The impact of service and goods offshoring on employment : Firm-level evidence

Working Paper Research

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May 2017 No 319

National Bank OF BELGIUM
Eurosystem

Editor
Jan Smets, Governor of the National Bank of Belgium

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ISSN: 1375-680X (print)
ISSN: 1784-2476 (online)

Abstract

Advances in communication technology have led to a remarkable increase in the tradability of services, resulting in a substantial increase in offshoring of services over the last two decades. Research investigating how this surge in service offshoring affects employment, has been largely hampered by the paucity of suitable microdata. This paper tries to fill this gap by using a newly constructed database of Belgian firms that combines individual transaction-level data on international trade in goods and services with annual financial accounts. This unusually rich dataset allows us to produce fresh evidence on the impact of goods and service offshoring on total employment and employment by educational levels for both manufacturing industries and the service sectors. Our results show that: (i) goods offshoring has a positive impact on employment growth among workers with both low and high levels of education in the manufacturing industry but this effect disappears when controlling for scale effects; and (ii) service offshoring has a negative impact on employment growth among highly educated workers in the service sectors. This novel evidence suggests that globalization may threaten job security of higher educated workers too.

Keywords: Offshoring, trade in services, labour markets

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Acknowledgements
We would like to thank Sebastien Miroudot, Hector Calvo Pardo, Jan Van Hove, an anonymous referee of the National Bank of Belgium and participants at the CEP Workshop on Employment Effects of Service Trade Reform in Geneva, the EIST workshop in Florence and the ETSG conference in Paris for helpful comments. This paper has also benefited from a presentation at the OECD. This paper was initiated while Ilke Van Beveren was visiting the National Bank of Belgium.

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I. Introduction

The impact of globalisation on domestic labour markets has been debated among academics for several years and, recently, has taken centre stage in the political debate in various developed countries, most recently in the 2016 US election campaign. The relocation of jobs abroad by domestically active firms is generally considered one of the culprits for the decline in employment in developed economies' manufacturing industries as well as for the worse labour market outcomes of unskilled workers. Given that unskilled jobs are more easily moved offshore to developing countries that have a comparative advantage in the production of unskilled labour-intensive goods, globalisation can lower the relative demand for unskilled workers in developed countries, thereby contributing to increased wage inequality in Western economies. While trade was originally found to explain only a small part of the observed changes in wage inequality, the introduction of offshoring – the disintegration of the production process across national borders – in theoretical and empirical work has shown that globalisation accounts for a substantial part of the rise in wage inequality (Krugman, 2008; Feenstra and Hanson, 2003).

Because of continuous advances in information and communication technology, services have also become increasingly tradable. Although the level of international trade in services is still relatively small, the growth in services trade substantially outperforms the growth in goods trade. This evolution has led governments to start new trade negotiations that can reflect the reality of increasingly service-based international commerce; for instance, several members of the WTO are currently negotiating the Trade in Services Agreement (TiSA) with the aim of facilitating market access and improving rules in areas such as licensing, telecommunications, e-commerce and financial services. While most economists believe that opening up markets for services leads to economic growth, increasing tradability also means that a large number of jobs previously insulated from foreign competition may potentially be located abroad (Blinder, 2006), thus leading to

what Amiti and Wei (2005) call the "fear of service offshoring."

When a firm relocates part of its production process abroad, one would expect a direct negative effect on firm employment, the magnitude of which depends on the number of in-house workers that are attached to the offshored process. However, offshoring may also lead to productivity gains and product quality improvements that can boost firms' output growth and employment (Wright, 2014). Because the question of which of the two effects dominates is an empirical one, the aim of this paper is to produce fresh empirical evidence on the impact of offshoring on employment outcomes. More precisely, we use a rich dataset of Belgian firms to investigate the effects of both goods and service offshoring on total labour demand, as well as on relative labour demand for skilled and unskilled workers in the manufacturing and services sectors.

Most of the academic literature on the labour market effects of trade has focused on the relative demand for unskilled labour, while studies on the absolute change in employment are less common. This may reflect modelling conventions that impose inelastic labour supply and abstract from labour market frictions. As a result, workers losing their jobs in firms/sectors because of increased globalisation would simply be relocated to other firms/sectors (Acemoglu et al., 2014). However, with (labour) market imperfections, there is no guarantee that such perfect relocation would occur. For example, Autor et al. (2013); Acemoglu et al. (2014) and Pierce and Schott (2016) find that import competition from China has been a major force behind employment reductions in the US manufacturing sector. Moreover, the import competition has depressed overall job growth in the US, indicating imperfect relocation.

Most of the studies on the impact of offshoring on labour have focused on offshoring of goods, initially using industry-level data (see, for example, Feenstra and Hanson, 1999) and more recently using firm-level data (e.g., Mion and Zhu, 2013). The general consensus in this literature is that the relative demand for unskilled workers falls in response to goods offshoring. However, the findings from

studies investigating the effects on absolute employment are mixed, with most of them estimating rather small effects of offshoring on domestic employment, whether positive or negative (Wright, 2014). In a recent article, Monarch et al. (2017) study several offshoring events by matching Trade Adjustment Assistance (TAA) program petition data to U.S. Census Bureau microdata. They find that offshoring firms experience a significant decline in employment in the year when offshoring starts and in the following 4 years after the event. They also show that there is no evidence of employment recovery in the longer run.

Compared to the large empirical and theoretical literature on trade in goods, our understanding of trade in services and its impact is still hampered by the paucity of suitable microdata. Given that service tasks are, on average, more skill-intensive than production tasks, economic intuition would suggest that service offshoring should exert a downward pressure on skilled labour demand (Crino, 2009). But the few available empirical studies have found no support for this hypothesis. On the contrary, service offshoring seems to increase relative demand for skilled workers (Crino, 2010b,a, 2012), mimicking the findings for goods offshoring in earlier studies. But Crino (2012) shows that this similarity between service and goods is actually driven by two different forces: complementarity between imported services and domestic skills in the case of service offshoring and substitution of low-skilled labour in the case of material offshoring. Similarly, Geishecker and Görg (2013) combine individual-level data on wages with sector-level data on service offshoring and find that service offshoring negatively affects the real wage of low-and medium-skilled individuals in the same industry, while skilled workers benefit from service offshoring through higher real wages. Using a panel of Swedish manufacturing firms, Andersson et al. (2016) also finds that service offshoring increases relative demand for skilled labour while goods offshoring appears to have no impact.

The number of studies that investigate the effective impact of service offshoring on total labour demand is even more limited. Amiti and Wei (2005, 2006) use

sector-level data for UK and US manufacturing, respectively. They find a small negative or no effect of service offshoring on labour demand in the US, but a small positive effect in the UK. Görg and Hanley (2005) uses a panel of 100 Irish electronic firms and find some negative effects of service offshoring on employment, but smaller in magnitude than those of goods offshoring. Using data on imports and exports of service retrieved from a survey of UK firms, Hijzen et al. (2011) find that employment growth in firms that import services, is higher than in firms that do not. The results appear to be driven by cost savings associated with offshoring that give rise to an increase in the scale of production.[1]

We aim to contribute to the existing literature in several ways. First, we investigate the relationship between employment outcomes and the offshoring of both goods and services. The number of studies measuring the effects of service offshoring is still limited, and they use mostly aggregated sector-level data or are based on surveys of a sample of firms. In contrast, we can observe firm-level imports of both goods and services. Second, we incorporate the services sectors in our analysis. Although the bulk of employment is located in the services sectors, most of the empirical work focuses solely on manufacturing industries, largely because of data constraints. This is particularly important for our research question, as most of the activity in service offshoring takes place in the services sectors. Third, we look at both the impact on the change in total employment and the effect on workers with different education levels. Finally, our econometric framework will allow us to disentangle substitution and scale effects, as well as short-run effects versus the impact over a longer period. In principle, purchasing an input from abroad implies the immediate replacement of a task previously done by domestic workers employed either by the importing firms or by a domestic supplier of that firm. However, the purchase of foreign inputs may

[1]Another strand of the literature has investigated the impact of globalisation decisions on firm performance. Amiti and Konings (2007) show how the imports of intermediate products lead to higher productivity. Similarly, Halpern et al. (2011) provide evidence that the access to new intermediate goods varieties is an important source of productivity growth. Goldberg et al. (2010) find that access to foreign imports increases firm product scope and that this can lead to an increase in the market shares of offshoring firms, thus mitigating or even offsetting the initial negative effect of offshoring on employment.

later lead to productivity gains and quality improvements that allow the firm to expand output and employment (Grossman and Rossi-Hansberg, 2008).

Our findings indicate that goods and service offshoring have different effects on employment growth. Employment growth is positively related to goods offshoring in the manufacturing sector. However, when controlling for scale effects, this relation becomes either non-statistically different from zero or even negative, depending on the specification. Service offshoring is negatively related to employment growth in the services sector, and interestingly enough, this result appears to be driven by employees with high education. To the best of our knowledge, this is the first paper to find robust large-scale evidence that in the services sectors, it is the job security of skilled workers that globalisation threatens. This finding is compatible with the fact that most of service imports come from other OECD countries.

The rest of the paper is structured as follows. Section II describes the dataset used for the analysis. Section III explains the empirical methodology and the construction of the instrumental variables used to identify the causal impact of offshoring on employment. Section IV presents the results, and section V concludes.

II. Data

For our empirical analysis, we rely on Belgian firms' annual accounts which are merged with data on their trading activities for the period 1996-2005.[2] The annual accounts contain the standard variables, such as employment, value added, turnover and book value of tangible assets.[3] While all limited-liability firms

[2]We restrict the analysis to the period 1996-2005 for two reasons. First, the definition of employment in the annual accounts has changed in 1996. Since many firms still reported employment according to the old reporting standard, the data for 1995 are not always reliable, hence we drop this year from the sample. Second, trade in services is available for the full population only until 2005. Until 2005, the data were constructed using transaction data on cross-border payments to foreign enterprises reported by financial institutions, implying that data were available for the full population of firms. Starting in 2006, data are collected directly from a sample of (large) firms, resulting in a structural break in the series. Therefore, we include only data until 2005 in our sample.

[3]For a limited number of firms, the reporting year does not run from January to December. To correct for these, we follow a procedure suggested by the National Bank of Belgium to annualize these

are required to report their annual accounts to the National Bank of Belgium, reporting requirements are limited for small firms.[4] Since some of the variables used in the empirical analysis, such as turnover and job flows by education levels, are available only for firms that report complete annual accounts, we limit our attention to these (larger) firms.

We obtained data on trade in goods from the National Bank of Belgium (NBB). We observe for each firm in a given year its imports and exports at the product-country level, where products are defined according to the Combined Nomenclature (CN8) classification. Data on intra-EU imports and exports of goods are subject to reporting cutoffs that have changed over time. Specifically, from 1995 to 1997, firms had to report intra-EU exports (imports) if their value in the previous year exceeded €104,115. Between 1998 to 2005, this threshold increased to €250,000 per year. Moreover, the change in EU membership in 2004 implicitly increased the number of countries included in intra-EU declarations. For extra-EU trade flows, data are collected from customs data. All transactions for which the value is higher than €1,000 or whose weight is over 1,000Kg have to be recorded.

