent inclusion of an imputed rent value for local authority tenants would reinforce this trend of larger gains for lower income quintiles. This is shown in Table 2 below where we see that the vast majority of social housing tenants are found in the bottom quintiles.

Table A2: *Distribution of tenure within quintiles of disposable income*

Quintile	Tenure within quintile				
	Own outright	On mortgage	Social housing	Market rent	Rent free/ employer/ family
	%	%	%	%	%
Bottom	44.0	23.8	23.1	7.2	1.8
2.00	44.1	40.0	9.5	5.2	1.2
3.00	42.2	46.9	4.5	4.2	2.2
4.00	38.4	52.8	1.6	5.9	1.3
Top	29.7	60.1	.1	8.5	1.6
All	39.7	44.8	7.7	6.2	1.6

Health:

We value two aspects of healthcare in this paper- firstly, the traditional approach of attributing all healthcare spending to Irelands citizens and secondly, focussing on medical card spending. When looking at all healthcare spending we compute a value for various age groups calculated on the basis of OECD Health Data, which includes all public expenditure on health. It encompasses expenditure on in-patient care, ambulatory medical services and pharmaceutical goods but does not include non-reimbursed individual health expenditures or cash benefits related to sickness. As can

be seen in figure 1 below, using the insurance-based approach, healthcare spending per capita increases with age, rising sharply above the age of 60.

Figure A1: Public Healthcare Per Capita for Each Age Group, 2000
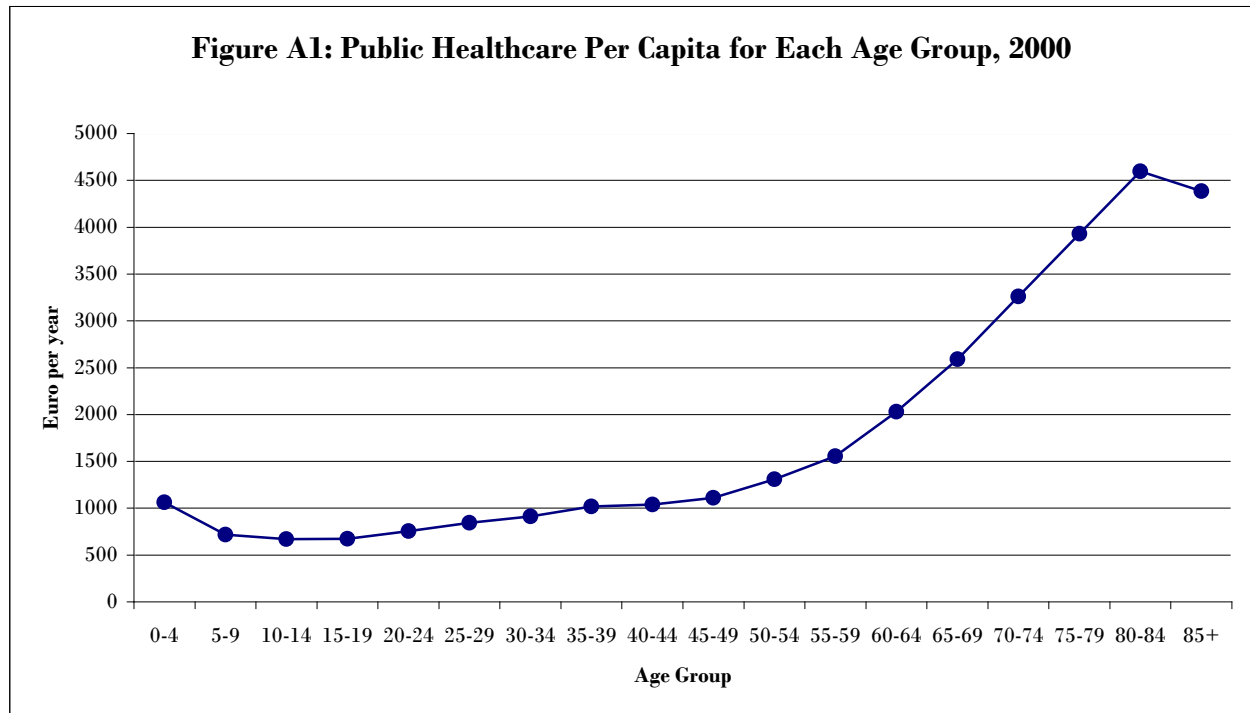
We then go on to look at the income-contingent medical card. Using the cost per capita approach we attribute a value to each medical cardholder. In 2000, 1,148,055 people (including dependants) were covered by the medical card scheme (35 per cent of the population). We took the total spending under the GMS (General Medical Services scheme) for the year 2000, as shown below in Table A3.

