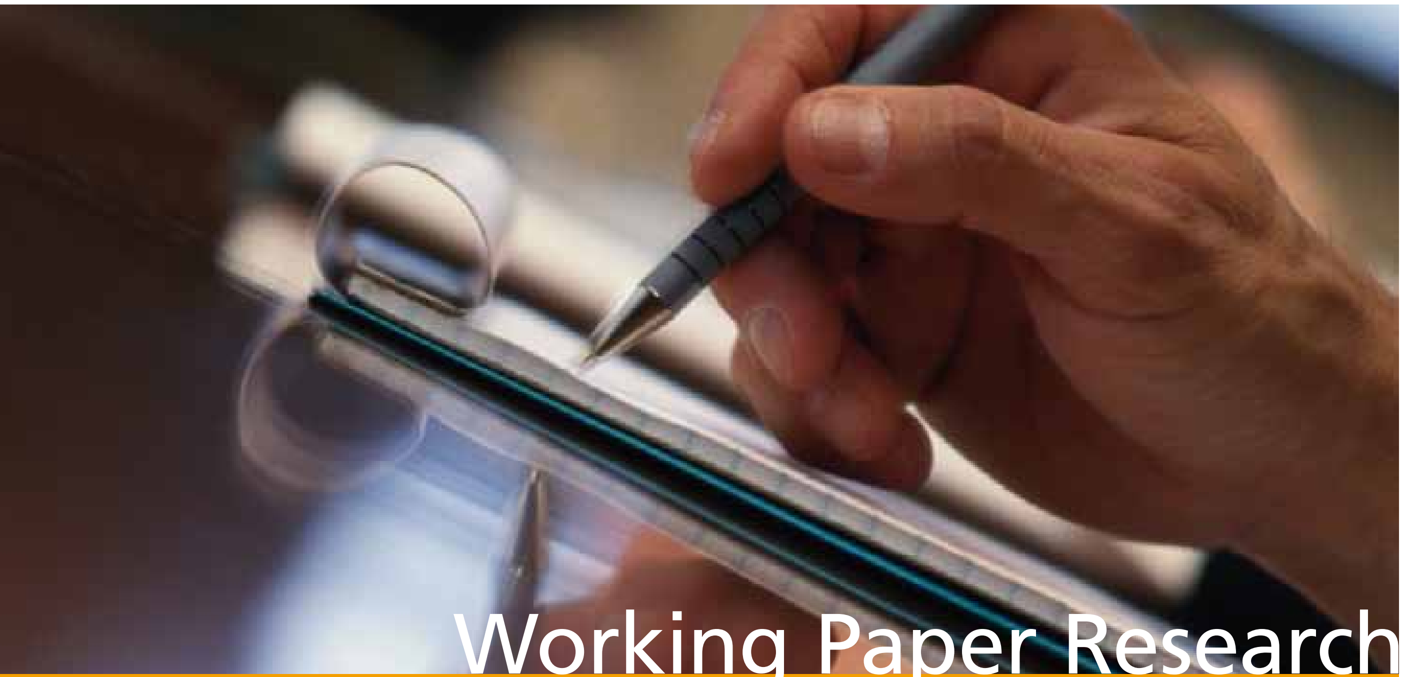
Trade with China and skill upgrading: Evidence from Belgian firm level data



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Abstract

We use Belgian firm-level data over the period 1996-2007 to analyze the impact of imports from China and other low-wage countries on firm growth, exit, and skill upgrading in manufacturing. For this purpose we use both industry-level and firm-level imports by country of origin and distinguish between firm-level outsourcing of final versus intermediate goods. Results indicate that, both industry-level import competition and firm-level outsourcing to China reduce firm employment growth and induce skill upgrading. In contrast, industry-level imports have no effect on Belgian firm survival, while firm-level outsourcing of finished goods to China even increased firm's probability of survival. In terms of skill upgrading, the effect of Chinese imports is large. Industry import competition from China accounts for 42% (20%) of the within firm increase in the share of skilled workers (non-production workers) in Belgian manufacturing over the period of our analysis, but these effects, as well as the employment reducing effect, remain mainly in low-tech industries. Firm-level outsourcing to China further accounts for a small but significant increase in the share of non-production workers. This change in employment structure is in line with predictions of offshoring models and Schott's (2008) 'moving up the quality ladder' story. All these results are robust to IV estimation.

Key Words: import competition, outsourcing, China, skill upgrading.
JEL Classification: F11, F14, F16

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1 Introduction

For many developed countries the past decades has been characterized by large and rising imports from China, a loss in manufacturing employment, firm exit and offshoring of especially low skilled jobs to low wage countries. This has triggered a substantial amount of research both from trade economists and labor economists in search of a causal relationship between the imports from low wage countries and labor market outcomes in developed countries. The purpose of this paper is to contribute to this literature by using firm-level panel data for Belgium that are highly disaggregate and which includes information on firm-level imports by product and by source country. The use of this data offers several distinct innovations compared to the previous literature. First, by using firm-level data we can control for firm heterogeneity which was not possible in studies using industry-level data. Second, by having access to imports at the firm-level, we can usefully distinguish between an industry-wide competition effect of low wage country imports, as well as a firm-specific effect for those firms importing goods directly from low wage countries. And third, it allows us to distinguish two different types of firm-level outsourcing. Previous industry level studies on outsourcing[1] did not allow researchers to distinguish within firm adjustment from between firm adjustment. One notable exception is Biscourp and Kramarz (2007). Similar to them we distinguish between outsourcing of intermediate goods and of final goods by countries of origin. Different to their study is that we address the endogeneity problem inherent in the use of firm-level imports by adopting an IV strategy and using product-level tariffs and trade weighted exchange rates, and we use a much more recent data period, i.e., from 1996 to 2007. Another original feature of our data is that we can measure workers' skill by their education level, which allows us to go beyond the crude distinction between production and nonproduction workers used in the literature (Feenstra and Hanson, 1996; Machin and Van Reenen, 1998).

Our empirical strategy in part follows Bernard, Jensen and Schott (2007) – henceforth BJS – that study the effects of industry-level imports from low wage countries on US manufacturing firms. Our results confirm the importance of low-wage countries' imports on firm employment growth and share of non-production workers. But novel to their approach is our analysis of firm-level outsourcing and that we single out China as a low-wage country whose imports may have different effects than imports from other countries (low wage, OECD and others) on firm-level performance. Rodrik (2006) and Schott (2008) already pointed out that

[1] Feenstra and Hanson [1999] for the US, Hijzen et al. [2005] for the UK, Falk and Koebel [2002] for Germany, etc.

Chinese exports have different characteristics with respect to other low-wage countries, i.e., they are more sophisticated and show more overlap with products of OECD countries. In this regard, it is interesting to see whether Chinese exports are also more 'sophisticated' in their impact on developed country firms, e.g., in addition to low-tech industry firms, do they also have important effect on high-tech industry firms (since China exports a lot of 'high-tech' products)?