The international trade in services data for Belgium are collected on the basis of the balance of payment returns sent to the NBB either by commercial banks or by direct reporters.[5] Between 1995 and 2005, banks had to report payments made or received by their clients when the payer or the payee was a non-resident. Data are available at the firm-service-country-year level. Starting with the NACE rev1.1

accounts.

[4]Firms are considered small if they do not exceed more than one of three criteria: 1)employment higher than 50; 2) balance sheet total exceeding €3.65 million; and 3)turnover higher than €7.3 million.

[5]Trade in services is usually classified in four different modes (Francois and Hoekman, 2010). *Mode 1* is cross-border supply and applies when service suppliers located in one country provide services in another country without either the buyer or the supplier moving to the physical location of the other. A typical example is a call center located in India that provides services to a Belgian firm. *Mode 2* is consumption abroad and applies when the service is consumed by a resident of one country in the territory of another country–e.g., hotel services to tourists. *Mode 3* refers to commercial presence–i.e. firms moving to the location of the consumers to provide their services locally through the establishment of a foreign affiliate or branch. *Mode 4* is the movement of natural persons and refers to services provided by the firm of one country through the presence of natural persons in another country–for example, a Polish transport company that offers transport services in Belgium through the presence of its trucker in Belgium. Since the data for Belgium are constructed using financial transaction data involving foreign businesses and Belgian residents, mode 3 is not included, as there is no cross-border payment involved in this mode of service trade.

classification used by the NBB, we divide services into seven different groups: Transport, Financial and Insurance, Communication, Information Technologies, (other) Business, Construction and Cultural Services.[6] In our empirical analysis, we exclude construction and cultural services.

In constructing our dataset, we limit attention to transactions involving Belgian firms, thus excluding for example spending by Belgian tourists abroad. We also exclude the following transactions: 1) transactions in goods that did not involve a change in ownership; 2) payments of royalties and license fees and financial flows between related companies since these could reflect profit shifting for tax reasons; 3) all merchanting transactions related to trade in goods and 4) payments made by governments or international institutions.

Figure 1 shows the evolution of trade in goods and trade in services in nominal values. The growth in trade of services is higher than that for goods over the time window considered. As shown in Appendix VII.B, this increase is even more pronounced for services such as Business Services, (+254% increase in nominal value of imports), IT Services (+271%) and Communication Services (+340%), compared to an average of +110% for trade in goods. However, in level terms, imports of services still represent only around 10% of the value of imports of goods at the end of our sample period.[7]

To convert the data into real values, we use deflators from the EUKLEMS database. The international trade data – both services and goods – are deflated with the output deflator corresponding to the NACE code of the trade flow.[8] Firms' turnover, material inputs and value added reported in the annual account dataset are deflated with the deflators for output, material and value added, respectively. To convert tangible and intangible fixed assets into real values, we

[6]The NACE rev1.1 classification translates one-to-one into the international classification of services EBOPS. Table A.1 in Appendix VII.A shows the EBOPS classification and the correpsonding NACE codes.

[7]The coverage of the international trade in services is much smaller as banks are not included in the annual report database.

[8]For trade in goods, CN8 products are translated into NACE categories using an appropriate correspondence table. Manufacturing firms are firms active in NACE rev 1.1 sectors 15 to 36. The services sector consists of NACE rev 1.1 codes 60 to 74.

apply the capital deflator reported by Eurostat for Belgium in the appropriate year. Finally, we use the Harmonized Consumer Price Index (HCPI) to deflate wages.

After some cleaning of the data,[9] the final sample that we use in our empirical analysis consists of an unbalanced panel of 3751 manufacturing firms and 3679 service firms for the period 1996 to 2005. Table 1 displays total imports of the different types of services for this final sample.[10] Services imports have increased by more than imports of goods, mostly due to the boom in business, IT and communication services. Although the sample consists of large firms, only a minority imports services, but the share of firms importing services has increased from 28.2% to 38.8% over the sample period. The share of firms that imports goods is substantially higher, at more than 50% (and over 80% if we consider only firms in the manufacturing sector). These large numbers reflect the Belgium's substantial trade openness as well as the fact that we focus on large firms.

We define offshoring of goods and services as the firm-level imports of goods and services, respectively. In the empirical section we check the robustness of our results using the following alternative definitions of offshoring: (a) "narrow goods offshoring" defined as the purchases of inputs classified in the same NACE2 manufacturing industry of the firm and, similarly, "core service offshoring" defined as acquired services that belong to the same group classification discussed previously (see last column of Table A.1 in the Appendix); and (b) offshoring from OECD and non-OECD countries.

In Figure 2, we plot the average ratio between firm-level offshoring and total expenditures on material and service inputs for each NACE 2-digit sector. Offshoring of goods and of services are shown in light-grey and dark-grey, re-

[9]We drop observations where (i) the share of offshoring–i.e., the ratio between offshoring of goods and services and turnover, is above one; and (ii) the absolute change in the share of offshoring over two consecutive years is above 0.5. Furthermore, we winsorize the growth of employment and share of offshoring at the 1st and 99th percentile.

[10]The relative importance of each service category is comparable to the full dataset. Only the Financial and Insurance Services imports are of relatively lower importance in comparison to the figures in Table B.1, which show the importance of the different types of services in the trade database. This is because banks are not included in the firm-level dataset.

spectively. Several sectors in the manufacturing compartment are found to import more than 20% of their intermediary inputs. Not surprisingly, offshoring of intermediate inputs is mostly prevalent in the manufacturing industries, while offshoring of service inputs is more common in service sectors. Total offshoring is higher in manufacturing industries, reflecting higher tradability of goods in comparison with services.

Table 2 reports summary statistics for some of the key variables used in the empirical analysis. The average firm in the manufacturing sector employs 153 people and generates 45 million euro in revenues. The share of offshoring of goods, defined as the ratio between offshoring and turnover, is almost 20%, while the corresponding share for services is around 0.5%. Average employment growth is very low and equal to 0.45%. The average firm active in the services sector employs around 156 people, with a turnover of almost 22 million euro. In general, total imports as a percentage of turnover is relatively low compared to the manufacturing sector, but imports of services are much more important and equal to 3.3%. Average employment growth is equal to 3.6%, reflecting the aggregate pattern of increasing importance of the services sector.

Growth of Education. — Our data also report the inflow and outflow of employees (but not their total stock) by education level. The employees are divided into 4 categories: (1) primary education or lower; (2) secondary education; (3) higher education, non-university; and (4) university education. We collapse these four categories into two education levels: low education (categories 1 and 2) and high education (categories 3 and 4). To gain insight into the relative importance of workers with low (L) and high (H) education in the manufacturing and services sectors, we compute the share of group j=L, H in the total gross flow of employees as $Share^j = \frac{Inflow^j + Outflow^j}{\sum_{j=L,H}(Inflow^j + Outflow^j)}$), and we find that employees with high education account for 40% of total gross flows in the service sector, compared to a much lower 20% in the manufacturing sector.

To compute the growth rate of employment by education level, we use the following procedure. First, we use the observed net flow of employment $\Delta N_{it}^{j} = Inflow^{j} - Outflow^{j}$ in education group j to compute the corresponding net flows in total employment, $\Delta N_{it} = \sum_{j=L,H} \Delta N_{it}^{j}$. Second, we compute the difference between ΔN_{it} and the change in total average number of employees ΔE_{it},[11] and we add this difference to the net flows of low-education or high-education workers proportional to their share in the sum of the absolute values of these net flows. For example, suppose that ΔE is equal to 2, ΔN^{L} equal to -8 and ΔN^{H} equal to 4, resulting in ΔN being equal to -4. The difference between ΔE and ΔN is, thus, equal to 6. The share of low-(high-) skilled workers in the total flow is $\frac{8}{8+4} = \frac{2}{3}$ (respectively, $\frac{1}{3}$). The adjusted flows are then $\Delta E^{L} = -8 + \frac{2}{3}6 = -4$ and $\Delta E^{H} = 4 + \frac{1}{3}6 = 6$. Finally, we use the adjusted flows ΔE^{j} in each education group to compute the growth rate of employment by education levels as $\Delta e_{it}^{j} = \frac{\Delta E_{it}^{j}}{0.5(E_{it-1}+E_{it})}$.[12]

III. Empirical Framework and Instruments

A. *Framework*

The specification we take to the data consists in regressing the growth of employment, Δe_{it}, on time-varying firm-level measures of share of offshoring for goods, SO_{it}^{g}, and services, SO_{it}^{s}, measured as imported goods or imported services over total turnover.[13] We define the dependent variable as growth rates because, as explained above, we observe changes in employment (but not employment levels) for different education levels. We use measures of offshoring scaled by firm size to eliminate the possibility of finding a positive (or negative) correlation be-

[11] The difference between ΔN and ΔE may be due to two reasons. First, ΔN refers to the difference between employment at the end of year t and employment at the end of year $t-1$, while ΔE refers to the change in average employment during the year. Second, there could be measurement error in reporting the flows by education levels.

[12] Following the notation just introduced, in the rest of the paper, we use Δx to indicate the percentage change (i.e. growth rate) of variables X and ΔX to indicate the difference between the levels of X over two consecutive years.

[13] See also Bernard et al. (2006) and Mion and Zhu (2013) for similar approaches

tween imports and employment due to exogenous positive (respectively, negative) shocks in demand or productivity that cause a proportional increase (decrease) in both output and variable inputs: for instance, the award of a public procurement contract that leads to a simultaneous increase in output and imported inputs but that leaves the share of offshoring unchanged.

To capture differences between the immediate impact of offshoring and the effects over a longer period, we start with the following specification:

$$e_{it} = \beta_1 e_{it-1} + \beta_2 SO^g_{it} + \beta_3 SO^g_{it-1} + \beta_4 SO^s_{it} + \beta_5 SO^s_{it-1} + \eta_i + \varepsilon_{it}, \tag{1}$$

where η_i is the firm unobserved productivity assumed to be constant over the time window considered and ε_{it} captures shocks to employment, possibly correlated with the offshoring activities, and measurement errors. Subtracting e_{it-1} on both sides of the equation and subtracting and adding $\beta_2 SO^g_{it-1}$ and $\beta_4 SO^s_{it-1}$ on the RHS, we obtain:

$$\begin{aligned} \Delta e_{it} = (\beta_1 - 1) e_{it-1} + \beta_2 \Delta SO^g_{it} + (\beta_2 + \beta_3) SO^g_{it-1} \\ + \beta_4 \Delta SO^s_{it} + (\beta_4 + \beta_5) SO^s_{it-1} + \eta_i + \varepsilon_{it}, \end{aligned} \tag{2}$$

where ΔSO^g_{it} (ΔSO^s_{it}) indicates the difference in the share of goods (respectively, service) offshoring over two consecutive years. The coefficients on ΔSO_{it} measure the short-run effect of goods or service offshoring, while the coefficients on SO_{it-1} capture the effect over a longer (two-year) period.

