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Internationalisation of Services, Productivity and Economic Growth: Literature Review

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Internationalisation of Services, Productivity and Economic Growth: Literature Review

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Abstract: Over the past decade there has been an increased internationalisation of services via trade and investment as well as an increased international outsourcing of services. However, to date there is a lack of solid empirical evidence on the extent and determinants of the internationalisation of services in the European Union and its effects on productivity, employment growth and competitiveness. This study discusses recent theory and empirical evidence on the internationalisation of services and its effects on firm performance. In addition, it outlines existing knowledge gaps and proposes a research agenda and methodology to address them.

Keywords: Services, international trade, international investment, international outsourcing, firm performance

JEL classification: F14, F23, D22, D24, O33

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1 Introduction

This study discusses recent theory and empirical evidence on the internationalisation of services and firm performance. In addition, it outlines existing knowledge gaps and proposes a research agenda and methodology to address them.

Advances in information and communication technologies have increasingly facilitated cross-border trade in services. While international trade in services has grown in importance, there is a lack of solid empirical evidence on services firms' engagement in exports and imports and the associated effects on productivity, employment and competitiveness.

Beyond trade, an increasingly important activity in the European service sector is international investment. Over the past decade there has been a surge in cross-border mergers and acquisitions (M&A) in both manufacturing and services. While existing studies have looked at the effects of foreign ownership on firm performance in manufacturing, there is a lack of knowledge and understanding of the effects of foreign ownership on firm performance in services.

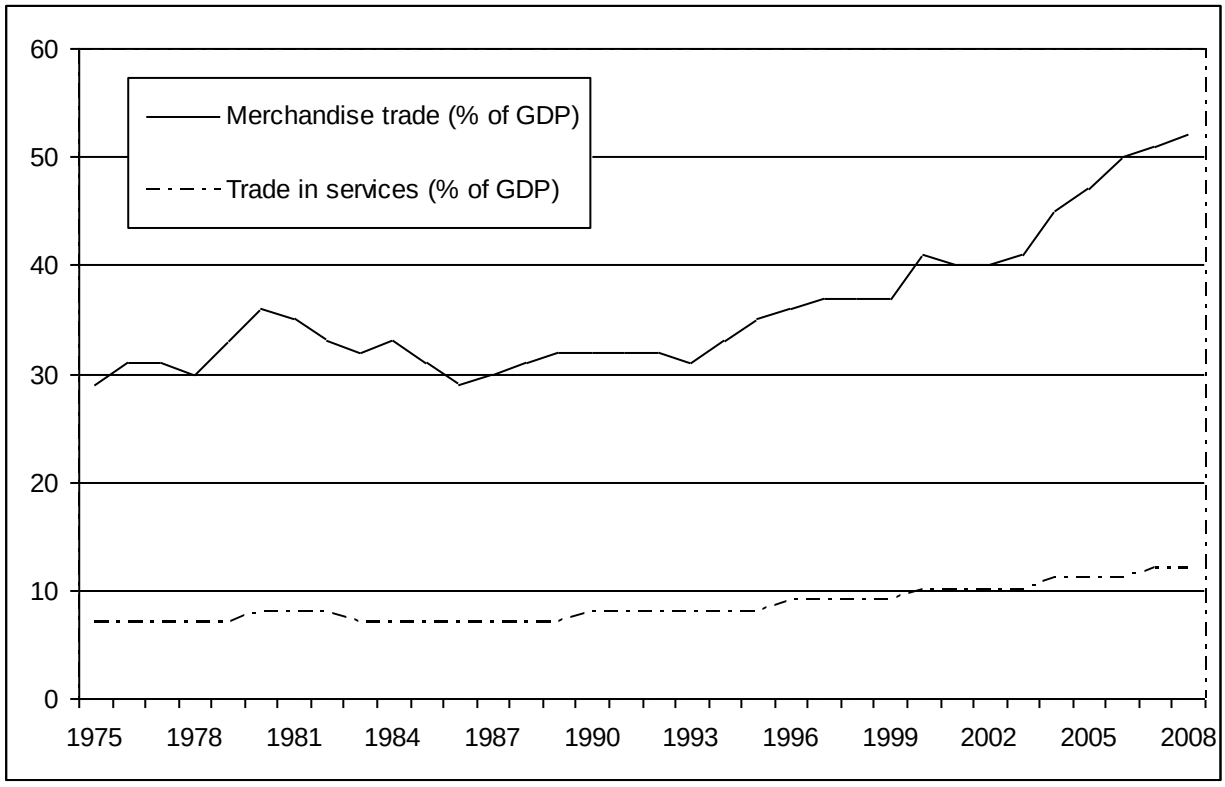
Besides trading and foreign acquisition, firms increasingly engage in international activity through outsourcing part of their activity to a foreign country (off shoring). This is manifested in the increase of international outsourcing of materials and services inputs in the manufacturing sector, in particular to low- and medium-income countries. However, to date there is little empirical evidence on the productivity effects of international outsourcing of services for European Union's countries.