While we look at several firm performance measures in this paper, the skill upgrading measures are arguably the focus of our interest. Since the late 1980s, there has been a rising concern about low-skilled workers in developed countries. Both job opportunities and wages for low-skilled workers are decreasing relative to high-skilled workers. Several explanations have been put forward including trade induced technological change (Bloom et al. 2007) as well as more recent theories on the offshoring of tasks (Grossman & Esteban-Rossi, 2008). The rapid growth of a country like China provides a nice opportunity to study its role in these events. In this paper we set out to test for a causal relationship between imports and the skill structure of Belgian firms. While labor economists have provided a sizable amount of firm-level evidence relating technological change and within firm skill upgrading,[2] firm-level trade studies focussing on trade channels have only started to surface.[3] While our findings do not say anything about the relative importance of technology versus imports, they clearly point in the direction of complementarities between the two in explaining firm-level employment and skill structure.

Our main findings show that China is different from other low-wage countries but also different from OECD countries and its separate inclusion in the analysis brings out new results. Both industry-level import competition and firm-level outsourcing from China reduce firm employment growth and induce skill upgrading. In contrast, industry-level imports have no effect on Belgian firm survival, while firm-level outsourcing of finished goods to China even increased firm's probability of survival. The effect of Chinese imports is large in terms of skill upgrading. Industry import competition from China accounts for 42% (20%) of the within firm increase in the share of skilled workers (non-production workers) in Belgian manufactur-

[2] See, for example, Levy and Murnane (1996), Doms, Dunne and Troske (1997), and Bresnahan, Brynjolfsson, and Hitt (2002).

[3] There exist some firm-level studies relating skill upgrading within multi-national firms, such as Head and Ries (2002) for Japanese multinationals, Hansson (2005) for Swedish multinationals, and Castellani et al. (2008) for Italian multinationals. However, such contributions focus on a special group of firms (multinationals) only and it is thus questionable how to extend results to a larger spectrum of firms. Our paper also relates to some firm-level analysis about developing countries and trade, such as Bustos (2005) for Argentina and Eric Verhoogen (2008) for Mexico.

ing over the period of our analysis, but these effects, as well as the employment growth effect, remain mainly in low-tech industries. Firm-level outsourcing to China further accounts for a small but significant increase in the share of non-production workers. This change in employment structure is in line with predictions of offshoring models and Schott's (2008) 'moving up the quality ladder' story.

The remainder of this paper is organized as follows. In Section 2, we briefly outline the theoretical background of our research. Section 3 describes the data and the instrumental variables. Section 4 provides summary statistics and takes a first look at the evidence. Section 5 discusses the main results and section 6 is a concluding one.

2 Theoretical Background

The strongest result arising from this study is the effect of Chinese imports on skill-upgrading in Belgian manufacturing. Thus far, the favorite explanation for the increase in relative demand of skilled workers in developed countries is the 'skill-biased technological change' (SBTC). The main reasons that led economists to favor the SBTC explanation are as follows. First, skill upgrading was found to occur mainly within industries rather than between industries, which contrasts the prediction of traditional Heckscher-Ohlin (HO) theory (Berman, Bound and Griliches, 1994). Second, skill upgrading not only occurred in developed countries but also in developing countries, which also goes against HO. Third, product-price studies revealed that the prices of labor intensive goods did not decrease significantly relative to skill intensive goods in developed countries. This violates the prediction of the Stolper-Samuelson theorem (Lawrence and Slaughter, 1993, Leamer, 1996, and Baldwin and Cain, 2000). Finally, factor content calculations revealed that trade with developing countries was not important enough to have a major impact on employment structure in developed countries (see, e.g., Krugman, 1995).

However, some recent developments in trade theory have stressed the complementarity between trade and technology. Trade liberalization may have altered the returns on different available technologies and may have led to a skill-biased technological change that has ultimately resulted in skill upgrading (Wood, 1998, Acemoglu, 2003, Ekholm and Midelfart, 2005, Bloom et al., 2008). This hypothesis makes the trade-based explanation consistent with the technology-based explanation. Additionally, trade economists have recently extended the traditional HO model and shifted the focus away from trade in goods to trade in tasks, or offshoring (Feenstra and Hanson, 1996, Feenstra and Hanson, 2001, Grossman and Rossi-Hansberg, 2008). This shift in focus makes trade-induced *within* industry skill upgrading possible. Trade in tasks can explain why both developed and developing countries can experience skill upgrading after trade liberalization i.e. by offshoring its most labor intensive tasks, skill intensity in developed countries rises while the newly offshored tasks going to developing countries tend to be more skill intensive than those already performed there.

In short, there are reasons to believe that trade is important to explain employment structure changes in the developed countries. While most of the above mentioned debate has an industry-level focus, in this paper we go one step further by looking at within firm skill upgrading. Within firm skill upgrading naturally follows from the above mentioned within industry mechanisms as long as one considers homogeneous firms. However, if firms are heterogeneous and face difficulties in changing their technology and/or their production process then the bulk of skill upgrading within an industry may only occur *across firms*. We see at least three mechanisms through which trade may induce *within firm* skill upgrading among heterogeneous firms. First, trade may induce within firm technology upgrading, which may increase firm's relative employment of skilled workers (Bloom et al. 2008). Second, multi-product firms may specialize in more skill intensive products when facing competition from low-wage imports, which will also induce within firm skill upgrading (Bernard et al, AER 2010). Finally, firms have also the option to outsource the labor intensive stages of the production process to low-wage countries (Grossman & Esteban-Rossi, 2008).

3 Data

3.1 Industry-level trade and production Data

The industry-level imports data comes from the ComExt Intra- and Extra-European Trade Data, which is an harmonized and comparable statistical database for EU countries merchandize trade. The database is compiled by Eurostat, using statistics from the member states. We extract data on both Belgian and EU15 manufacturing imports by country of origin and by 4-digit NACE rev.1.1 industry for the period of 1995-2007. Then we categorize countries into four groups: OECD countries, China, other low-wage countries (BJS), and the rest of the world. The definition for low-wage country is from Table 1 in Bernard et al. (2006), where they define countries with less than 5 percent of U.S. per capita GDP in 1992 as low-wage countries. According to such definition, major labor-abundant countries like China, India and

Vietnam are all classified as low-wage. Unlike Bernard et al. (2006), we distinguish China from BJS countries.

We use the variable import share to measure the degree of import competition faced by Belgian firms from different country groups at the four digit NACE code industry level. We construct two distinct import share measures for Belgium and the EU15. We use the Belgian import share in our baseline estimations and report results based on the EU15 import share in the Appendix. [4] Let $IMPSHARE^c_{jt}$ denote the import share of country group c of the goods produced by industry j in year t. Import share is defined as follows:

$$IMPSHARE^c_{jt} = \frac{IM^c_{jt}}{IM_{jt} + PR_{jt}}$$

where IM^c_{jt} and IM_{jt} represent (respectively) the value of imports from country group c and all countries. PR_{jt} is Belgian domestic production of industry j in year t and comes from the Prodcom Production Data also provided by Eurostat.