The main specification we take to the data controls for labour productivity, LP, capital intensity, KI, and log of wages, w, all of which also enter as lagged levels and yearly changes.[14] Accordingly:

$$\Delta e_{it} = \alpha e_{it-1} + \mathbf{SO}_{it}\boldsymbol{\beta} + \mathbf{V}_{it}\boldsymbol{\gamma} + \eta_i + \varepsilon_{it}, \tag{3}$$

[14]LP is defined as log(value added/number of employees) while KI is log(physical capital/number of employees). Note that w refers to the log of wages.

where $\alpha \equiv \{\beta_1 - 1\}$, the vector $\mathbf{SO}_{it} \equiv \{SO^g_{it-1}, \Delta SO^g_{it}, SO^s_{it-1}, \Delta SO^s_{it}\}$ and the vector $\mathbf{V}_{it} \equiv \{\Delta LP_{it}, LP_{it-1}, \Delta KI_{it}, KI_{it-1}, \Delta w_{it}, w_{it-1}\}$. The specification above is estimated using firm-level fixed effects to control for productivity differences and any unobserved heterogeneity across firms.

Offshoring can affect labour in two ways. First, it can reduce the amount of employment to the extent that imported inputs replace a task previously done in-house. However, product improvements and efficiency gains due to the use of (new and better) imported inputs may have an expansion effect on firms' output and employment. In order to identify the complementarity or substitutability of offshoring with respect to labour, net of sales expansion due to rising productivity and increased demand, we will also estimate the specification above adding lagged log of output and growth of output in real terms as extra control variables:

$$\Delta e_{it} = \alpha e_{it-1} + \mathbf{SO}_{it}\boldsymbol{\beta} + \mathbf{V}_{it}\boldsymbol{\gamma} + \mathbf{Q}_{it}\boldsymbol{\delta} + \eta_i + \varepsilon_{it}, \tag{4}$$

where $\mathbf{Q}_{it} \equiv \{q_{it-1}, \Delta q_{it}\}$.[15] Hummels et al. (2014) use a similar approach to estimate the direct and aggregate (i.e., including productivity gains) effect of goods offshoring on wages in Denmark. But while Hummels et al. (2014) use levels of offshoring, we scale trade variables by firm size to eliminate the correlation in employment and imports that is unrelated to the offshoring decision.

B. Instruments

The key identification challenge we face in our empirical exercise is that productivity shocks and changes in the demand for the firms' products are likely to simultaneously affect employment and offshoring. For instance, there is undisputed evidence that highly productive firms are larger, export more products and import more inputs. Our specification tries to minimize these sources of endogeneity by including a rather rich set of control variables capturing the impact of

[15] Note that q is the log of real output Q.

technological changes, capital deepening and the cost of labour on employment. Nevertheless, estimating equation (3) with Ordinary Least Squares or FE may still result in biased parameter estimates if there are unobserved productivity changes and demand shocks that affect firms' offshoring intensity as well as their labour demand. Thus, we need to find firm-time varying instruments that are correlated with imports at the firm level but uncorrelated with labour demand.

To construct the instruments, we combine the firm-level trade structure in a base year with factors at the product-country level affecting the propensity to import (see, also, Hummels et al., 2014 for a similar approach). More precisely, our firm-time varying instrument Z_{it} for firm i in period t is constructed as $Z_{it} = \sum_{c,k} s_{ick} I_{ckt}$, where s_{ick} represents the share of imports of product k from country c by firm i in the base year–i.e., the pre-sample year or the first year that the firm enters the sample. The other component of the instrument I_{ckt} consists of factors affecting or reflecting changes in comparative advantage of country c in the production of product k. These include exchange rates, inflation, and world export supply in goods and services. These factors are discussed in more detail in subsequent sections.

Exchange rates. — The exchange rate between country c and Belgium in period t affects the costs of importing in euros (or in the Belgian franc for the period before 1999), thus affecting the offshoring intensity of Belgian firms from that country. However, the exchange rate itself is not related to the employment outcome of specific Belgian firms, making it a valid instrument. We obtained exchange rates from the International Financial Statistics database published by the IMF. Note that the exchange rates have only country-time variation, no product variation.

Inflation rates and Wages. — If inflation or wages in country c are higher than in Belgium, the imported products/services become more expensive, altering the

optimal amount of imports. At the same time, these variables can be considered exogenous to the employment outcome of individual Belgian firms. As for the exchange rates, we obtained inflation rates from the International Financial Statistics Dataset, and they have country-time variation. Data on wages, were retrieved from the STructural ANalysis (STAN) database produced by the OECD and have a country-industry-time variation.

Trade in Goods. — We follow Hummels et al. (2014) and construct so-called World Export Supply (WES), which is equal to total exports of product k by country c net of exports of product k by country c to Belgium. The idea is that WES captures changes in comparative advantage for the exporting country, arising from changes in the production price, product quality or variety. Subtracting the exports to Belgium from the total exports makes ensures that Belgian demand factors are filtered out of the instrument. For bilateral trade flows, we rely on the BACI dataset (Gaulier and Zignago, 2010), which is based on the COMTRADE dataset.[16] From this database we can construct WES at the HS6 digit-year-country level.[17] Other studies use variation in tariffs to construct a similar instrument. We experimented with tariffs from the UNCTAD Trains database, but the tariff instruments had little explanatory power in the first-stage regressions, probably due to the little variation in tariffs over the sample period.

Trade in Services. — We construct a similar measure for World Export Supply, but for trade in services. Unfortunately, bilateral trade flows of services are not as detailed as those for trade in goods. The WTO reports trade in services, but only exports to the world for each country (and not bilateral trade flows). Therefore, we can not control for the exports to Belgium. However, given that

[16]The BACI dataset makes corrections to COMTRADE based on the observation that the reported imports of country j from country c should be the same as the reported exports of country c to country j, after taking into account that import values are reported CIF (cost, insurance and freight) and export values are reported FOB (free on board).

[17]To control for HS6 codes changing over time, we follow the concordance procedure explained in Van Beveren et al. (2012).

Belgium is a small country, it is unlikely to affect the aggregate export patterns of the partner countries. Note that the product level is very coarse however, as we can only separately observe exports of commercial services and transport services throughout the sample period.

The different variables described above have country-time or country-time-industry variation. As mentioned above, we obtain firm-year level instruments by taking a weighted sum of these factors with the share of the import value of product k from country c by firm i in the base year as weight. The idea is that a firm i that sources a particular input k from country c is likely to keep on buying this input k from country c over a long period of time because, for example, the product is a particularly good fit for the firm or because there are fixed costs associated with switching countries to buy the inputs (Hummels et al., 2014). Over time, the exporting country's comparative advantage in a product can change, and these changes will affect the supply decisions of firms already importing from this country more than other firms.

In the empirical specification, we use the exchange rate, trade in goods and wages as instruments for offshoring of goods, and the exchange rate, trade in services and inflation for offshoring of services. Econometric tests reported in the following section confirm that our instruments are highly correlated with the import share while being orthogonal to the changes in firm level employment.

IV. Results

Before investigating the impact of offshoring on employment, we start exploring the relationship among total employment, national intermediary inputs, and offshoring. More precisely, we regress the growth rate of employment on the growth rate of the other inputs–namely, domestically purchased[18] and imported inputs:

[18]Domestically purchased inputs are obtained by subtracting firm level imports, excluding imports of capital goods according to the BEC classification, from total reported spending on intermediate goods and services.

$$\Delta e_{it} = \beta_m \Delta m_{it} + \beta_o \Delta o_{it} + u_{it},$$

where Δe_{it} is the growth rate of average yearly employment of firm i between period $t-1$ and t, and Δm_{it} and Δo_{it} are, respectively, the growth rate of domestically purchased inputs and total offshoring (i.e. goods and services together). Similarly, we estimate a model with Δm_{it} on the left-hand side (LHS) and Δe_{it} on the right-hand side (RHS). Each of these two specifications is estimated a second time by adding Δq_{it} as a control variable. This exercise, exploratory in nature, is aimed at understanding the strength of complementarity and substitutability between offshoring, on one side, and labour and national intermediary inputs, on the other side.

Two interesting facts emerge from the estimates reported in Table 3. When we do not control for real output growth Δq, we find a positive relationship between the growth of offshoring and growth of employment, while we find a negative relationship between the growth of national inputs and offshoring. Once we include Δq on the RHS, we uncover a negative relationship between Δe and Δo in the services sector but not in the manufacturing sector. The point estimate for the services sector is, however, very small in absolute value. Overall, these findings suggest that most of the offshoring involves looking abroad for new suppliers of goods and services previously bought on national markets, rather than the (much feared) relocation of parts of the production process to low-income countries. This is also consistent with the fact that in Belgium (as in other European countries), most of the trading of goods and services is within the EU.

A. Main Results

We now turn to the main results obtained from estimating equations (3) and (4). As explained in the empirical section, all specifications include firm fixed effects and a number of control variables, such as (growth rates and lagged levels

of) labour productivity, capital intensity and the wage rate. [19] The lagged level of dependent variable is also included on the RHS to control for potential mean reversion in firm employment growth.[20] Hereafter, we first discuss the results for total employment and then those for different levels of education.

Total Employment. — Table 4 reports the estimated coefficients for the manufacturing sector on the left panel and for the services sector on the right panel. In each case, we first show the firm fixed effect (FE) results and then the FE-IV results, where we instrument for the four offshoring variables.

The diagnostics for the IV specifications show that the Kleibergen-Paap test statistic of weak instruments (Kleibergen and Paap, 2006) strongly rejects the null of underidentification in all specifications.[21] At the same time, the $p-$values of the Hansen test of overidentifying restrictions support the idea that instruments are exogenous for the service sector.[22] For the manufacturing industries, there appears to be a problem with the exogeneity of the instruments for the specification that include the control for output $\mathbf{Q}_{it}$. We note that in the check of robustness reported at the end of this section, we obtain a Hansen p-value of 0.14 when using data for the period 1998-2005 (cf column (6) in Table 9).[23].

In the manufacturing sector, when we do not control for output growth nor we instrument for the offshoring variables, both the change in goods offshoring and the lagged level of goods offshoring are positively related to employment growth

[19]The coefficients of most of the control variables (not reported in the tables but available upon request) take the expected signs and are very precisely estimated. For instance, the coefficients on growth and the lagged level of the hourly wage are both negative and significant at the 1 per cent level.

[20]See, for example, Sutton (1997) for a survey on the relation between firm size and employment growth.

[21]Similarly, the Angrist and Pischke (2009) F-test of weak and underidentification (not reported but available upon request), strongly rejects underidentification of each single endogenous variable, with p-values below 0.001 in all the specifications presented in this Section.