The rest of this paper is organised as follows. Section 2 focuses on international trade in services. Section 3 discusses international investment in services and Section 4 discusses international outsourcing of services. Section 5 proposes a research agenda to fill the knowledge gaps identified in previous sections.

2 International Trade in Services

According to the world development indicators, in 2008 69% of value added in the world was generated in services sectors compared to 53% in 1970 (World Bank, 2010). In line with the increasing importance of the services sectors especially in developed countries, trade in services has increased substantially since the mid-1990s (see Figure 1). In just over a decade the ratio of world services trade to world GDP has increased to 12%. This is still a small fraction compared to merchandise trade (52% of world GDP) but an impressive development, nonetheless. Eurostat (2008) records EU27 exports of services growing mostly on par or above exports in goods for the period 2000-2006. Given these trends, it is not surprising that the liberalisation of services remains high on the agenda in particular in GATS (General Agreement on Trade in Services) negotiations, but also an issue for integrating regions such as the EU and NAFTA.

Figure 1 Merchandise trade and trade in services in % of world GDP, 1975-2008



Source: World Development Indicators (World Bank, 2010)

Despite its increasing importance evidence on firms engaged in services trade is only starting to build up. In contrast, for firms trading goods it is well established that they are larger, more productive, more capital- and skill-intensive than non-trading firms. This literature has long focussed on premia for exporting firms. It goes back to Bernard and Jensen (1995, 1999) and has been surveyed by Greenway and Kneller (2007) and Wagner (2007). More recent evidence shows that also importing

firms are more productive than non-traders and firms that import and export tend to outperform firms that engage in only one dimension of trade (Andersson et al., 2008; Muûls and Pisu, 2009; Castellani et al., 2010; Altomonte and Békés, 2009; Kasahara and Lapham, 2008). These findings have been formalised in a number of different theoretical models (e.g. Melitz, 2003; Bernard et al., 2003; Eaton et al., 2008).

In contrast to goods that can travel across borders unaccompanied, services frequently require the physical presence of both the producer and the consumer to be traded. Thus, in the General Agreement on Trade in Services the definition of trade in services encompasses four different modes: cross-border supply (mode 1) covers services flows from one country to another country (e.g. banking or architectural services transmitted via telecommunications or mail); consumption abroad (mode 2) refers to situations where a service consumer (e.g. tourist or patient) travels to another country to obtain a service; commercial presence (mode 3) implies that a service supplier of one country establishes a territorial presence, including through ownership or lease of premises, in another country's territory to provide a service (e.g. domestic subsidiaries of foreign insurance companies or hotel chains); and presence of natural persons (mode 4) refers to persons of one country entering the territory of another country to supply a service (e.g. accountants, doctors or teachers).

This difference to trade in goods raises the question whether existing models of trade are suited to also explain trade in services or whether a completely new set of models is required. Much of the early literature including some papers debating the applicability of existing theoretical models for trade in services centre strongly around finding an actual definition of services with the emphasis being on the joint production and consumption requirement (Hill, 1977; Deardorff, 1985; Melvin, 1989).