3.2 Firm balance sheet data

Firm-level balance sheet data over the period 1996-2007 comes from the Business Registry covering the population of Belgian firms required to file their (unconsolidated) accounts to the National Bank of Belgium (NBB). The data combine annual accounts figures with data from the Crossroads Bank on firms' main sector, activity and legal status. Overall, most firms that are registered in Belgium (i.e., that exist as a separate legal entity) and have limited liability are required to file annual accounts.[5] Specifically, all limited-liability firms that are incorporated in Belgium have to report unconsolidated accounts involving balance sheet items and income statements. Belgian firms that are in addition part of a group also have to submit consolidated accounts where they report the joint group's activities in a consolidated way. However, Belgian affiliates of a foreign group which do not exist as a separate legal entity in Belgium are not required to report unconsolidated accounts (they are required to file a consolidated account, but these data do not allow us to obtain firm-level characteristics for

[4] The reasons we use EU15 import share as a robust test are as following. First, some imports of other EU15 countries from China may be re-exported to Belgium. Second, Belgian firms export a lot to EU market, thus imports from China by other EU countries may reduce their imports from Belgium which will also affect Belgian firms

[5] Exceptions include: sole traders; small companies whose members have unlimited liability; general partnerships; ordinary limited partnerships; cooperative limited liability companies; large companies whose members have unlimited liability, if none of the members is a legal entity; public utilities; agricultural partnerships; hospitals, unless they have taken the form of a trading company with limited liability; health insurance funds; professional associations; schools and higher education institutions.

the Belgian affiliate). There are two types of annual accounts: full and abbreviated. Firms have to file a full annual account when they exceed at least two of the following three cutoffs: (i) employ at least 50 employees; (ii) have an annual turnover of more than 7.3 million euros; and (iii) report total assets of more than 3.65 million euros.

For this study, we selected those companies with their main activity in the manufacturing sector (NACE 2-digits codes 15 to 37) that filed a full-format or abbreviated balance sheet between 1996 and 2007. This provides us with about 15,000 firms per year for which all the relevant information is available. The data coverage, compared with other European firm-level data, is particularly good. For example, despite France has almost 6 times more manufacturing employment than Belgium, the well-known French EAE (Enquête Annuelle Entreprise) manufacturing firms database contains data on about 'only' 25,000 firms.

Using the information from the balance sheet data, we construct a battery of firms' covariates and retrieve the main NACE 5-digit activity code of each firm. $\mathrm{NP/E}_{it}$ is the share of non-production workers of firm i at time t, which is defined as the ratio of non-manual workers NP (including managers) to total employment E[6] and is a proxy for the skill intensity of the workforce. The log of tangible assets per worker – $\log(\mathrm{K/E})_{it}$ – is instead used as a measure of capital intensity while log value added per worker – $\log(\mathrm{VA/E})_{it}$ – and log total employment – $\log(\mathrm{E})_{it}$ – are used as measures for labor productivity and firm size, respectively. As standard in the empirical Industrial Organization literature we also consider the log of firm age plus one – $\log(\mathrm{Age})_{it}$. Finally, we use intangible assets per worker – $\log(\mathrm{Intang.K/E})_{it}$ – to control for technology-related spending within the firm.[7]

As for dependant variables, we consider a number of measures of firm performance. To limit endogeneity problems, we follow Bernard and Jensen (2004) and use firm covariates at time t and dependent variables at time $t+1$. The first dependent variables is firm growth ($\Delta \mathrm{E}_{it+1}$), which is defined as the log difference between a firm total employment in year $t+1$ and t. The second one is firm exit (Death_{it+1}), which is defined as disappearing from the dataset for at least two consecutive years starting from $t+1$. We then further consider two measures of the skill level of a firm workforce. The first one is the previously mentioned share of non-production workers that we take at time t+1 ($\mathrm{NP/E}_{it+1}$). The second one is a measure of the educational level. While most of the papers in the literature only use the share of non-production workers to measure skill, we are able to go further thanks to a unique

[6] We use full time equivalent as a measure for employment.

[7] Intangible assets include patents, licences, and R&D capitalized costs as well as goodwill.

feature of the data. We are indeed able to track, for firms with full-format balance sheets only (i.e., large firms), the education level of workers that enter and exit a firm in each year. At the cost of decreasing sample size, we are thus able to construct a proxy for the share of skilled workers based on education.[8] In particular our measure S_{it+1} based on the following time decomposition:

$$S_{it+1} = \frac{skill_{it+1}}{E_{it+1}} = \frac{skill_{i0}}{E_{it+1}} + \frac{skill\_net\_flow_i^{0:t+1}}{E_{it+1}} \tag{1}$$

where $skill_{it+1}$ is the number of skilled workers in firm i at time $t+1$, and $skill\_net\_flow_i^{0:t+1}$ is the net inflow (i.e., inflow minus outflow) of skilled workers between year 0 and year $t+1$ for firm i. The only term on the righthand side of equation (1) which is unobservable in our data is $skill_{i0}$, i.e. the initial number of skilled workers in firm i. We use the oldest available information (year 1996) about non-production workers as a proxy for $skill_{i0}$.

3.3 Firm-level import data

Belgian imports data by year, firm, product (CN8 nomenclature), and country are also provided by the NBB and covers the period 1995-2007. Micro trade data are collected by the NBB on a monthly basis from Intrastat (intra-EU trade) and Extrastat (extra-EU trade) declarations that cover the universe of trade transactions.[9] The reliability of the trade declaration data builds upon the mandatory VAT returns that firms are obliged to file either monthly or quarterly depending the volume of sales and purchase of goods. Sales and purchases involving a non-resident must be separately indicated in VAT returns due to the different treatment of these operation with respect to the VAT tax. This information is then used by the NBB to identify firms involved in trade activities which are then required to file, whenever relevant, the Intrastat and/or Extrastat declaration. Balance sheet and trade data were merged using the VAT number which uniquely identifies firms in Belgium. The trade data is extremely rich and comparable in quality to the widely known French Customs data used by Eaton *et al.* (2004) among others. Information about the nature of the transaction is also available and,

[8] In particular, we define in what follows a worker as being skilled upon having more than secondary school education (ISCED levels 5 or 6).

[9] For intra-EU trade, the threshold above which a legal obligation to declare exports arises is (from 1st January 2006 onwards) 1 million euros. The threshold has changed over time going from 104,105 euros for the period 1993-1997, to 250,000 euros for the period 1998-2005. Firms trading less than 1 million euros represent less than 1% of aggregated exports. Moreover, firms often do provide information about their trade even when they are below the threshold. Extra-EU trade is virtually exhaustive with the legal requirement for declaration being a value of 1,000 euros or more or a weight of 1,000 kg or more.

for the purpose of our analysis, we concentrate on transactions involving transfer of ownership so leaving aside trade related to (i) work done; and (ii) return and replacement of goods.

In order to capture the different facets of outsourcing we follow Biscourp and Kramarz (2007) and first divide firm's imports into two categories: imports of finished goods and imports of intermediate goods. Finished goods are defined as CN8 products that correspond to the same 3-digit NACE code of the main activity of the firm.[10] Other imports are defined as imports of intermediate goods. The purpose of this distinction is to broadly account for the different nature of imports of goods that are 'ready to sell' versus imports of goods that will be further processed within the firm. Our measure of outsourcing of finished goods is:

$$OUTFIN_{it}^{c} = \frac{IMF_{it}^{c}}{T_{it}}$$

where IMF_{it}^{c} corresponds to firm i imports of finished goods from country group c in year t and T_{it} is firm turnover in year t. Outsourcing of intermediate goods by firm i at time t from country group c ($OUTINT_{it}^{c}$) is defined as:

$$OUTINT_{it}^{c} = \frac{IMI_{it}^{c}}{T_{it}}$$

where IMF_{it}^{c} corresponds to firm i imports of intermediate goods from country group c in year t. As for country groups, we build on the same partition used for industry-level imports shares $IMPSHARE_{jt}^{c}$, i.e. OECD countries, China, other low-wage countries (BJS), and the rest of the world.