[22]The endogeneity test is calculated as the difference between the Hansen statistic for the regression where the offshoring variables are treated as endogenous and the Hansen statistic where they are assumed to be exogenous. This difference has a χ^2 distribution with degrees of freedom equal to the number of variables tested for exogeneity. Under homoskedasticity, this test is numerically equal to a Hausman test statistic. Baum et al. (2007)

[23]More generally, we note that, by changing the combination of instruments, we can obtain higher p-values of the Hansen test with no major changes in the point estimates of our offshoring variables. We believe that it is cleaner to use the same set of instruments across all specifications, even if in few instances, we get low Hansen p-value

while we do not find any significant effect of service offshoring on employment growth. The coefficients on SO^g_{it-1} and on ΔSO^g_{it-1} are not statistically different. As mentioned before, the estimated effects of offshoring are a combination of a scale effect and a technology effect. The scale effect could stem from imports of intermediate products increasing firm-level productivity because of learning, variety or quality effects Amiti and Konings (2007), thus boosting competitiveness and increasing sales and, in turn, employment growth.[24] The fact that the coefficient for ΔSO^g_{it} is positive in column (1) but negative in column (2) suggests that in the short-run, there is a certain degree of substitutability between goods offshoring and labour, but this effect is more than offset by an expansion in output.

Even after including the different controls and firm FE in the regression, there could still be an endogeneity problem in the form of firms' specific demand or productivity shocks that increase simultaneously labour demand and the share of imported intermediary inputs. We use IV regression to control for this endogeneity problem. The results in column (3) show that our IV strategy leads to a drammatic increase in the point estimates for all offshoring variables: we now find a large positive effect of both goods and services offshoring on employment.

The short-run coefficient on ΔSO^g_{it-1} is significantly larger than the coefficient on SO^g_{it-1}, a common feature across most of the specifications that will be presented in the rest of this Section. This result suggests that the positive effects of offshoring are often halved when considering a longer period, possibly because of the longer time required to adjust the labour force in Belgium. This interesting finding confirms the importance of using an empirical framework that allows us to assess the effect of offshoring at different points in time. Interestingly enough, the two "long-term" coefficients on the lagged offshoring variables are no longer significant when we control for output growth. This is consistent with the idea

[24]Note that the increase in sales must be higher than the increase in imports to have an increase in the share of offshoring.

that the offshoring does not lead to a substitution of tasks previously performed in-house; rather, it replaces domestic providers with suppliers located abroad.

The results for the services sector on the right panel show a more complex picture. Similar to the manufacturing sector, an increase in the offshoring of goods is related to an increase in employment, and this effect disappears when we include controls for output growth. This, again, can be explained by service firms replacing national intermediate goods with foreign goods that have a better price/quality ratio. Offshoring of services is, instead, negatively related to employment growth in the fixed effects specifications. When instrumenting for the offshoring variables, we estimate a positive effect of ΔSO^s on employment growth, but this is a short-lived effect that disappears after one period, given that the coefficient on lag offshoring is insignificant. The change in the coefficient for ΔSO^s is consistent with the idea that firms face labour-saving technical changes that, at the same time, facilitate offshoring of services. Finally, results in the last column show that once we control for changes in output, service offshoring makes firms in the service sector less labour intensive. However, it is important to note that the size of the effect remains relatively small. For example, a firm that would increase its share of service offshoring from 0 to the average 0.033, would see a reduction in employment of around 1%, holding output fixed. This limited effect of offshoring is mainly driven by the relatively low level of service offshoring during our sample period (1996-2005). Over the last decade, services trade has continued to grow at a fast pace. If the marginal effect of service offshoring on employment growth has remained stable after our sample period, this implies that the contribution of service offshoring to employment losses can be substantially higher. However, the relation between service offshoring and employment could as well have changed over the last decade, making it difficult to extrapolate our findings to more recent years.

Education level. — The fear of offshoring is not only driven by total job losses, but also by concerns that offshoring favours one group of employees over the other, based on their education/skill level. In this subsection, we look at the impact of offshoring on low- and high-educated employees.

Tables 5 and 6 report the IV results for manufacturing and services, respectively. The first two columns repeat the specification used in the previous section for the sake of comparison.

Columns (3) and (5) in Table 5 shows that the positive effects of offshoring on employment growth in the manufacturing sector are shared by low- and high-skilled workers. Given our definition of the dependent variable as the change in employment of a particular skill type divided by total employment, the coefficient on the offshoring variable also varies with the importance of the labour type in total employment. So, given that the fraction of low-skilled workers in manufacturing industries is approximately four times as large as the fraction of high-skilled workers, the coefficient on offshoring for the low-skilled should also be four times as large as that for the high-skilled in order to keep the relative shares of the different types at the same level. However, the coefficients for the high-skilled are relatively larger when not controlling for output, indicating that the firms are becoming more skill-intensive. This may explain why the only coefficient that it is marginally significant when controlling for output is for the skilled workers in column (6).

The results for the services sector are included in Table 6. The positive effect of goods offshoring on employment growth when we do not condition on output growth is shared by both low-educated and high-educated workers. For service offshoring, the negative effect on employment is entirely due to high-skilled employment. The results indicate that the offshored activities in Belgium are executed mainly by highly-educated employees. This is one of our key findings, as it offers the first large-scale evidence using firm-level data that service offshoring may threaten the job security of higher-educated workers. Given that the vast

majority of imported services originate in other developed economies, the negative impact is not due to trading with low-wage countries. We will provide further evidence on this issue in the next subsection.

B. Robustness Checks and Extensions

In this part, we check the robustness of the results when using a "narrow" definition of offshoring and when reducing the sample period to 1998-2005.[25]. Moreover we also explore whether the results above are driven by imports from OECD or non-OECD countries.[26]

Transport Services Excluded/ Narrow Definition of Goods Offshoring. — In the literature, there is a discussion of whether to define offshoring narrowly or more broadly. [27] This rests on the idea that the closer the imported inputs are to the outputs produced by the firm, the more likely it is that within-firm labour could have produced those inputs. Moreover, up till now, we have included transport services in out measure for service offshoring. However, especially for the manufacturing sector, these are likely to relate strongly to exports of goods. In Table 7, we show results for the manufacturing sector using a "narrow" definition of goods offshoring and not including transport in service offshoring. Results are very similar to those presented in the previous section; in particular, offshoring of goods is confirmed to have a large positive impact on employment of all types of workers, but for workers with low education, this effect disappears when we control for output.

[25] As mentioned in the Data section, the threshold at which firms are asked to report intra-EU imports and exports changed in 1998, so focusing on the 1998-2005 period can soften problems due to changes in data reporting conditions.

[26] We have also experimented with alternative specifications, and obtained similar results, when: (i) including a control for exports; (ii) adding an aggregate measure of import competition at industry-level; and (iii) using only lagged offshoring instead of our richer dynamic framework.

[27] Note that if we were to apply the definition of "narrow" offshoring to services, the value of service offshoring would be equal to zero for manufacturing firms.

Core Services. — We apply similar ideas to the services sector and we repeat the same analysis, but we now include only the core services–that is, the offshoring of services that correspond to the main activity of the firm. Results reported in Table 8 confirm the findings in Table 6, most notably the fact that it is only for workers with a high level of education that (i) there is a negative overall effect of offshoring (see the coefficient on SO^s_{it-1} in column (5)); and (ii) there is a strong substitution effect between labour and services offshoring when we control for changes in output (see column(6)).

Period 1998-2005. — We re-estimate equations (3) and (4) using data for the period 1998-2005 as in the first years of our data set the thresholds to report trade data have changed. Moreover, the reporting of employment changed in 1996. Table 9 shows that results are very similar to those reported in Tables 5 and 6 above. The diagnostic tests for IV regressions confirm again that excluded instruments are highly correlated with the endogenous offshoring variables; at the same time, we now obtain higher p-values of the Hansen statistics, thus giving further support to the validity of our IV strategy.

Including Origin of Imports. — Several empirical works have found that the negative impact of goods offshoring on manufacturing sector employment is driven by imports from developing countries–China in particular. For instance, Pierce and Schott (2016) find: "*Industries where the threat of tariff hikes declines the most experience more severe employment losses along with larger increases in the value of imports from China and the number of firms engaged in China-U.S. trade.*" In the present context, it is interesting to assess whether our two main results (i.e., the positive effect of goods offshoring on employment for all types of workers and the negative impact of services offshoring on highly-educated workers) change according to the origin of the imported inputs. For this, we divide our measure of offshoring intensity between offshoring from OECD countries and from

non-OECD countries. Three interesting facts emerge from the results reported in Table 10. First, imported goods from both OECD and non-OECD countries have a positive impact on workers with low education, especially in the manufacturing sectors, when not controlling for output growth. This finding suggests that for the workforce in a particular firm, goods offshoring from developing countries does not represent a threat. However, when controlling for output growth, offshoring to non-OECD countries appears to have a long-term negative impact on employment growth, indicating that the production process becomes less labor intensive. When distinguishing between low and high skilled workers, the coefficient remains negative but becomes insignificant for both categories. Second, the positive impact of goods offshoring on employees with high education is driven by imports from OECD countries. This result is probably driven by the fact that the imports from Western economies represent a better match with the skills of this group of workers. Finally, the negative effect of services offshoring on higher-educated workers is driven by trading with OECD countries.

V. Conclusion

The impact of globalisation on domestic labour markets has been the subject of a large debate within the academic arena and among the general public. While the focus has historically been on goods, offshoring of services has recently attracted more and more interest because advances in information and communication technology have led to a remarkable increase in the tradability of services.

Using a newly constructed dataset that contains firm-level information on imports of both goods and services, this study produces fresh evidence on the impact of offshoring on the employment outcome in manufacturing industries and services sectors. We deal with the standard endogeneity problem of offshoring by constructing firm-level instrumental variables based on high-quality information on exchange rates, inflation, wages and international trade flows. Diagnostic tests presented in the empirical section show that our IVs are both highly correlated

with offshoring and exogenous with respect to the possible demand and productivity shocks buried in the residual.

We find that employment growth of both workers with low and high education is positively related to goods offshoring in the manufacturing sector. Our empirical specification allows us to uncover a substantial reduction in this positive impact over time, with a coefficient on lagged offshoring often halved compared to the (short-run) effect in period t. Moreover, we find that this positive relationship disappears when controlling for scale effects. For the services sectors, our key finding is that there is a negative effect of service offshoring on the employment outcome of workers with higher education. To the best of our knowledge, this is the first large-scale study with detailed information on services offshoring that showing that globalisation may threaten the job security of higher-educated workers. We show that this result is driven by trading within OECD countries, which is not unsurprising given that the vast majority of trade in services is with these countries. This result contrasts the findings of previous studies, in which trading from low-wage countries–China in particular, was the main culprit for the loss of blue-collar jobs in the manufacturing industries.

The fact that service offshoring represents a small percentage of firms' turnover implies that its impact on the employment of higher-educated workers is not large in the period we study. However, the nature of our findings are very important if we take into consideration that service offshoring has grown at a faster pace than goods offshoring in the last decade, a trend that may even increase given that ongoing trade negotiations are increasingly focused on facilitating market access in areas such as licensing, telecommunications, e-commerce and financial services.