Since the mid-1980s a number of contributions concluded that the standard concepts of comparative advantage and theories of the determinants of trade patterns could be applied to services (technology, endowments, the specific factors model, but not the law of one price) (see Hoekman (2006) for a more in-depth discussion). Bhagwati (1984) argues that the same forces that drive trade in goods will also apply to trade in those services where services can be “splintered” from goods or people (their “carriers”) and thus the joint production and consumption requirement is relaxed. The same applies to exchanges between a resident of one country and another, for example where consumers temporarily move to the location of the service provider or the service provider temporarily moves to the location of the producer. Hindley and Smith (1984) maintain that none of the differences between services and goods trade change the normative implications of existing

theoretical approaches. Bhagwati et al. (2004) show that mode 1 trade in services is analytically equivalent to a technical change that lowers the relative price (wage) of more skilled-intensive labour in the importing country. This has distributional consequences among factors of production in that country, but generates an overall gain for the economy in the absence of significant adverse terms of trade effects. Markusen (1989) and van Marrewijk et al. (1997) point out that – similar to a large class of trade in goods models - most producer services are both differentiated and characterized by important scale economies.

The evidence from the firm-level empirical literature on trade in goods has motivated a new set of trade models that explicitly account for firm heterogeneity (e.g. Melitz, 2003; Bernard et al., 2003). In these papers only firms that receive a productivity draw above a certain threshold are able to cover the fixed and the variable cost associated with trading. Thus, they are able to replicate the empirical finding that only a certain fraction of firms engage in trade. In contrast to the literature working with perfectly competitive markets or representative firms described above, these more recent models of international trade have not yet been adapted to trade in services. Whether they need to be adapted depends on whether the stylised facts for firms that engage in services trade are similar to those for firms that trade goods

A first set of papers already provides evidence in this direction. These papers fall into two categories. The first set examines whether exporting firms have different characteristics than non-exporters in services sectors (Muûls and Pisu, 2009; Kox and Rojas-Romagosa, 2010; Temouri et al., 2010). The second set examines whether firms that engage in trade in services have different characteristics compared to firms that do not engage in trade in services (Breinlich and Criscuolo, 2010; Gaulier et al, 2010, Kelle and Kleinert, 2010). Muûls and Pisu (2009) provide evidence that even fewer Belgian firms export, import or export and import in wholesale and retail trade and in the remaining services sectors than in manufacturing. They further show that the bulk of exports and imports in wholesale and retail trade are concentrated in the hands of very few firms. Kox and Rojas-Romagosa (2010) show that both export participation and export intensities are lower in services than in manufacturing among Dutch firms. Their regression results suggest that only the most productive and profitable firms export both in manufacturing and in services. They also find evidence that firms self-select into exporting and some indication that they learn from exporting when controlling for the firm's distance to the international technological frontier. Temouri et al. (2010) compare firms in business services sectors in Germany, France and the UK. They find that exporters are more productive and pay higher wages on average in all three countries, French exporters are also more profitable whereas German exporters are less profitable compared to non-exporters. The results for

wages and productivity hold in the years before firms start exporting, which indicates self-selection into exporting of more productive services firms that pay higher wages.

Breinlich and Criscuolo (2010) show that there are firms in all sectors of the economy and not only in the services sectors in the UK that engage in services trade. Typically only a small fraction of firms export and/or import services and participation varies substantially across sectors. Like firms that trade goods, firms that trade services differ significantly from firms that do not trade in terms of size, productivity, capital intensity and average wages. Firms that export and import tend to outperform firms that only export and firms that only import, the ranking of the latter two groups varies across performance measures. Firms that export services are also shown to differ to a certain degree from firms that trade goods. The evidence on the number of markets served and the number and value of services traded suggests that like trade in goods, trade in services is highly concentrated in the hands of a few firms. Gaulier et al. (2010) provide similar evidence for French exporters of services. They also show that there is persistence in exporting services; this tends to be higher in the services than in the manufacturing sectors. Kelle and Kleinert (2010) also produce comparable evidence for German services exporters.