3.4 Instrumental variables

The key variables in our analysis are $IMPSHARE_{jt}^{c}$, $OUTFIN_{it}^{c}$, and $OUTINT_{it}^{c}$. In order to solve the potential endogeneity problems arising with these variables we use exchange rates and ad valorem tariffs data to construct instrumental variables for both industry-level (import share) and firm-level (outsourcing of finished and intermediate goods) imports. Exchange rates data comes from the IFS database compiled by the IMF. Ad valorem tariff data comes from the online customs tariff database, also called the TARIC, provided by European Commission. Such dataset integrates all tariff-like restrictions applying to goods that enter the EU market by country of origin and CN8 code for several years. The fact that detailed tariff information

[10] A detailed correspondence table between CN8 and NACE 3-digit codes across time have been provided by the NBB.

is available along two dimensions (country and product) is a pretty unique feature of these data compared to, for example, the widely used UNCTAD's TRAINS data base in which only information at the HS6 digit is available. Although the database contains information about many trade restrictive measures (like quotas, weight-based tariff, etc.) we only use ad valorem tariffs to construct our IVs. To construct a comprehensive trade barrier index that utilizes information on all trade measures is in fact both cumbersome and highly questionable. For this reason we decide to focus on ad valorem tariff data only.

We use country specific exchange rates in order to construct group c-industry specific and group c-firm specific IVs for, respectively, industry-level and firm-level imports. To this end we exploit trade ratios using them as weights. We denote by $IVEXCHSHA^c_{jt}$ the exchange rate IV for $IMPSHARE^c_{jt}$ and by $IVEXCHFIN^c_{it}$ ($IVEXCHINT^c_{it}$) the exchange rate IV for outsourcing of finished (intermediate) goods. We construct them as follows:

$$IVEXCHSHA^c_{jt} = \sum_{h \in c} \frac{IM^h_{j0}}{IM_{j0}} EXCH^h_t$$

$$IVEXCHFIN^c_{it} = \sum_{h \in c} \frac{IMF^h_{i0}}{T_{i0}} EXCH^h_t$$

$$IVEXCHINT^c_{it} = \sum_{h \in c} \frac{IMI^h_{i0}}{T_{i0}} EXCH^h_t$$

where h denotes a country, $EXCH$ denotes exchange rates, and 0 denotes the initial value of the corresponding variable. We use the oldest information on trade ratios (in 1995) only rather than contemporaneous t one because the current trade ratio may be endogenous. We further consider firm turnover rather than firm total imports as the denominator of $IVEXCHFIN^c_{it}$ and $IVEXCHINT^c_{it}$ because the variable would otherwise be defined for importing firms only.

Similarly, denoting by $IVDUTYSHA^c_{jt}$ the tariff IV for $IMPSHARE^c_{jt}$, and by $IVDUTYFIN^c_{it}$ ($IVDUTYINT^c_{it}$) the tariff IV for outsourcing for finished (intermediate) goods we construct the as follows:

$$IVDUTYSHA^c_{jt} = \sum_{h \in c, p \in j} \frac{IM^h_{p0}}{IM_{j0}} D^h_{pt}$$

$$IVDUTYFIN_{it}^{c} = \sum_{h \in c, p \in fp} \frac{IMF_{pi0}^{h}}{T_{i0}} D_{pt}^{h}$$

$$IVDUTYINT_{it}^{c} = \sum_{h \in c, p \in ip} \frac{IMI_{pi0}^{h}}{T_{i0}} D_{pt}^{h}$$

where D denotes ad valorem tariffs, p denotes an 8-digit CN product code, and fp (ip) denotes the set of finished (intermediate) goods.[11]

4 A few intriguing figures and descriptive statistics

In this Section we provide some descriptive statistics on the key variables we use both at the whole manufacturing level and at two digit NACE industry level. Figure 1 shows that the import share of China for manufacturing as a whole increased substantially during the period 1996-2007. Starting from the same level as other low-wage countries in 1996, China's import share triplicate during the period while the import share of other low-wage countries has only slightly increased. This remarkable difference is one of the key empirical facts that make us believe that China has to be treated separately. Moreover, in 2001, which is also the year when China officially entered WTO, Belgian manufacturing employment started, as showed in Figure 2, to fall sharply.

Figures 1 and 2 are just about correlation between two variables without any pretence of causality. However, they have the virtue of summarizing rather well what is the common fear about the increase in competition due to Chinese imports: employment losses. What is usually less emphasized is that another performance measure is also correlated with the increase in China's import share: the skill upgrading of the workforce. Figures 3 and 4 show the evolution over the period 1996-2007 of, respectively, the share of non-production workers and the share of skilled workers in Belgian manufacturing. Both are indeed steadily increasing over time especially after 1998. What makes the picture even more complex is the fact that import competition is only one of the ways in which China and other low-wage countries are eventually affecting manufacturing firm in the western world. Some Chinese goods are in fact directly imported by manufacturing firms for either immediate sale (finished goods) or further processing (intermediate goods). This is a rather different form of trade for these firms who might actually benefit a lot in terms of increased performance and profitability. Figures 5 and

[11]It is important to stress that both fp and ip are firm-time specific as they depend on the NACE 3-digit industry code of a firm.

6 shows the time evolution of the share of Belgian manufacturing firms involved, respectively, in outsourcing of finished and intermediate goods with China and other low-wage countries over the period 1996-2007. Again, a rather stable line for other low-wage countries and a straight increasing line for China.

The above evidence does not provide a basis for casual statements and econometric analysis is needed. This is the goal of the next Section. However, one necessary condition to reach some conclusions is that there is enough identifying variation in the data. Our key explanatory variables vary across the NACE 4-digit (import share) and firm (outsourcing of finished and intermediate goods) dimensions. Table 1 provides evidence that there is already considerable variation in our dependent variables across the relatively aggregated NACE 2-digit breakdown over the period of analysis. While being strongly negative in the case of Apparel and Leather product and footwear, employment growth has been remarkable for Office machinery and computers. On the other hand the Apparel and Leather product and footwear industries have experienced an impressive increase in both the share of non-production and skilled workers. However, the Other Transportation equipment industry has also experienced a noticeable skill upgrade while keeping a modest exit rate and a pretty good employment growth.

Tables 2 to 4 further report the value and changes of our main explanatory variables over the sample period by NACE 2-digit industry. As in the previous case, these Tables highlight the fact that there is quite a lot of variation even at the relatively aggregated NACE 2-digit breakdown. Table 2 shows the value of the import share of China and other low-wage countries in 1996 and 2007 as well as their change over the period. One can see, the import share of both China and other low-wage countries increased in almost all industries, but Chinese imports increased generally faster, especially in relative high-tech industries like office machinery and computers, electrical machinery, radio, TV and communication equipment, etc. Actually, until 2007, imports from other low-wage countries still concentrate on low-tech industries like textile, apparel and leather goods, while Chinese imports span both low-tech and high-tech industries from the beginning of the period. This fact is in line with the literature emphasizing the relative sophistication of Chinese exports (Schott, 2008).