A limitation of our work is that we only look at the effects of offshoring on individual firms. To assess the aggregate impact of service offshoring, one would need to take into account the impact on domestic suppliers and competitors, which could experience employment losses and could be more likely to exit the market. Determining these effects lies outside the scope of the current paper and

we leave this for future research.

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VI. Figures

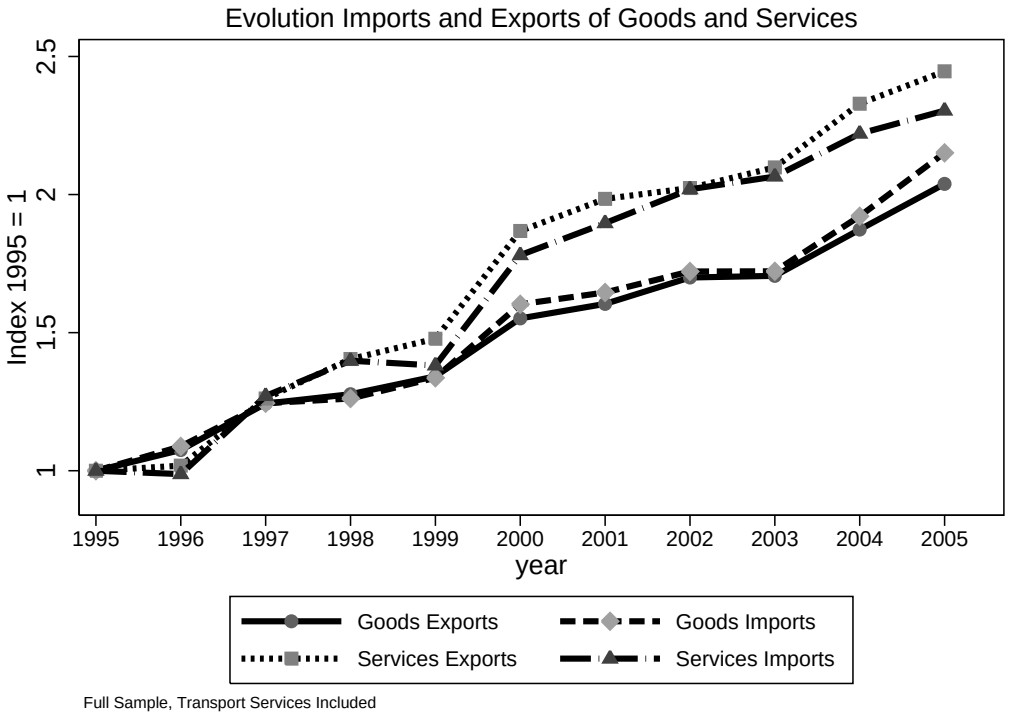
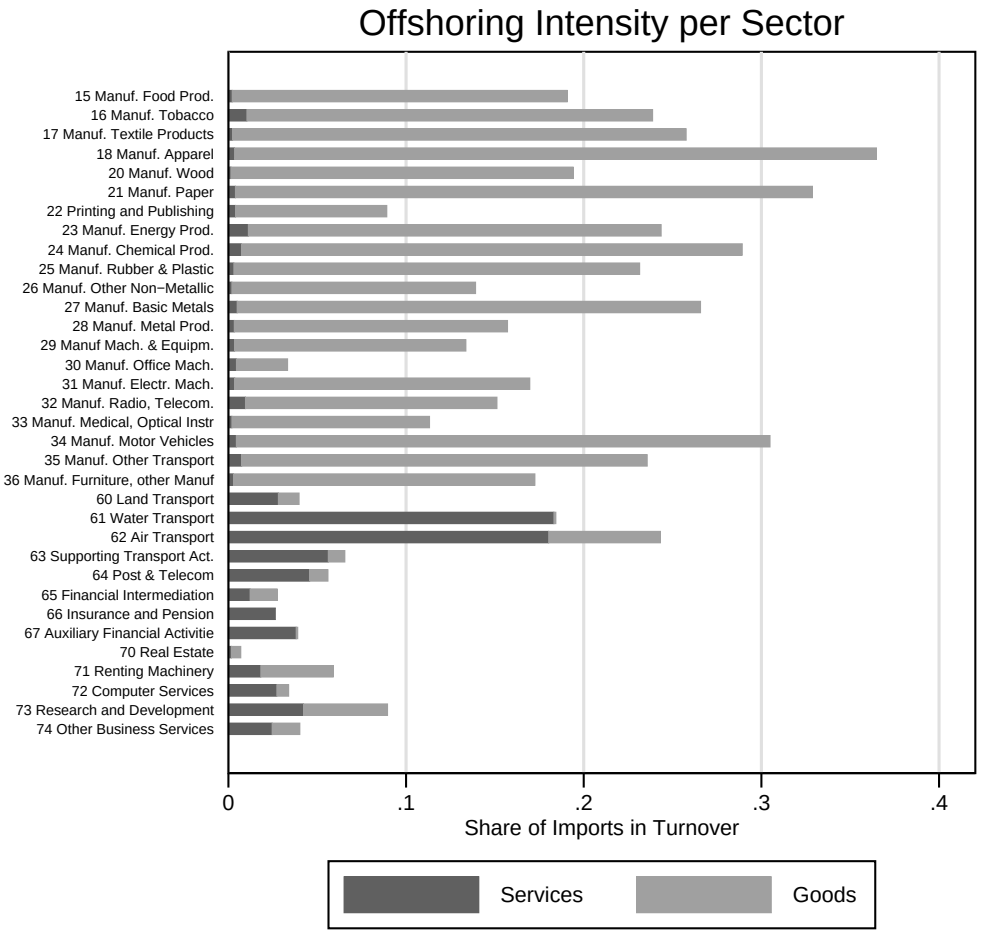


FIGURE 1. EVOLUTION TRADE IN GOODS AND SERVICES

FIGURE 2. OFFSHORING PER SECTOR



Average share of imports in turnover; Goods excludes capital goods

VII. Tables

Table 1—Imports of Different Service Types (values in million euros)

	1996			2005		
Type of Service	Value	Share	% Firms	Value	Share	%Firms
Transport Services	2,054	61.5%	13.6%	3,771	45.9%	14.8%
Business Services	788	23.6%	13.8%	2,411	29.4%	21.5%
IT Services	189	5.7%	5.6%	965	11.8%	8.2%
Communication Services	228	6.8%	2.0%	910	11.1%	2.8%
Financial Services	80	2.4%	11.2%	151	1.8%	12.2%
Total Trade in Services	3,339	100%	28.2%	8,208	100%	38.8%
Total Trade in Goods	29,766		57.2%	56,219		51.6%

Table 2—Summary Statistics

Variable	Mean	p50	sd	Obs
Manufacturing				
Turnover (×1000€)	44,932	11,377	181,515	24,489
Employment	153	56	424	24,489
Offshoring of Goods (×1000€)	13,309	1,654	88,390	24,489
Offshoring of Services (×1000€)	552	0	7,163	24,489
Share Offshoring Goods	0.194	0.145	0.189	24,489
Share Offshoring Services	0.005	0	0.021	24,489
Employment Growth	0.45%	0.0%	16.4%	24,489
Services				
Turnover (×1000€)	21,744	5,184	117,440	20,161
Employment	156	27.1	1,389	20,161
Offshoring of Goods (×1000€)	450	0	6,385	20,161
Offshoring of Services (×1000€)	1,702	0	14,977	20,161
Share Offshoring Goods	0.013	0	0.067	20,161
Share Offshoring Services	0.033	0	0.077	20,161
Employment Growth	3.6%	1.7%	23.1%	20,161

Table 3—Substitutability between inputs

	Manufacturing				Service			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Empl	Empl	Nat Mater.	Nat Mater.	Empl	Empl	Nat Mater.	Nat Mater.
Growth National Materials	0.121***	-0.0181***			0.191***	-0.0406***		
	(0.00496)	(0.00591)			(0.00783)	(0.00954)		
Growth Tot Employment			0.432***	-0.0398***			0.368***	-0.0554***
			(0.0171)	(0.0128)			(0.0149)	(0.0129)
Growth Offshoring	0.0670***	-0.00095	-0.0505***	-0.240***	0.0363***	-0.00831*	-0.0654***	-0.115***
	(0.00315)	(0.00364)	(0.00621)	(0.00531)	(0.00483)	(0.00468)	(0.00749)	(0.00571)
Growth Output		0.318***		1.077***		0.436***		0.842***
		(0.0115)		(0.0126)		(0.0135)		(0.0139)
R-squared	0.233	0.392	0.020	0.073	0.0709	0.209	0.083	0.441
N	21431	21409	21852	21784	14161	14121	14161	14121

[a] Robust standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$

[b] Regression of respectively growth in employment and growth in domestically purchased intermediates on growth in other inputs.

Table 4—Employment growth and offshoring

	Manufacturing				Services			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	FE	FE	IV-FE	IV-FE	FE	FE	IV-FE	IV-FE
$ShOf^g_{it-1}$	0.111***	-0.033	0.737***	0.166	0.134*	-0.038	1.451***	0.285
	(0.02)	(0.02)	(0.12)	(0.12)	(0.07)	(0.07)	(0.26)	(0.20)
$\Delta ShOf^g_{it}$	0.084***	-0.069***	1.383***	0.347*	0.188***	-0.032	1.638***	0.117
	(0.02)	(0.02)	(0.20)	(0.19)	(0.07)	(0.06)	(0.43)	(0.35)
$ShOf^s_{it-1}$	0.070	0.050	0.616	0.059	-0.100**	-0.098***	0.033	-0.281**
	(0.12)	(0.11)	(0.38)	(0.28)	(0.05)	(0.04)	(0.15)	(0.12)
$\Delta ShOf^s_{it}$	0.025	0.020	0.839**	-0.078	-0.120***	-0.144***	0.435***	-0.286*
	(0.09)	(0.07)	(0.42)	(0.31)	(0.04)	(0.04)	(0.19)	(0.15)
Controls for Output		X		X		X		X
Obs	24489	24489	24489	24489	20161	20161	20161	20161
Test $ShOf^g_{it-1} = \Delta ShOf^g_{it}$	.184	.060	.000	.220	.329	.900	.608	.575
Test $ShOf^s_{it-1} = \Delta ShOf^s_{it}$	.634	.746	.558	.630	.633	.207	.016	.972
Underidentification			.000	.000			.000	.000
Endog. Test			.000	.245			.000	.257
Hansen $p-$val			.525	.053			.411	.664

[a] Robust standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$

[b] All specifications include controls for wages, labor productivity and capital intensity. The controls enter in the same way as the offshoring variables, i.e. in the specification where offshoring enters in lagged levels as well as in growth, the control variables also enter in both lagged levels and growth.The same holds for controlling for output. If the specification controls for output, output enters in the same way as offshoring. Finally, the lagged level of employment is included as well.