While these latter studies use direct information on traded services, this data typically captures only services trade via GATS modes 1, 2 and 4. This is because sales of services by affiliates of foreign-owned firms (mode 3) are not regarded as trade in services in the national accounts or balance of payments. Information on mode 3 is collected separately and is referred to as foreign affiliate trade statistics (FATS). Bhagwati (2004) states that while mode 3 necessarily involves a degree of foreign investment, this is supposed to be minuscule involving only the “right to establish” to distinguish it from full-scale foreign investment. FATS data, however, capture both mode 3 and sales of full-scale foreign affiliates. As a result, existing statistics suggest that “foreign affiliate trade in services” is the largest of the four modes of supply. Based on UNCTAD data for 2004, Hoekman (2006) states that it is currently “about 50 percent greater than total cross border trade flows as registered in the balance of payments (i.e., some $3.5 trillion)”. Excluding holding companies, Kelle and Kleinert (2010) report a figure of 215.8 billion Euros for services exports through commercial presence abroad (mode 3) compared to 86.5 billion Euro worth of cross-border services exports (modes 1, 2 and 4 together) for Germany in 2005.

3 International Investment in Services

Besides trade, an increasingly important activity in the European service sector is *international investment.* Over the past decade there has been a surge in cross-border mergers and acquisitions (M&A) in both manufacturing and services. In the European Union (EU), the number of M&A has increased in particular over the period 2002-2006, from 10,168 deals to 25,832 deals, an increase by 1.5 times[1]. Over the period 1999-2009, M&A amounted to 162,166 deals of which services represented 63.6%. Most of M&A were between domestic firms, 74.2%, while foreign M&A represented 25.8%. The share of services in domestic M&A was 63.2% while 60.7% of foreign acquisitions were in services. The UK accounted for 35.7% of all mergers and acquisitions in the EU. The other big EU countries accounted for 31.0 % of the total number of M&A (France: 10.9%; Germany: 8.7%; Italy: 6%; Spain 5.4%). Relative to its small economic size, Finland experienced a large number of M&A accounting for 5.6% of all M&A in the EU.

While existing studies have looked at the effects of foreign ownership on firm performance in manufacturing, there is a lack of knowledge and understanding of the effects of foreign ownership on firm performance in services.

Economists and policy makers tend to take for granted that multinational enterprises (MNEs) have an advantage over domestic firms due to large endowments of intangible assets which compensate for a lack of local information and experience. There is indeed a large empirical evidence showing that MNEs are more productive than domestic firms (Doms and Jensen, 1998 for the US; Driffield, 1997; Girma and Görg, 2007a; Griffith and Simpson, 2001; for the UK; De Backer and Sleuwaegen, 2005 in the case of Belgium; Pfaffermayer and Bellak, 2002 in the case of Austria; Ruane and Ugur, 2004 for Ireland). However, the empirical evidence on the causal link between foreign ownership and firm productivity is inconclusive. The ownership change due to foreign acquisition provides an appropriate framework to analyse this causal link. To the extent that foreign investors acquire the best performing firms, the productivity advantage might not be associated with foreign ownership *per se*. Harris and Robinson (2003) provide empirical evidence for cherry-picking in the case of UK manufacturing firms. Balsvik and Haller (2010) find that in Norway foreign acquirers picked large, high-wage and high productivity manufacturing firms and that firm performance measured in terms of employment, wages and labour productivity increased after foreign acquisition. While a number of studies have found positive effects of foreign M&A on firm productivity (Lichtenberg and Siegel, 1987 and McGuckin and Nguyen, 1995 for the US; Conyon et al, 2002 for the UK; Karpaty, 2007 for

[1] The source of the data on M&A is the database Zephyr of Bureau van Dijk.

Sweden; Arnold and Javorcik, 2009 for Indonesia; Balsvik and Haller, 2010 for Norway), other research has found that acquired firms do not reap any benefit from foreign ownership (Harris and Robinson, 2003 for the UK), no causal link (Barba Navaretti et al, 2004) or a positive effect only in the case of US multinationals (Benfratello and Sembenelli, 2006 for Italy), or in certain industries (Schiffbauer et al, 2009 for the UK).

With respect to the effects of foreign acquisitions on employment, most of the research finds no effect or a positive relationship (for example Girma, 2005 for the UK; Bandick and Karpaty, 2010 for Sweden). Evidence on wage increases following foreign acquisitions is found for the UK by Conyon et al (2002), Girma and Görg (2007b), and for Finland by Huttunen (2007).