Table 3 and 4 report, respectively, the 1996 and 2007 levels (and change) of the share of firms that are involved in outsourcing of finished and intermediate goods from China and other low-wage countries by NACE 2-digit industry. The pattern is similar to that shown in table 2: more and more firms start importing from low-wage countries over the period, especially from China. There is a lot of heterogeneity across industries with, for example, the Radio, TV and Communication Equipment industry receiving the highest level and increase of the share of firms importing finished and intermediate goods from China. Though this industry might, to some extent, be considered as low tech, the increase in the share of outsourcing firms from China in the Chemical industry should dissipate any reasonable doubt about the technological content of some Chinese products.

5 Econometric Results

We look at the impact of industry-level import competition and firm-level outsourcing on four firm outcome measures: employment growth, firm exit, share of blue collar workers and share of skilled (highly educated) workers.

$$Y_{it+1} = c + V_{it}^{'}\alpha + T1_{jt}^{'}\beta_1 + T2_{it}^{'}\beta_2 + \delta_t + \delta_i + \varepsilon_{it} \tag{2}$$

Equation (2) is based on Bernard et al. (2006) and the dependant variable (Y_{it+1}) will be firm employment growth ($\Delta \mathrm{E}_{it+1}$), or firm exit (Death_{it+1}), or the firm share of non-production workers ($\mathrm{NP/E}_{it+1}$) or its share of skilled workers ($\mathrm{S/E}_{it+1}$). V_{it} is a vector of time t firm controls including firm size, age, labor productivity, capital intensity, and its intangible capital intensity (the latter being used as control for expenditure in technology). When considering employment growth and firm exit we also include the current share of non-production workers as a further control in V_{it}. $T1_{jt}$ is instead a vector containing the time-varying industry j-level variables which measure the degree of import competition from different country groups ($IMPSHARE_{jt}^{c}$). $T2_{it}$, which is not considered in Bernard et al. (2006), is a vector containing the time-varying firm i-level variables which measure the importance of outsourcing of final ($OUTFIN_{it}^{c}$) and intermediate ($OUTINT_{it}^{c}$) goods from the different country groups. Finally, δ_t is a vector of time dummies and δ_i is firm fixed effect.

In additional specifications we interact $T1_{jt}$ with some firm characteristics (factor intensities and labor productivity) in order to account for the impact of import competition *across* firms within an industry. In particular, following Bernard et al. (2006), we focus on employment growth and firm exit and disentangle the within and across firm adjustment due to import competition.[12] In some other specifications we interact $T1_{jt}$ with categorial dummies indicating whether a given NACE 4-digit industry is low, medium-low, medium-high, or

[12] Firms may respond heterogeneously to import competition from low-wage countries. According to the heterogeneous firms literature (e.g., Melitz, 2003), low productive firms are indeed more likely to exit and/or to become smaller after trade liberalization.

high-tech. The technological ranking of industries we build upon, reported in Figure 7, has been obtained by Eurostat based on R&D spending statistics. The purpose of this exercise is to see whether Chinese import competition have different effects on firms in industries characterized by different technology levels. While it is clear from the literature, as well as from the descriptive statistics of the previous section, that Chinese imports are significant both in low- and high-tech industries, it is less clear whether the competition presure they exsert on firms is also significant both in low- and high-tech industries.

For all of the regressions above, we use exchange rates and ad valorem tariffs data to construct IV's for industry-level (import competition) and firm-level (outsourcing of finished and intermediate goods) trade. For firm-level trade, lagged firm-level imports are also used as instruments. The estimation results are shown in Tables 5 to 10. Tables 5 to 7 show estimation results for equation (2) for employment growth and firm exit with the first two Tables focusing on import competition and the last one on firm-level outsourcing. Tables 8 to 10 show estimation results of equation (2) for the share of non production and the share of skilled workers with the first two Tables being devoted to industry-level import competition and the last one to outsourcing. Tables 11 to 16 provide robust evidence of our results by using industry-level import shares of the EU15 (instead of Belgium) as measures of import competition from the different country groups. Results are virtually identical and so we will not discuss them further.

We use robust standard errors and statistics. At the bottom of each Table we report the under-identification (Kleibergen-Paap LM), weak identification (Kleibergen-Paap Wald F), and over-identification (Hansen J) statistics and p-vales. The number of endogenous variables and number of instruments are also indicated along with the number of observations, firms, and the R^2. Results indicates that our instruments for both industry-level and firm-level trade are not weak. At the same time, however, the Hansen J statistic often rejects the null of no over-identification when industry-level import competition is instrumented, a problem that does not occur in the regressions on the outsourcing of finished and intermediate goods.

5.1 Employment Growth

Table 5 reports the relationship between firm employment growth and industry-level import competition for our four country groups: OECD, China, other low-wage countries (BJS), and the rest of the world (Other). In order to make our results comparable to previous studies, and in particular to Bernard et al. (2006), we do not consider for the moment firm-level outsourcing variables, i.e. the vector $T2_{it}$, in the estimation of (2). The first three columns report within estimates while the remaining three columns report IV estimates. Columns 1 and 4 refer to the baseline specification. In columns 2 and 5, we add interaction terms of some firm characteristics (share of non-production workers, capital intensity and productivity) with both Chinese and BJS import shares. In column 3 and 6 we instead consider interaction terms of industry-level categorial dummies measuring technological intensity, with China's import share.[13] In all the regressions, we include year and firm fixed effects to control for aggregate trends in manufacturing employment growth and unobserved (time-invariant) firm characteristics.

Within estimation results in column 1 reveal that employment growth is negatively related to import competition from China as well as BJS countries with roughly similar magnitudes. This is not the case for both OECD and Other countries' import competition which have insignificant coefficients. These finding echoes those of Bernard et al. (2006) and are *partially* confirmed by IV estimations in column 4. Indeed, when instrumenting, only import competition from BJS countries has a significant (and larger) coefficient with respect to China. Columns 5 and 6 further qualify IV results. The interactions of $IMPSHARE_{jt}^{c}$ for the BJS countries and China with firm characteristics indicate that, contrary to the case of BJS countries, Chinese imports are inducing a re-allocation of resources across Belgian firms characterized by different capital intensities. In particular, firms with *high* capital intensity are particularly hit by Chinese import competition which is somewhat in line with the Schott (2008) story discussed earlier. However, capital intensity does not necessarily correspond to high-tech. Indeed, column 6 indicates that the only group of industries whose employment growth is significantly affected by import competition from China is the excluded category (i.e. the low-tech). As for other industries, the sum of the reference category parameter and the interaction term is in fact never significant. Finally, the implied magnitude of our coefficients is quite sizeable. The average firm yearly employment growth in our panel data is 0.58%. Taking the coefficient value corresponding to low-tech industries (who account for roughly 36% of Belgian manufacturing employment) in column 6 (-0.5167) and considering that the average across firms (belonging to this subset of manufacturing) of $IMPSHARE_{jt}^{c}$ for China has steadily increased from 0.0138 in 1996 to 0.0502 in 2007, we get that import competition from China could be blamed for a -0.5167 $\times$ 0.0138=-0.71% firm employment growth effect in 1996 and a -0.5167 $\times$ 0.0502=-2.59% firm employment growth effect in 2007. As for other

[13] The omitted category refers to low-tech industries.

low wage countries, using the coefficient in column 6, which now refers to all manufacturing, and the average import shares in 1996 and 2007 reveals that import competition from BJS countries turns into a -0.47% growth effect for 1996 and a -1.19% growth effect in 2007.