[c] All specifications include firm fixed effects.

Table 5—Employment growth and offshoring in manufacturing sectors; Low versus high educated

	Total		Low Skilled		High Skilled	
	(1)	(2)	(3)	(4)	(5)	(6)
	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE
$ShOf^g_{it-1}$	0.737***	0.166	0.474***	0.040	0.205***	0.100*
	(0.12)	(0.12)	(0.09)	(0.10)	(0.05)	(0.06)
$\Delta ShOf^g_{it}$	1.383***	0.347*	0.900***	0.141	0.331***	0.116
	(0.21)	(0.19)	(0.16)	(0.16)	(0.09)	(0.10)
$ShOf^s_{it-1}$	0.616	0.059	0.285	-0.123	0.233	0.118
	(0.38)	(0.28)	(0.28)	(0.23)	(0.15)	(0.13)
$\Delta ShOf^s_{it}$	0.839**	-0.078	0.157	-0.489*	0.436**	0.230
	(0.42)	(0.31)	(0.32)	(0.26)	(0.17)	(0.16)
Controls for Output		X		X		X
Obs	24489	24489	24489	24489	24489	24489
$ShOf^g_{it-1} = \Delta ShOf^g_{it}$	.000	.220	.001	.418	.125	.836
$ShOf^s_{it-1} = \Delta ShOf^s_{it}$	.558	.630	.6631428	.130	.186	.424
Underidentification	.000	.000	.000	.000	0	0.00E+00
Endog. Test	.000	0.245	.000	.341	0	0.050
Hansen $p-$val	.539	.053	.411	.113	.157	0.041

[a] Robust standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$

[b] All specifications include controls for wages, labor productivity and capital intensity. The controls enter in the same way as the offshoring variables, i.e. in the specification where offshoring enters in lagged levels as well as in growth, the control variables also enter in both lagged levels and growth. The same holds for controlling for output. If the specification controls for output, output enters in the same way as offshoring. Finally, the lagged level of employment is included as well.

[c] All specifications include firm fixed effects.

Table 6—Employment growth and offshoring in services sectors; Low versus high educated

	Total		Low Skilled		High Skilled	
	(1)	(2)	(3)	(4)	(5)	(6)
	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE
$ShOf^g_{it-1}$	1.451***	0.285	0.590***	-0.012	0.635***	0.174
	(0.26)	(0.20)	(0.17)	(0.16)	(0.15)	(0.14)
$\Delta ShOf^g_{it}$	1.638***	0.117	0.693**	-0.118	0.773***	0.176
	(0.43)	(0.35)	(0.30)	(0.28)	(0.26)	(0.24)
$ShOf^s_{it-1}$	0.033	-0.281**	0.237**	0.075	-0.194**	-0.321***
	(0.15)	(0.12)	(0.10)	(0.09)	(0.10)	(0.09)
$\Delta ShOf^s_{it}$	0.435**	-0.286*	0.255*	-0.110	0.072	-0.210**
	(0.19)	(0.15)	(0.13)	(0.12)	(0.12)	(0.10)
Controls for Output		X		X		X
Obs	20161	20161	20161	20161	20161	20161
$ShOf^g_{it-1} = \Delta ShOf^g_{it}$	.608	.575	.690	.655	.530	.992
$ShOf^s_{it-1} = \Delta ShOf^s_{it}$	.016	.972	.881	.085	.010	.235
Underidentification	.000	.000	.000	.000	.000	.000
Endog. Test	.000	.257	.001	.695	.000	.036
Hansen $p-$val	.411	.663	.726	.569	.560	.904

[a] Robust standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$

[b] All specifications include controls for wages, labor productivity and capital intensity. The controls enter in the same way as the offshoring variables, i.e. in the specification where offshoring enters in lagged levels as well as in growth, the control variables also enter in both lagged levels and growth.The same holds for controlling for output. If the specification controls for output, output enters in the same way as offshoring. Finally, the lagged level of employment is included as well.

[c] All specifications include firm fixed effects.

Table 7—Employment growth and offshoring in manufacturing sectors; Narrow goods offshoring and service offshoring without transport services

	Total		Low Skilled		High Skilled	
	(1)	(2)	(3)	(4)	(5)	(6)
	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE
$ShOf^g_{it-1}$	1.355***	0.382	0.864***	0.144	0.389***	0.214*
	(0.26)	(0.24)	(0.19)	(0.19)	(0.10)	(0.12)
$\Delta ShOf^g_{it}$	4.076***	1.195**	2.600***	0.523	0.995***	0.413
	((0.68)	(0.57)	(0.51)	(0.48)	(0.29)	(0.29)
$ShOf^s_{it-1}$	1.273	0.159	0.547	-0.238	0.530*	0.290
	(0.78)	(0.48)	(0.55)	(0.38)	(0.28)	(0.23)
$\Delta ShOf^s_{it}$	2.282***	0.207	0.814	-0.661	1.000***	0.530**
	(0.85)	(0.53)	(0.61)	(0.42)	(0.31)	(0.26)
Controls for Output		X		X		X
Obs	24518	24518	24518	24518	24518	24518
$ShOf^g_{it-1} = \Delta ShOf^g_{it}$	.000	.093	.000	.348	.022	.436
$ShOf^s_{it-1} = \Delta ShOf^s_{it}$	.183	.921	.627	.288	.085	.303
Underidentification	.000	.000	.000	.000	.000	.000
Endog. Test	.000	.139	.000	.225	.000	.040
Hansen $p-$val	.350	.109	.232	.134	.288	.076

[a] Robust standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$

[b] All specifications include controls for wages, labor productivity and capital intensity. The controls enter in the same way as the offshoring variables, i.e. in the specification where offshoring enters in lagged levels as well as in growth, the control variables also enter in both lagged levels and growth.The same holds for controlling for output. If the specification controls for output, output enters in the same way as offshoring. Finally, the lagged level of employment is included as well.

[c] All specifications include firm fixed effects.

TABLE 8—EMPLOYMENT GROWTH AND OFFSHORING IN SERVICES SECTORS; OFFSHORING OF CORE SERVICES

	Total		Low Skilled		High Skilled	
	(1)	(2)	(3)	(4)	(5)	(6)
	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE
$ShOf^g_{it-1}$	1.405***	0.269	0.561***	-0.025	0.626***	0.175
	(0.25)	(0.20)	(0.17)	(0.15)	(0.15)	(0.14)
$\Delta ShOf^g_{it}$	1.613***	0.100	0.642**	-0.165	0.794***	0.198
	(0.42)	(0.35)	(0.30)	(0.28)	(0.26)	(0.24)
$ShOf^s_{it-1}$ Core	0.048	-0.537**	0.431**	0.130	-0.359*	-0.598***
	(0.30)	(0.23)	(0.20)	(0.18)	(0.18)	(0.17)
$\Delta ShOf^s_{it}$ Core	1.190***	-0.613*	0.634**	-0.284	0.277	-0.429*
	(0.46)	(0.36)	(0.32)	(0.29)	(0.28)	(0.26)
Controls for Output		X		X		X
Obs	20275	20275	20275	20275	20275	20275
$ShOf^g_{it-1} = \Delta ShOf^g_{it}$	.556	.560	.749	.545	.433	.908
$ShOf^s_{it-1} = \Delta ShOf^s_{it}$	.005	.815	.478	.116	.011	.457
Underidentification	.000	.000	.000	.000	.000	.000
Endog. Test	.000	.185	.003	.703	.000	.025
Hansen $p-$val	.481	.655	.728	.574	.631	.899

[a] Robust standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$

[b] All specifications include controls for wages, labor productivity and capital intensity. The controls enter in the same way as the offshoring variables, i.e. in the specification where offshoring enters in lagged levels as well as in growth, the control variables also enter in both lagged levels and growth.The same holds for controlling for output. If the specification controls for output, output enters in the same way as offshoring. Finally, the lagged level of employment is included as well.

[c] All specifications include firm fixed effects.

Table 9—Employment growth and offshoring; 1998-2005

	Manufacturing						Services					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Total		Low Skilled		High Skilled		Total		Low Skilled		High Skilled	
	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE
$ShOf^g_{it-1}$	0.711***	0.140	0.458***	0.028	0.207***	0.094	1.441***	0.231	0.542***	-0.071	0.650***	0.166
	(0.13)	(0.13)	(0.10)	(0.10)	(0.05)	(0.06)	(0.29)	(0.23)	(0.20)	(0.18)	(0.17)	(0.16)
$\Delta ShOf^g_{it}$	1.292***	0.289	0.884***	0.154	0.276***	0.059	1.510***	0.189	0.572*	-0.125	0.752***	0.227
	(0.21)	(0.19)	(0.17)	(0.17)	(0.10)	(0.10)	(0.46)	(0.38)	(0.33)	(0.30)	(0.28)	(0.26)
$ShOf^s_{it-1}$	0.605	-0.043	0.254	-0.211	0.230	0.087	0.022	-0.313**	0.245**	0.078	-0.225**	-0.366***
	(0.39)	(0.29)	(0.30)	(0.24)	(0.16)	(0.14)	(0.16)	(0.13)	(0.11)	(0.10)	(0.10)	(0.09)
$\Delta ShOf^s_{it}$	0.607	-0.302	-0.006	-0.643**	0.376**	0.169	0.478**	-0.274*	0.297**	-0.077	0.067	-0.232**
	(0.44)	(0.33)	(0.34)	(0.27)	(0.18)	(0.17)	(0.20)	(0.16)	(0.14)	(0.13)	(0.12)	(0.11)
Control for output		X		X		X		X		X		X
Obs.	22224	22224	22224	22224	22224	22224	18478	18478	18478	18478	18478	18478
$ShOf^g_{it-1} = \Delta ShOf^g_{it}$	.001	.327	.002	.332	.412	.675	0.854	0.891	0.908	0.824	0.652	0.772
$ShOf^s_{it-1} = \Delta ShOf^s_{it}$	.995	.372	.384	.078	.343	.567	0.009	0.780	0.671	0.164	0.007	0.171
Underidentification	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Endog. Test	0.000	.341	0.000	.118	0.000	.166	0.000	0.369	0.004	0.752	0.000	0.016
Hansen $p-$val.	.753	.189	.552	.151	.368	.140	0.464	0.783	0.668	0.574	0.694	0.911

[a] Robust standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$

[b] All specifications include controls for wages, labor productivity and capital intensity. The controls enter in the same way as the offshoring variables, i.e. in the specification where offshoring enters in lagged levels as well as in growth, the control variables also enter in both lagged levels and growth.The same holds for controlling for output. If the specification controls for output, output enters in the same way as offshoring. Finally, the lagged level of employment is included as well.

[c] All specifications include firm fixed effects.