Bandick et al (2010) find that foreign acquisitions in Sweden led to a higher R&D intensity in the acquired domestic firms both in multinationals and non-multinationals. Bertrand (2009) shows that foreign acquisitions of French firms increased their external and in-house R&D expenditures. Bertrand et al (2008) find that acquisitions in France were associated with a higher R&D intensity in comparison to greenfield investments.

4 International Outsourcing of Services

Besides trading and foreign acquisition, firms increasingly engage in international activity through *outsourcing* part of their activities *to a foreign country (offshoring)*. This is manifested in the increase of international outsourcing of materials and services inputs in the manufacturing sector. For example, Görg (2000) shows that US imports into the EU for further processing increased from 17% of total US imports in 1988 to 20 % in 1994. The same ratio increased much more significantly from 14 to 24 percent for the "peripheral" countries such as Greece, Ireland, Portugal and Spain. In a more up-to-date analysis, Geishecker (2007) uses data for all Euro Area countries to calculate measures of imports of intermediate material inputs. Based on this data, he finds that over the period 1995 to 2004, international outsourcing significantly increased in all euro area countries and almost all industries. When differentiating by geographic trading partner region he finds that outsourcing towards Central and Eastern Europe as well as South East Asia shows the strongest increases although in absolute terms its role was still only minor in 2004. Unfortunately, even to measure the extent of outsourcing at the European level is problematic because comparable data in different countries are still lacking. Exceptions for individual countries are provided by Amiti and Wei

(2005) and Görg and Hanley (2010) for the UK, the US and Ireland, respectively. They find that services outsourcing has grown considerably over the last decade or so, but that the level is still low.

International outsourcing (offshoring) of services is frequently mentioned in connection with fears about job losses following the relocation of services activities abroad. However, this popular concern does not consider the whole picture about outsourcing. The standard economic theory argument to counter such fears is that offshoring leads to gains from specialisation and restructuring towards more high value activity in industrialised countries. Such arguments should not be underestimated and should be considered in any debate about outsourcing.

Indeed, firms that outsource tend to become more technology intensive, improve efficiency and productivity and ultimately become more competitive on international markets (e.g., Glass and Saggi, 2001, Antras and Helpman, 2004). Such gain in competitiveness, in turn, will have positive implications for domestic labour markets, with both employment levels and quality of jobs increasing. While this argument is well rehearsed it is oftentimes not perceived as very convincing by the general public and some policy makers. This is arguably partly due to a lack of solid empirical evidence showing these gains from specialisation and rationalization. However, the recent literature is moving towards providing more and more about such crucial evidence to show that international outsourcing is not only about destroying jobs.

Geishecker and Görg (2008a) use individual level data from the British Household Panel Survey to investigate the effects of services offshoring on wages. They find that services offshoring affects negatively the wages of low and medium skilled individuals, but that skilled workers benefit from such offshoring activity. While these effects are statistically significant, their economic magnitude is rather small, however.[2] Amiti and Wei (2005) estimate labour demand equations using British data and also find that services offshoring has not had any strong effect on the total level of employment. Hijzen *et al.* (2007) look at the impact of intermediate trade in services (their definition of offshoring) on UK firm employment and wages. They find that offshoring has a positive impact on wages but not a statistically significant effect on employment. In the same vein, Crinò (2010a) using Italian data finds that offshoring of services (measured as the share of imported services in the inputs of the firm) does not affect the overall employment of the firm, but rather its composition:

[2] A related study by Geishecker and Görg (2008b) uses individual level data for Germany from the Socio Economic Panel (SOEP) to investigate the effect of materials outsourcing at the industry level on individual wages. Their findings on the effects of outsourcing are similar to those found for Britain. However, the study for Germany does not consider services outsourcing. Geishecker (2008) and Bachmann and Braun (2010) investigate the impact of offshoring on individual employment probabilities, however, they also only consider materials outsourcing, not services.

i.e. the firm employs more skilled-workers after importing services. As becomes apparent, the research is still in its infancy and focuses heavily on the UK.[3] Our research aims to gather additional empirical evidence to provide a more comprehensive picture about European countries of the effect of offshoring of services on labour market outcomes.