Overall, our findings so far are in line with the existing literature while further qualifying China as being different from other low-wage countries. Though, our Hansen J calls for caution and we cannot unfortunately compare the quality of our over-identifying restrictions with previous studies.[14] In Table 7 we report results on the relationship between employment growth and firm-level trade which are given in the first 3 columns. The *causal* analysis of the impact of outsourcing of finished and intermediate goods from different country groups is arguably the main contribution of our paper and Table 7 reveals that results are intriguing. The full econometric model in (2) is now estimated with column 1 (2 and 3) providing within (IV) estimates. Import competition variables, i.e. the vector $T1_{it}$, is included but coefficients are not reported in order to save space. Our preferred specification is the one in column 3 where industry-level trade, in contrast to column 2, is not instrumented and our Hansen J statistic does not reject the validity of our instruments.

Two key features stand out from our results. First of all, contrary to a widespread fear, firm outsourcing does not dramatically affect firm employment growth. This is certainly the first order effect and comes from coefficients being almost never significant or, when they are significant, having a small magnitude. The coefficient on imports of intermediates from OECD countries (0.1296) is actually positive and significant. The relatively stable over time mean of $OUTINT_{it}^{c}$ for OECD countries across manufacturing firm is 0.0396 meaning that this type of outsourcing accounts for a 0.1296 $\times$ 0.0396=0.51% firm employment growth effect. While the coefficient of outsourcing of finished goods to China (-0.3182) is significant and negative. $OUTFIN_{it}^{c}$ for China is small. Outsourcing to China steadily increased from 0.0005 in 1996 to 0.0015 in 2007 implying that it accounted only for -0.3182 $\times$ 0.0015=-0.05% firm employment growth in Belgian firm level manufacturing in 2007.

Two comments are in order. First, our firm-level analysis confirms both the ambiguity and the limited impact of outsourcing on employment found in previous industry-level studies in the literature (Amiti and Shang-Jin Wei, 2005). Second, our finding on China is in line with the hypothesis put forward by Biscourp and Kramarz (2007) that outsourcing to low wage countries only has a negative effect on firm employment when the imported goods are

[14]Though the number of instruments in Bernard et al. (2006) is larger than the number of endogenous variables, no over-identifying test statistic is provided and/or mentioned.

final in nature. While Biscourp and Kramarz (2007) could only perform a correlation on this hypothesis, our data and analysis confirm this hypthosis for China.

5.2 Firm exit

Table 6 reports the relationship between firm exit and industry-level import competition from different country groups while columns 4, 5 and 6 of Table 7 contains our estimations of the full model for firm exit with a focus on the role of outsourcing. The structure of the different specifications presented is the same as for employment growth.

Focusing on IV results in Table 6 reveals that, contrary to import competition for other low-wage countries, imports from China are not increasing the likelihood of firm exit. This is again another dimension in which China is different from BJS countries whose import competition instead induces significantly more exit. OECD countries behave like China in that their import competition does not significantly affect firm survival while imports from other countries actually decrease the likelihood of exit. This latter result is quite puzzling and might be related to measurement error in this residual country category.

Interactions with firm-level variables in column 5 further indicate that neither for China nor for BJS countries there is significant evidence of an heterogenous firm response. Moreover, results from column 6 actually suggest (although significance is weak) that Chinese imports *decrease* exit in high-tech industries. This finding confirms the descriptive evidence we provided about the active role of China in high-tech industries and might reflect the existence of some complementarities. Implied magnitudes of significant coefficients are, contrary to the case of employment growth, not stunning. The unconditional probability of firm exit in the panel is 11.92% and import competition from BJS countries increases the probability of exit by 0.44% in 1996 and 1.00% in 2007.

Overall, our findings on import competition are again in line with the existing literature while further qualifying China as being different from other low-wage countries. We now turn to IV results about the role of firm-level outsourcing on exit reported in Table 7. For the same reasons explained above, the specification in column 6 is our preferred one. Again, the big picture is that most coefficients are not significant and/or small with results for China and OCED standing out. Outsourcing of finished goods from OECD countries increase the likelihood of firm exit. This might be due to firms moving out of Belgium to the country of origin of final goods sourcing. On the other hand, outsourcing of intermediate (finished) goods from China increases (*decreases*) the probability of exiting. Combined with the previously identified negative impact on firm employment growth, our finding on finished goods depicts a scenario in which firms respond to globalization by outsourcing some of their jobs to China (via the import of finished goods) but in turn gets more competitive and are able to survive.

Finally, turning coefficients into induced exit probabilities by means of average values of $OUTFIN_{it}^{c}$ and $OUTINT_{it}^{c}$ reveals that, in 2007, outsourcing of finished (intermediate) goods with China causes a decrease (increase) of the exit probability of 0.03% (0.06%). As for OECD countries, the effect of $OUTFIN_{it}^{c}$ in 2007 is larger and equals 0.21%.

5.3 Skill upgrading

Tables 8 and 9 report the relationship of, respectively, firms's employment structure (share of non-production workers) and skill intensity (share of skilled workers) with industry-level import competition from different country groups. The first two columns of each Table report within estimates while the remaining two columns report IV estimates. In column 2 and 4 of each Table, we consider interaction terms of our industry-level categorial dummies measuring technological intensity with the Chinese import share. In all the regressions, we include year and firm fixed effects to control for aggregate trends and unobserved (time-invariant) firm characteristics.

The basic message from IV results of both Tables is the same: import competition from China is inducing *within firm* skill upgrading by both fostering an increase of the share of non-production workers and an increase in the share of workers with tertiary education. At the same time neither import competition from OECD nor from other low-wage countries has a significant effect on skill upgrading. These original findings are of high policy relevance and pins down a key firm adjustment margin to globalization to be added to those identified in Bernard et al. (2006).

The magnitude of the impact is big. NP/E_{it+1} and S/E_{it+1} are, contrary to employment growth and firm exit, stock variables so that a more useful way of interpreting coefficients' magnitudes is to compute what share of the observed time change (between 1996 and 2007) of NP/E_{it+1} and S/E_{it+1} can be accounted for by the time change of $IMPSHARE_{jt}^{c}$. Doing this back of the envelope calculation with coefficients from column 3 reveals that import competition from China is responsible for 19.77% (42.71%)[15] of the increase in the share of

[15] Using the same sample as in column 3 of table 8, we get that the import share of China increased by

non-production (skilled) workers in Belgian manufacturing over our period of analysis. As further shown in column 4, all of the adjustment is taking place in low-tech industries with, for example, China accounting for 79.25% of the increase in the share of skilled workers in these industries.

Skill upgrading in low-tech industries due to increased import competition from China has to be compared with the negative impact we found on employment growth due to Chinese imports and the non significant effect on firm exit for those industries. Overall, our results can be rationalized by the following argument. Even though imports from China raise the degree of competition in the Belgian market pushing firms to reduce their employment, it also induces firms to upgrade their technology and employment structure. In the presence of market failures limiting technology adoption, like those described in Bloom et al. (2008), this may ultimately be beneficial for firms and make them less likely to die. Bloom et al. (2008) show that import competition from China is inducing a sizeable within firm technological upgrade as measured by firm-level IT spending and patents. Our findings complement their results by pointing to a different channel: skill upgrading. The two aspect are clearly related and, although we use IV and a control variable for firm technological intensity (the value of intangible assets), it might still be the case that some of the skill upgrading effect we are picking up is due to technological change in response to import competition from China.