Table A3: *GMS spending in 2,000-Total & per Medical Card Holder.*

	2000 €m	
Doctors Fees		113.88
Allowances		56.05
Pharmacists Fees & Mark-up		131.99
Drugs & Medicines	395.61	
Reduction as per DPS eligibility[1]	(75.76)	319.85
Dentists		38.07
Investment In General Practice Development		10.22
High Tech Drugs Scheme		
Payment to Wholesalers		48.85
Patient Care Fees paid to Pharmacists		3.05
Optometrists		8.69
Administration		11.78
Total Payments for the Year		742.43
Total # of Medical Card Holders (incl. dependants)		1,148,055
Annual value per medical card holder		€646.68

1 €140.7m was spent under the Drugs Payment Scheme in 2000. All non-medical cardholders are entitled to claim under the DPS; therefore we calculated the average spending per person eligible under the DPS and reduced the cost of drugs and medicines by this amount per medical cardholder.

We then attributed this annual value of the medical card to each holder (and all dependants) in the sample.

Education:

In order to maintain cross-country comparability we use the OECD *Education at a Glance* figures in our analyses. We exclude spending on research and development, which inflates the value of third level education per recipient. In our computation of the value of primary, secondary and tertiary we use the cost per capita basis. This equates to an annual value per student of €3,291 for primary students, €4,407 for secondary students and €4,687 for third level students. As we are focussing on non-compulsory education only we look at the senior cycle of secondary school and third level education. If a household member falls in the 16-18.5 age category they are

given the value for secondary level education. From the age of 18.5-22.5 they are given the value of third level education.

Table A4: *Public Expenditure per Education Level*.

Education Level	Average Public Expenditure per Student (OECD) € Per annum	Age Group
Primary	3,291	4.5-12.5 years
Secondary	4,407	12.5-16 years (compulsory)
		16-18.5 (non-compulsory)
Tertiary	4,687	18.5-22.5 years

Year	Number	Title/Author(s) ESRI Authors/Co-authors *Italicised*
2008	244	Scenarios of Carbon Dioxide Emissions from Aviation *Karen Mayor* and *Richard S.J. Tol*
	243	The Effect of the Euro on Export Patterns: Empirical Evidence from Industry Data *Gavin Murphy* and *Iulia Siedschlag*
	242	The Economic Returns to Field of Study and Competencies Among Higher Education Graduates in Ireland *Elish Kelly, Philip O'Connell* and *Emer Smyth*
	241	European Climate Policy and Aviation Emissions *Karen Mayor* and *Richard S.J. Tol*
	240	Aviation and the Environment in the Context of the EU-US Open Skies Agreement *Karen Mayor* and *Richard S.J. Tol*
	239	Yuppie Kvetch? Work-life Conflict and Social Class in Western Europe *Frances McGinnity* and *Emma Calvert*
	238	Immigrants and Welfare Programmes: Exploring the Interactions between Immigrant Characteristics, Immigrant Welfare Dependence and Welfare Policy *Alan Barrett* and Yvonne McCarthy
	237	How Local is Hospital Treatment? An Exploratory Analysis of Public/Private Variation in Location of Treatment in Irish Acute Public Hospitals *Jacqueline O'Reilly* and *Miriam M. Wiley*