Table 10—Employment growth and offshoring; goods and services separately; OECD versus non-OECD

	Manufacturing						Services					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Total		Low Skilled		High Skilled		Total		Low Skilled		High Skilled	
	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE	IV-FE
$ShOf^g_{it-1}$ OECD	0.693***	0.099	0.441***	0.005	0.198***	0.082	1.307***	0.176	0.476**	-0.110	0.625***	0.169
	(0.12)	(0.11)	(0.09)	(0.09)	(0.05)	(0.05)	(0.29)	(0.22)	(0.20)	(0.18)	(0.17)	(0.15)
$\Delta ShOf^g_{it}$ OECD	1.269***	0.221	0.825***	0.078	0.287***	0.071	1.369***	-0.059	0.547	-0.205	0.694**	0.118
	(0.21)	(0.20)	(0.16)	(0.16)	(0.10)	(0.10)	(0.47)	(0.39)	(0.34)	(0.32)	(0.29)	(0.27)
$ShOf^m_{it-1}$ non-OECD	0.676**	-0.446**	0.521**	-0.281	0.098	-0.134	2.850**	0.925	1.937**	0.973	0.512	-0.215
	(0.28)	(0.23)	(0.22)	(0.19)	(0.12)	(0.12)	(1.13)	(0.82)	(0.81)	(0.68)	(0.65)	(0.59)
$\Delta ShOf^m_{it}$ non-OECD	1.597***	0.138	1.314***	0.295	0.269	-0.034	6.033***	2.746*	4.210***	2.398**	1.050	-0.133
	(0.58)	(0.45)	(0.45)	(0.39)	(0.23)	(0.21)	(1.94)	(1.44)	(1.34)	(1.14)	(1.15)	(1.04)
$ShOf^s_{it-1}$ OECD	0.504	-0.028	0.229	-0.186	0.216	0.105	0.044	-0.208	0.231**	0.102	-0.172*	-0.277***
	(0.41)	(0.31)	(0.31)	(0.25)	(0.16)	(0.15)	(0.17)	(0.13)	(0.11)	(0.10)	(0.10)	(0.09)
$\Delta ShOf^s_{it}$ OECD	0.692	-0.164	0.044	-0.577**	0.419**	0.238	0.367*	-0.286*	0.222	-0.097	0.046	-0.217**
	(0.44)	(0.33)	(0.34)	(0.28)	(0.18)	(0.17)	(0.19)	(0.15)	(0.14)	(0.12)	(0.12)	(0.11)
$ShOf^s_{it-1}$ non-OECD	-0.020	1.124	2.222	2.633	-1.431	-1.126	3.412**	0.466	1.566	0.131	1.308	0.204
	(3.10)	(2.25)	(2.33)	(1.87)	(1.29)	(1.17)	(1.56)	(1.22)	(1.04)	(0.92)	(0.99)	(0.89)
$\Delta ShOf^s_{it}$ non-OECD	1.648	2.464	3.779	4.080*	-1.132	-0.878	5.392**	-0.448	2.670*	-0.276	2.633*	0.443
	(3.69)	(2.72)	(2.70)	(2.18)	(1.54)	(1.38)	(2.31)	(1.90)	(1.53)	(1.41)	(1.52)	(1.40)
Control for output		X		X		X		X		X		X
Obs	24498	24498	24498	24498	24498	24498	20177	20177	20177	20177	20177	20177
Underidentification	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Endog. Test	.000	.421	.000	.314	.000	.367	.000	.433	.000	.578	.005	.468
Hansen $p-$val	.045	.011	.085	.013	.223	.179	.188	.325	.250	.114	.578	.937

[a] Robust standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$

[b] All specifications include controls for wages, labor productivity and capital intensity. The controls enter in the same way as the offshoring variables, i.e. in the specification where offshoring enters in lagged levels as well as in growth, the control variables also enter in both lagged levels and growth.The same holds for controlling for output. If the specification controls for output, output enters in the same way as offshoring. Finally, the lagged level of employment is included as well.

[c] All specifications include firm fixed effects.

Appendices

A. Classification of Services

Table A.1 lists the types of services and the corresponding NACE code. The table further aggregates services into seven categories: Transport, Financial and Insurance, Construction, IT Business and Cultural Services.

Table A.1—International trade of services: Classification of services

Rub	EBOPS	Description of service in services trade database	NACE 1.1	EU KLEMS	Category
100	207	Transportation - Sea transport - Passenger	61	60t63	Transport
101	208	Transportation - Sea transport - Freight			
102	209	Transportation - Sea transport - Other			
110	211	Transportation - Air transport - Passenger	62	60t63	
111	212	Transportation - Air transport - Freight			
112	213	Transportation - Air transport - Other			
120	215	Transportation - Other transport - Passenger	60 + 63	60t63	
121	216	Transportation - Other transport - Freight			
122	217	Transportation - Other transport - Other			
130	260	Financial services	65t67	J	Financial/Insurance
131	260	Financial services			
142	246	Communication services - Postal and courier services	64	64	Communication
143	246	Communication services - Postal and courier services			
144	247	Communication services - Telecommunication services			
156	249	Construction Services	45	F	Construction
162	263	Computer and information services - Computer services	72	71t74	IT
163	264	Computer and information services - Information services			
180	271	Insurance services - Other direct insurance	65t67	J	Financial/Insurance
181	256	Insurance services - Life insurance and pension funding			
182	254	Insurance services - Freight insurance			
183	255	Insurance services - Reinsurance			
184	257	Insurance services - Auxiliary services			
190	258	Other business services - Research and development	73	71t74	Business services
191	274	Other business services - Miscellaneous business, professional and technical services - Legal, accounting, management, consulting and public relations	74	71t74	
193	280	Other business services - Miscellaneous business, professional and technical services - Architectural, engineering and other technical services			
194	278	Other business services - Miscellaneous business, professional and technical services - Advertising, market research, and public opinion polling			
195	283	Other business services - Miscellaneous business, professional and technical services - Agricutltural, mining and on-site processing services - Other			
196	282	Other business services - Miscellaneous business, professional and technical services - Agricutltural, mining and on-site processing services -Waste treatment and depollution			
199	284	Other business services - Miscellaneous business, professional and technical services - Other			
231	288	Personal, cultural and recreational services: Audiovisual and related services	92	O	Cultural
239	289	Personal, cultural and recreational services: Other personal, cultural and recreational activities			
247		DROPPED from data, does not exist in classification	-		
270	272	Other business services - Operational leasing services	71	71t74	Business services

[a] Column "Rub" lists the services codes appearing in the Belgian data. The column "EBOPS" lists the corresponding (international) EBOPS code for that service. The column "NACE Rev 1.1" lists the corresponding NACE sector for each service, while the column "EU KLEMS" assigns a NACE sector code that features in the EU KLEMS data (sometimes these sectors are more aggregated than the original NACE codes. The final column "Service category" shows the groupings applied in the data. We consider these services categories separately in the data. All services except "Transport" are "producer services", we have already excluded e.g. travel services from the data prior to assigning service categories.

B. Summaries Evolution Trade in Goods and Services

Table B.1 displays services imports and exports for the years 1995 and 2005. The total value of service imports surged from 8.5 billion euros in 1995 to 20 billion euros in 2005, an increase of over 130%. Service exports increased by 145%, from 10 billion euros to 24 billion euros. Transport services are the largest category, followed by Business Services and Financial Services. The rankings of the different service types are similar for imports and exports, consistent with models of intra-industry trade and product differentiation. Growth in Transport Services follows the trend in goods trade more closely and decreases in relative importance over the sample period. International trade in Business, ICT and Communication Services boomed particularly between 1995 and 2005.

The last row in Table B.1 displays total imports and exports of goods in 1995 and 2005. While the increase in Service Trade was more pronounced over the period, the value of total trade in services was only 10% of the value of total trade in goods in 2005. Table B.2 makes a comparison between the top destination countries/countries of origin for exports and imports of goods versus services. Trade in goods is dominated by trade with the three neighbouring countries (The Netherlands, Germany and France), accounting for over 40% of total trade in goods. For trade in services, the United Kingdom tops the ranking of the countries of destination/origin and the US ranks second for exports. This is consistent with the findings of Breinlich and Criscuolo (2011) that the US and the UK are more important trading partners for services than for goods trade.

Table B.1—International Trade in Goods and Services, 1995-2005

	Imports					Exports				
	1995		2005		Change	1995		2005		Change
	Value	Share	Value	Share	95-05	Value	Share	Value	Share	95-05
Transport Services	4,628	53.4%	8,802	44.1%	+90.2%	5,639	56.5%	9,922	40.7%	+75.9%
Business Services	1,604	18.5%	5,692	28.5%	+254.8%	1,645	16.5%	6,214	25.5%	+277.8%
Financial/Insurance Services	1,112	12.8%	1,929	9.7%	+73.4%	1,122	11.2%	2,800	11.5%	+149.5%
Construction Services	442	5.1%	636	3.2%	+43.8%	410	4.1%	1,439	5.9%	+251.3%
IT Services	398	4.6%	1,476	7.4%	+271.2%	656	6.6%	1,975	8.1%	+201.0%
Communication Services	238	2.7%	1,048	5.3%	+340.8%	418	4.2%	1,644	6.7%	+293.3%
Cultural Services	237	2.7%	370	1.9%	+55.7%	86	0.9%	411	1.7%	+376.2%
Total Trade in Serices	8,659	100.0%	19,952	100%	+130.4%	9,977	100.0%	24,406	100.0%	+144.6%
Trade in Goods	99,740		214,540		+115.0%	110,352		224,976		+103.9%

Values in Million Euros. Full sample from international trade in services and international trade in goods databases.