If offshoring indeed allows firms to restructure and move into more high value activities, then we should observe among others that firms become more skill and technology intensive, and improve their productivity. However, to date there is little empirical evidence on the productivity effects of international outsourcing of services for EU countries to date (for a survey see Olsen, 2006). An important exception is provided by Görg, Hanley and Strobl (2008) for Ireland, who were among the first to study the impact of services offshoring on the productivity of firms.[4] They actually find that productivity is boosted by offshoring but only for exporting firms. For non- exporters (firms that sell only in their domestic markets), offshoring activities does not influence their productivity. In a related paper, Görg and Hanley (2010) show that services offshoring also leads to firms spending more on R&D, in other words, they tend to become more knowledge intensive because outsourcing has freed up some resources devoted to R&D. Furthermore, recent work by Bombarda, McCann and Toubal (2010) find a positive impact of French firms services imports on firms exit (ie. firm closures and M&A) pointing to a rationalizing effect of services trade.

[3] There is also related work for the US by Amiti and Wei (2009) and Crino (2010b), the findings are similar to those found for European countries.

[4] Amiti and Wei (2009) related evidence for the US, based on industry level data. See also Hijzen et al. (2010) for a similar study for Japan. McCann (2010), also using firm level data for Ireland provides further evidence on positive productivity effects of outsourcing, however, he only considers material outsourcing, not services.

5 Research Agenda

This research project will generate new knowledge on the internationalisation of services in the European Union and its effects on productivity, employment and competitiveness. It will provide evidence on the determinants of the internationalisation of services. It will then analyse the effects of international trade, international investment and outsourcing in services on productivity, employment and growth. The results of this research will contribute to the strengthening of the scientific knowledge base for policies on enterprise, innovation, competition, trade and investment at national and European levels.

5.1 International Trade in Services

This research will analyse the extent to which firms in services engage in import and export markets and the effects of international trade on firm productivity and employment in EU countries.

In a first step, the project will establish which firms are engaged in trade in the services sectors in the countries under examination, namely Finland, France, Ireland, Slovenia and the Central, Eastern and South-Eastern European (CESEE) countries (Bosnia, Bulgaria, Czech Republic, Croatia, Estonia, Hungary, Latvia, Lithuania, Macedonia, Montenegro, Slovakia, Romania and Serbia,). The aim will be to document what fraction of firms export, import and export & import. This will be analysed at different points in time, by different firm size groups and by ownership status (foreign and domestic). This part of the work will also establish which groups of firms account for the largest shares of trade. Where possible there will be a distinction made between firms that trade only in services and firms that trade also goods.

In a second step, the project will examine differences between trading firms and non-trading firms in terms of size, wages and productivity. To this end, we will first tabulate unconditional means of firm characteristics by trading status - that is, distinguishing firms between those that do not trade, those that export only, those that import only and those that export and import.

Finally, the project will examine the effects of engaging in international trade on firm productivity and employment growth. Much of the debate regarding the superior performance of exporters has been to establish whether firms are more productive before they start exporting (self-selection hypothesis) or whether their performance improves once they are active in the export market (learning hypothesis). If firms that start to trade self-select into trading status (exporting/importing) we should observe that compared to the set of firms that do not start to trade, they are larger and have higher productivity already in the years before entering the export/import market. If firms

learn from exporting/importing they should exhibit higher growth rates of productivity (and potentially employment) in the first few years after export/import market entry compared to firms that continue not to trade. Alternatively, if we observe only a very small fraction of starters, we will look at industry level reallocation of economic activity due to firms that start to trade, continue trading and exit trading following Eaton et al. (2008).

This research will use firm-level panel data for the services sectors collected by the national statistical offices of Finland, France, Ireland and Slovenia. These datasets are comparable and contain information on industry affiliation, ownership, turnover, value added, the number of employees, wages, capital investments, and exports and imports of goods and services. In addition, the proposed analysis will be conducted for Central, Eastern and South-Eastern European countries. Two data sources will be used for these latter countries. For Central and Eastern European (CEE) countries (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Slovakia and Romania), the data source data is *Amadeus* (Bureau van Dijk). For countries in South-Eastern Europe (SEE) (Bosnia, Croatia, Serbia, Macedonia, Montenegro) the source of data is *Infodata*, which compiles firm-level balance sheets and financial statements as well as information on exports for this region.