Table 10 reports our estimation results for skill upgrading and firm-level outsourcing. The first three columns report the relationship between share of non-production workers and firm-level imports. The last three columns report the relationship between the share of skilled workers and firm-level imports. The structure of the different specifications presented is the same as for Table 7.

Looking at results for NP/E_{it+1} reveals that firm-level outsourcing has, contrary to the case of employment growth and exit, in many cases a significant impact. A more careful inspection tells us that in the IV specifications, outsourcing of finished goods from all country groups induces skill upgrading. This is a very strong result and is in line with, for example, the trade-in-tasks model of Grossman and Rossi-Hansberg (2008). To the extent that the final production stage (assembly) is low skill intensive as compared to other stages like design and commercialization, the involvement of a firm into outsourcing of final goods can reasonably induce skill upgrading due to shift of a firm domestic activities towards more skill intensive

0.026 from 1996 to 2006, while NP/E_{it+1} increased by 0.038 from 1997 to 2007, thus we get the contribution of China's import share is $0.026\times 0.289/0.038=0.1977$, or 19.77%, where 0.289 is the coefficient of China's import share in column 3 of table 8. The other numbers used in this section are calculated in similar way.

tasks. However, the magnitude of the effects we are talking about is very small. Given estimated coefficients in column 3 and time changes of $OUTFIN_{it}^{c}$ across the four country groups, the increase in outsourcing (from all origins) of final goods during the period 1996-2007 accounts for a mere 0.50% of the increase in NP/E$_{it+1}$. Interestingly, China is different, i.e., also the outsourcing of intermediate goods induces skill upgrading. Again, the effect is small (0.68%).

The picture is quite different when looking at estimations for the share of skilled workers. In this case, only outsourcing from OECD countries has a significant impact which is pointing again towards skill upgrading. Both outsourcing of final and intermediate goods to OECD countries induces a within firm increase in the share of college educated workers with the impact being stronger for the finished goods. Indeed, the time change of outsourcing of finished (intermediate) goods to OECD countries accounts for 3.48% (1.06%) of the time change of S/E$_{it+1}$ over our period of analysis.

6 Conclusion

Imports from China into Belgium have risen faster than from other low-wage country imports in recent years. This paper evaluates the effect of both industry-wide and firm-level imports from China separately from other countries' imports on Belgian manufacturing firms in terms of employment growth, firm survival and skill-upgrading. In obtaining our results we used an instrumental variable (IV) strategy using product-country level ad-valorem tariffs and trade weighted exchange rates as instruments for imports.

We find that additional to imports from other low-wage countries, Chinese imports have a distinct but different impact on within firm-level employment changes. Industry-level imports from China significantly and negatively affects employment growth, but only for firms in low tech industries. Contrary to the popular belief, industry level imports, which is a measure of product market competition in the industry, do not negatively affect firm survival in manufacturing. This result holds even when accounting for firm heterogeneity within an industry. The firm-level results suggest that Chinese imports of finished goods decrease the probability of firm death, while firm-level intermediate imports from China increase the probability of firm death. But all in all these effects are small in magnitude, for the reason that outsourcing to China is still very limited in magnitude for Belgian manufacturing firms.

By far the most important results we obtain are on skill upgrading. Chinese imports account for 42% (20%) of the within firm increase in the share of skilled workers (non-production workers), with most of the adjustment taking place in low tech industries. The 42% figure on the share of skilled workers should however be taken with caution as we were forced to make a number of assumptions in order to cope with the unavailability of the stock of skilled workers.

Our results seem to be consistent with a scenario where industry-level import competition from China reduces firm employment for firms in low tech sectors but pushes these firms to upgrade their workforce both in terms of occupation and in terms of education. Meanwhile, outsourcing production to China leads firms to upgrade their occupational structure and reduces employment growth. Import competition from China does not affect firm exit while outsourcing of finished goods to China actually increases a firm's chances to survive. The results we present in this paper are largely consistent with recent theoretical models of offshoring such as the Grossman and Rossi-Hansberg (2008) model where firms in developed countries that offshore low skill intensive task become more productive and have a better chance to survive.

Finally, we propose two directions for future research. First, the set of instruments for firm-level outsourcing can be widened to improve instruments' strength further. Second, there are other firm-level margins of adjustment in the face of import competition, such as product switching, quality upgrading and technology upgrading that can be at work but that are not studied here and that offer an interesting avenue for future research.

References

[1] Acemoglu, D., 2003. Patterns of skill premia. Review of Economic Studies 70(2), 199-230.

[2] Amiti, M., Wei, S.J., 2005. Fear of service outsourcing: is it justified? Economic Policy 20, No. 42, 308-347.

[3] Baldwin, R.E., Cain, G.G., 2000. Shifts in relative U.S. wages: the role of trade, technology, and factor endowments. Review of Economics and Statistics 82 (4), 580-595.

[4] Berman, E., Bound, J., Griliches, Z., 1994. Changes in the demand for skilled labor within US manufacturing: evidence from the annual survey of manufactures. Quarterly Journal of Economics 109 (2), 367-397.

[5] Bernard, Andrew B. and J. Bradford Jensen, 2004. Why Some Firms Export. The Review of Economics and Statistics, 86(2), 447-464.

[6] Bernard, A.B., Jensen, J.B., Schott, P.K., 2006. Survival of the best fit: Exposure to low-wage countries and the (uneven) growth of U.S. manufacturing plants. Journal of International Economics 68 (1), 219-237.

[7] Biscourp, P., Kramarz, F., 2007. Employment, skill structure and international trade: firm-level evidence for France. Journal of International Economics 75, 22-51.

[8] Bloom, N., Draca, M., van Reenen, J., 2008. Trade induced technical change? The impact of Chinese imports on technology and employment. Working paper.

[9] Branstetter, L., Lardy, N., 2006. China's embrace of globlization. NBER Working Paper 12373.

[10] Bresnahan, T.F., Brynjolfsson, E., Hitt, L.M., 2002. Information technology, workplace organization, and the demand for skilled labor: firm-level evidence. Quarterly Journal of Economics 117 (1), 339-376.

[11] Bustos, P., 2005. Rising wage inequality in the Argentinean manufacturing sector: the impact of trade and foreign investment on technology and skill upgrading. Working paper.

[12] Castellani, C., Mariotti, I., Piscitello, L., 2008. The impact of outward investments on parent company's employment and skill composition: evidence from the Italian case. Structural Change and Economic Dynamics 19, 81-94.

[13] Crino, R., 2008. Service offshoring and white-collar employment. Job market paper.

[14] Doms, M., Dunne, T., Troske, K.R., 1997. Workers, wages and technology. Quarterly Journal of Economics 112, 253-290.

[15] Eaton J., Kortum, S., and F. Kramarz, 2004, Dissecting Trade: Firms, Industries, and Export Destinations. American Economic Review Papers and Proceedings 94, May, 150-154.

[16] Ekholma, K., Midelfart, K.H., 2005. Relative wages and trade-induced changes in technology. European Economic Review 49 (6), 1637-1663.