Table B.2—Countries of Origin/Destination and Trade in Services/Goods

Services					
Imports			Exports		
Top Countries	Value	Share	Top Countries	Value	Share
United Kingdom	3,226	16.2%	United Kingdom	4,260	17.5%
France	2,502	12.5%	USA	4,147	17.0%
The Netherlands	2,479	12.4%	The Netherlands	3,600	14.7%
USA	2,311	11.6%	France	2,888	11.8%
Germany	2,212	11.1%	Germany	2,706	11.1%
Italy	870	4.4%	Luxembourg	1,136	4.7%
Switzerland	726	3.6%	Switzerland	730	3.0%
Spain	574	2.9%	Sweden	487	2.0%
Luxembourg	522	2.6%	Italy	455	1.9%
Hong Kong	403	2.0%	Spain	351	1.4%
Goods					
Imports			Exports		
Top Countries	Value	Share	Top Countries	Value	Share
The Netherlands	51,272	20.5%	Germany	42,383	16.1%
Germany	35,918	14.3%	France	40,669	15.5%
France	27,457	11.0%	The Netherlands	32,798	12.5%
USA	14,362	5.7%	United Kingdom	19,186	7.3%
United Kingdom	14,356	5.7%	USA	15,599	5.9%
Ireland	14,254	5.7%	Italy	12,107	4.6%
China	8,035	3.2%	Spain	8,313	3.2%
Italy	6,987	2.8%	India	6,661	2.5%
Japan	5,942	2.4%	Luxembourg	4,973	1.8%
Russia	5,935	2.4%	Poland	4,479	1.7%

Values in Million Euros. Services data are from 2005. Goods data are from 2010

C. *Fixed Effects Results*

TABLE C.1—EMPLOYMENT GROWTH AND OFFSHORING IN MANUFACTURING SECTORS; LOW VERSUS HIGH EDUCATED; FIXED EFFECTS

	Total		Low Skilled		High Skilled	
	(1)	(2)	(3)	(4)	(5)	(6)
	FE	FE	FE	FE	FE	FE
$ShOf^g_{it-1}$	0.111***	-0.033	0.088***	-0.016	0.022**	-0.009
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
$\Delta ShOf^g_{it}$	0.084***	-0.069***	0.074***	-0.034*	0.007	-0.028***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
$ShOf^s_{it-1}$	0.070	0.050	0.118	0.103	-0.074	-0.078
	(0.12)	(0.11)	(0.09)	(0.08)	(0.05)	(0.05)
$\Delta ShOf^s_{it}$	0.025	0.020	-0.023	-0.027	0.023	0.023
	(0.09)	(0.07)	(0.07)	(0.06)	(0.04)	(0.04)
Controls for Output		X		X		X
Obs	24489	24489	24489	24489	24489	24489
$ShOf^g_{it-1} = \Delta ShOf^g_{it}$	.184	.060	.368	.241	.121	.044
$ShOf^s_{it-1} = \Delta ShOf^s_{it}$	.634	.747	.051	.047	.028	.028

[a] Robust standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$

[b] All specifications include controls for wages, labor productivity and capital intensity. The controls enter in the same way as the offshoring variables, i.e. in the specification where offshoring enters in lagged levels as well as in growth, the control variables also enter in both lagged levels and growth. The same holds for controlling for output. If the specification controls for output, output enters in the same way as offshoring. Finally, the lagged level of employment is included as well.

[c] All specifications include firm fixed effects.

Table C.2—Employment growth and offshoring in services sectors; Low versus high educated; Fixed Effects

		Total	Low Skilled		High Skilled	
	(1)	(2)	(3)	(4)	(5)	(6)
	FE	FE	FE	FE	FE	FE
$ShOf^g_{it-1}$	0.134*	-0.038	0.111**	0.023	0.026	-0.042
	(0.07)	(0.07)	(0.05)	(0.04)	(0.03)	(0.03)
$\Delta ShOf^g_{it}$	0.188***	-0.032	0.106**	-0.007	0.092**	0.005
	(0.07)	(0.06)	(0.05)	(0.05)	(0.04)	(0.04)
$ShOf^s_{it-1}$	-0.100**	-0.098***	-0.015	-0.015	-0.082***	-0.082***
	(0.05)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)
$\Delta ShOf^s_{it}$	-0.120***	-0.144***	-0.056*	-0.068**	-0.062**	-0.071***
	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.02)
Controls for Output		X		X		X
Obs	20161	20161	20161	20161	20161	20161
$ShOf^g_{it-1} = \Delta ShOf^g_{it}$	.329	.900	.907	.407	.041	.139
$ShOf^s_{it-1} = \Delta ShOf^s_{it}$	.633	.207	.173	.056	.442	.670

[a] Robust standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$

[b] All specifications include controls for wages, labor productivity and capital intensity. The controls enter in the same way as the offshoring variables, i.e. in the specification where offshoring enters in lagged levels as well as in growth, the control variables also enter in both lagged levels and growth. The same holds for controlling for output. If the specification controls for output, output enters in the same way as offshoring. Finally, the lagged level of employment is included as well.

[c] All specifications include firm fixed effects.

Table C.3—Employment growth and offshoring in manufacturing sectors; Narrow Offshoring of Goods and Services Offshoring Excludes Transport Services; Fixed Effects

	Total		Low Skilled		High Skilled	
	(1)	(2)	(3)	(4)	(5)	(6)
	FE	FE	FE	FE	FE	FE
$ShOf^g_{it-1}$	0.062*	-0.077***	0.048**	-0.053**	0.016	-0.013
	(0.03)	(0.03)	(0.02)	(0.02)	(0.01)	(0.01)
$\Delta ShOf^g_{it}$	0.037	-0.152***	0.053*	-0.080***	-0.008	-0.051***
	(0.04)	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)
$ShOf^s_{it-1}$	-0.042	0.086	0.069	0.160*	-0.136	-0.107
	(0.16)	(0.15)	(0.10)	(0.09)	(0.09)	(0.09)
$\Delta ShOf^s_{it}$	0.078	0.162	-0.002	0.056	0.024	0.043
	(0.13)	(0.11)	(0.09)	(0.08)	(0.06)	(0.06)
Controls for Output		X		X		X
Obs	24518	24518	24518	24518	24518	24518
$ShOf^g_{it-1} = \Delta ShOf^g_{it}$	.445	.010	.854	.244	.106	.007
$ShOf^s_{it-1} = \Delta ShOf^s_{it}$	.308	.551	.407	.225	.022	.038

[a] Robust standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$

[b] All specifications include controls for wages, labor productivity and capital intensity. The controls enter in the same way as the offshoring variables, i.e. in the specification where offshoring enters in lagged levels as well as in growth, the control variables also enter in both lagged levels and growth. The same holds for controlling for output. If the specification controls for output, output enters in the same way as offshoring. Finally, the lagged level of employment is included as well.

[c] All specifications include firm fixed effects.

TABLE C.4—EMPLOYMENT GROWTH AND OFFSHORING IN SERVICES SECTORS; CORE SERVICES; FIXED EFFECTS

	Total		Low Skilled		High Skilled	
	(1)	(2)	(3)	(4)	(5)	(6)
	FE	FE	FE	FE	FE	FE
$ShOf^g_{it-1}$	0.121*	-0.039	0.105**	0.023	0.021	-0.042
	(0.07)	(0.06)	(0.05)	(0.04)	(0.03)	(0.03)
$\Delta ShOf^g_{it}$	0.184***	-0.035	0.105**	-0.007	0.088**	0.002
	(0.07)	(0.06)	(0.05)	(0.04)	(0.04)	(0.04)
$ShOf^s_{it-1}$ Core	-0.110	-0.127**	0.005	-0.004	-0.099**	-0.106***
	(0.07)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
$\Delta ShOf^s_{it}$ Core	-0.072	-0.152**	-0.062	-0.103**	-0.017	-0.049
	(0.07)	(0.06)	(0.05)	(0.05)	(0.05)	(0.04)
Controls for Output		X		X		X
Obs	20275	20275	20275	20275	20275	20275
$ShOf^g_{it-1} = \Delta ShOf^g_{it}$	.262	.928	.999	.405	.033	.154
$ShOf^s_{it-1} = \Delta ShOf^s_{it}$	.586	.664	.170	.028	.069	.166

[a] Robust standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$

[b] All specifications include controls for wages, labor productivity and capital intensity. The controls enter in the same way as the offshoring variables, i.e. in the specification where offshoring enters in lagged levels as well as in growth, the control variables also enter in both lagged levels and growth. The same holds for controlling for output. If the specification controls for output, output enters in the same way as offshoring. Finally, the lagged level of employment is included as well.

[c] All specifications include firm fixed effects.

Table C.5—Employment growth and offshoring; goods and services separately; OECD versus non-OECD

	Manufacturing						Services					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(7)	(8)	(13)	(14)
	Total		Low Skilled		High Skilled		Total		Low Skilled		High Skilled	
	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE
$ShOf^g_{it-1}$ OECD	0.130***	-0.019	0.104***	-0.003	0.023**	-0.009	0.111	-0.057	0.099**	0.013	0.018	-0.049
	(0.03)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.08)	(0.07)	(0.05)	(0.05)	(0.03)	(0.03)
$\Delta ShOf^g_{it}$ OECD	0.104***	-0.055**	0.090***	-0.021	0.008	-0.028***	0.159**	-0.074	0.074	-0.045	0.099**	0.006
	(0.03)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.07)	(0.07)	(0.05)	(0.05)	(0.04)	(0.04)
$ShOf^m_{it-1}$ non-OECD	-0.039	-0.163***	-0.023	-0.113**	0.002	-0.024	0.434**	0.126	0.221	0.063	0.148	0.025
	(0.07)	(0.05)	(0.06)	(0.05)	(0.02)	(0.02)	(0.22)	(0.18)	(0.18)	(0.13)	(0.12)	(0.09)
$\Delta ShOf^m_{it}$ non-OECD	-0.102	-0.262***	-0.075	-0.188***	0.008	-0.027	0.922**	0.605*	0.734***	0.572**	0.188	0.062
	(0.09)	(0.07)	(0.07)	(0.06)	(0.04)	(0.03)	(0.38)	(0.32)	(0.28)	(0.25)	(0.21)	(0.19)
$ShOf^s_{it-1}$ OECD	0.035	0.021	0.097	0.087	-0.084	-0.087	-0.122**	-0.110***	-0.031	-0.025	-0.089***	-0.084***
	(0.13)	(0.13)	(0.09)	(0.08)	(0.05)	(0.06)	(0.05)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)
$\Delta ShOf^s_{it}$ OECD	-0.004	-0.017	-0.036	-0.045	0.014	0.011	-0.136***	-0.146***	-0.072**	-0.077**	-0.068**	-0.073***
	(0.09)	(0.08)	(0.07)	(0.06)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)
$ShOf^s_{it-1}$ non-OECD	1.272	0.165	1.306	0.500	0.006	-0.222	0.743	0.318	0.802	0.585	-0.210	-0.379
	(1.11)	(0.99)	(0.93)	(0.84)	(0.57)	(0.56)	(0.85)	(0.61)	(0.50)	(0.42)	(0.51)	(0.42)
$\Delta ShOf^s_{it}$ non-OECD	1.633	1.528	1.549	1.440	0.237	0.239	1.992**	0.917	1.235**	0.688	0.757	0.331
	(1.35)	(1.28)	(1.00)	(0.93)	(0.76)	(0.76)	(0.88)	(0.77)	(0.57)	(0.55)	(0.56)	(0.53)
Control for output		X		X		X		X		X		X
Obs	24498	24498	24498	24498	24498	24498	20177	20177	20177	20177	20177	20177

[a] Robust standard errors in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$

[b] All specifications include controls for wages, labor productivity and capital intensity. The controls enter in the same way as the offshoring variables, i.e. in the specification where offshoring enters in lagged levels as well as in growth, the control variables also enter in both lagged levels and growth.The same holds for controlling for output. If the specification controls for output, output enters in the same way as offshoring. Finally, the lagged level of employment is included as well.

[c] All specifications include firm fixed effects.

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National Bank of Belgium
Limited liability company
RLP Brussels – Company's number: 0203.201.340
Registered office: boulevard de Berlaimont 14 – BE-1000 Brussels
www.nbb.be

Editor

Jan Smets
Governor of the National Bank of Belgium

Layout: Analysis and Research Group
Cover: NBB AG – Prepress & Image

Published in May 2017