The results from this research will be compared to developments in manufacturing sectors to assess the relative importance of internationalisation.

5.2 International Investment

This research will analyse determinants of foreign acquisitions in services and its effects on firm productivity and employment in EU countries. It will provide novel evidence on the profile of firms engaged in M&A, on the prevalence of "cherry-picking" by foreign investors and the effects of foreign acquisition on firm productivity (both multi-factor productivity (MFP) and labour productivity) and employment. It will examine the variation of these effects across the country or region of the acquiring and the merging firms and across industries. This focus on the service sector, with a comparative perspective, has not been attempted in the literature to date.

This research will analyse the causal link between foreign investment and firm performance in services in a number of EU countries. In particular, we will focus on the effects of mergers and acquisitions, on firm productivity and employment in services and will provide empirical evidence on: (i) the characteristics of firms in services acquired or merged with foreign owned firms; (ii) whether foreign investors acquire better performing firms; (iii) whether foreign investment *per se* has a causal effect on firm productivity and employment growth; (iv) the effects of foreign acquisition on productivity and employment depending on the home country of the foreign investor;

(v) the effects of foreign acquisition on productivity and employment growth across service industries and in comparison to manufacturing.

Firm-level data for this analysis covers the period 1999-2009 and is taken from two data sets from Bureau van Dijk. Information about M&A is obtained from the *Zephyr* database: characteristics of the acquired and acquirer firms such as identification number, location, industry, year of the deal's completion. This information will be linked with company account data obtained from the *Amadeus* database. In particular, these data include gross output, value added, employment, date of establishment, ownership, solvency, NACE codes, fixed tangible assets, depreciation and return on capital.

5.3 International Outsourcing of Services

This research will analyse the effects of international outsourcing of manufacturing and services on productivity, employment, exports and innovation in EU countries. In particular, we will provide empirical evidence on the following: (i) the characteristics of firms that engage in international outsourcing; (ii) the effects of international outsourcing on productivity at firm, industry and country levels; (iii) the effects of international outsourcing on employment growth at firm, industry and country levels; (iv) the effects of international outsourcing on exports of goods at firm, industry and country levels; (v) the effects of international outsourcing on innovation at firm, industry and country levels.

The research methods used will involve descriptive measurement and econometrics in a comprehensive manner. Particular attention will be paid to possible empirical biases due to firm heterogeneity and selectivity. For the analysis of the outsourcing decision probit models will be applied. The analyses of the effect of international outsourcing of manufacturing and services activities will be carried out using similar techniques.

This research will use several data sources, firm level data on foreign activities of firms, size, firm performance etc., as well as industry level data on offshoring activities in an industry.

In order to obtain data for various countries, to allow us a cross-country dimension to the analysis, we propose to analyse firstly the Amadeus database available from Bureau van Dijk. This unique dataset offers generally ten years of information about a very large sample of firms active in most European countries, including new member states. This database thus provides the possibility to make crucial cross country comparisons using firm-level data.

For specific countries (e.g., Germany, Ireland) we also explore the possibility of using other databases which provide more detail on various measures of firm performance, in particular related to technology use. To obtain measures of innovation we aim to use CIS data. CIS data provide various measures of innovative inputs and outputs, which can be used as alternative firm performance indicators.

The firm-level data will be complemented with industry-level data on trade in services and manufacturing intermediates. This allows us to calculate measures of imported services and manufacturing inputs in an industry. These data can be obtained using a combination of countries' input-output tables and trade statistics.

Furthermore, we will use firm level data available from the BEEPS Survey (Business Environment and Enterprise Performance Survey) provided by the World Bank and EBRD. This data set provides information on 27 Central and Eastern European and Central Asian Countries. As such, it includes also the EU new member states. This data allows to analyse, at the firm level, various measures of firms' innovative activity and outsourcing activities. As a downside, this data is only available in a cross section for 2008.

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