[17] Falk, M., Koebel, B.M., 2002. Outsourcing, imports and labour demand. Scandinavian Journal of Economics 104 (4), 567-586.

[18] Feenstra, R.C., Hanson, G.H., 1996. Globalization, outsourcing and wage inequality. American Economic Review 86, 240-245.

[19] Feenstra, R.C., Hanson, G.H., 1999. The impact of outsourcing and high-technology capital on wages: estimates for the United States, 1979-1990. Quarterly Journal of Economics 144 (3), 907-940.

[20] Feenstra, R.C., Hanson, G.H., 2001. Global production sharing and rising inequality: a survey of trade and wages. NBER Working Paper 8372.

[21] Grossman, G.M., Rossi-Hansberg, E., 2008. Trading tasks: a simple theory of offshoring. American Economic Review 98 (5), 1987-1997.

[22] Hansson, P., 2005. Skill upgrading and production transfer within Swedish multinationals. Scandinavian Journal of Economics 107 (4), 673-692.

[23] Head, K., Ries, J., 2002. Offshore production and skill upgrading by Japanese manufacturing firms. Journal of International Economics 58, 81-105.

[24] Hijzen, A., Gorg, H., Hine, R.C., 2005. International outsourcing and the skill structure of labour demand in the United Kingdom. Economic Journal 115 (October), 860-878.

[25] Krugman, P., 1995. Growing world trade: causes and consequences. Brookings Papers on Economic Activity, Vol. 1995, No.1, 25th Anniversary Issue, 327-377.

[26] Krugman, P., 2008. Trade and wages, reconsidered. Working paper.

[27] Lawrence, R.Z., Slaughter, M.J., 1993. International trade and American wages in the 1980s: giant sucking sound or small hiccup? Brookings Papers on Economic Activity (Microeconomics), Vol.1993, No. 2, 161-226.

[28] Leamer, E.E., 1996. Wage inequality from international competition and technological change: theory and country experience. American Economic Review 86 (2), Papers and Proceedings of the Hundredth and Eighth Annual Meeting of the American Economic Association San Francisco, CA, 309-314.

[29] Levy, F., Murnane, R.J., 1996. With what skills are computers a complement? American Economic Review 86 (2), Papers and Proceedings of the Hundredth and Eighth Annual Meeting of the American Economic Association San Francisco, 258-262.

[30] Machin, S., van Reenen, J., 1998. Techonology and changes in skill structure: evidence from seven OECD countries. Quarterly Journal of Economics 113, 1215-1244.

[31] Rodrik, D., 2006. What is so special about China's exports? China & World Economy 14 (5), 1-19

[32] Schott, P.K., 2008. The relative sophistication of Chinese exports. Economic Policy, Vol. 23, Issue 53, 5-49.

[33] Verhoogen, E., 2008. Trade, quality upgrading, and wage inequality in the Mexican manufacturing sector. Quarterly Journal of Economics 123 (2), 489-530.

[34] Wood, A., 1998. Globalisation and the rise in labour market inequalities. Economic Journal 108, 1463-1482.

[35] Xu, Bin, Lu, Jiangyong, 2009. Foreign direct investment, processing trade, and the sophistication of China's exports. China Economic Review 20 (3), 425-439

[36] Ma, A.C., Van Assche, A., and Hong, C., 2009. Global Production Networks and China's Processing Trade. Journal of Asian Economics 20(6), pp. 640-654.

Table 1: Dependent variables evolution across manufacturing industries over the period of analysis

Nace	Industry	Employment (FTE) change (%) 96-07	Average firm exit rate (%) 96-05	Share of white collar change (percentage) 96-07	Share of skilled workers change (percentage) 96-07
15	Food	-1.1	4.6	0.2	6.0
16	Tobacco	-35.0	2.4	2.1	8.0
17	Textile	-34.2	4.4	0.2	9.4
18	Apparel	-57.1	6.0	20.7	19.9
19	Leather product and footwear	-43.0	5.7	11.1	12.2
20	Wood products	-0.1	3.7	-7.2	5.7
21	Paper	-11.8	3.9	0.1	3.2
22	Publishing	-13.7	5.1	6.9	22.2
23	Nuclear	17.8	4.4	14.9	0.5
24	Chemical	5.9	4.5	8.3	6.2
25	Rubber and plastic	10.9	3.8	4.8	3.4
26	Non-metallic mineral	-10.7	3.7	1.4	9.5
27	Basic metal	-23.0	4.5	-0.7	5.5
28	Fabricated metal	11.5	3.6	0.3	5.8
29	Machinery and equipment	-0.4	4.2	0.6	9.3
30	Office machinery and computers	56.8	5.6	4.1	-1.7
31	Electrical machinery	-19.8	4.9	4.8	10.2
32	Radio. TV and Comm. Equip.	-37.0	6.5	7.8	24.3
33	Medical and optical instr.	8.1	3.5	8.4	7.3
34	Motor vehicles	-15.4	4.2	-8.5	3.5
35	Other transp. Equip.	19.5	5.2	13.4	4.9
36	Furniture and other	-24.4	4.4	2.3	9.9
37	Recycle	14.0	4.8	-1.0	6.3
	Total	-9.1	4.4	2.9	8.3

Notes: 1. Firm exit after 2005 cannot be observed due to its definition.
Notes: 2. The share of skilled workers is available only for large firms, i.e. those filing a complete form.

Table 2: Import share of China and other low-wage countries across manufacturing industries over the period of analysis

		Import share (%)		Import share(%)		Import share change	
Nace	Industry	China 1996	BJS 1996	China 2007	BJS 2007	China 96-07	BJS 96-07
15	Food	0.1	0.5	0.4	1.0	0.2	0.5
16	Tobacco	0.0	0.0	0.0	0.1	0.0	0.1
17	Textile	1.4	4.7	6.0	5.5	4.7	0.8
18	Apparel	4.2	4.9	21.7	12.0	17.4	7.1
19	Leather product and footwear	15.9	4.2	32.0	15.2	16.0	11.0
20	Wood products	0.7	0.3	3.9	0.6	3.2	0.3
21	Paper	0.0	0.0	0.8	0.0	0.8	0.0
22	Publishing	0.1	0.0	0.8	0.1	0.7	0.0
23	Nuclear	NA	NA	NA	NA	NA	NA
24	Chemical	0.4	0.1	0.6	0.3	0.2	0.1
25	Rubber and plastic	0.6	0.3	2.9	0.5	2.3	0.2
26	Non-metallic mineral	0.3	0.2	3.2	1.0	2.9	0.8
27	Basic metal	0.3	0.6	3.8	2.5	3.5	1.8
28	Fabricated metal	0.8	0.1	3.2	0.3	2.5	0.2
29	Machinery and equipment	0.6	0.0	3.1	0.2	2.5	0.2
30	Office machinery and computers	1.6	0.0	16.8	0.0	15.1	0.0
31	Electrical machinery	1.3	0.0	5.6	0.4	4.3	0.3
32	Radio, TV and Comm. Equip.	3.5	0.0	10.3	0.3	6.9	0.3
33	Medical and optical instr.	1.8	0.0	3.8	0.4	2.0	0.3
34	Motor vehicles	0.0	0.0	0.3	0.1	0.3	0.1
35	Other transp. Equip.	0.4	0.1	5.1	0.5	4.7	0.5
36	Furniture	3.8	8.3	13.4	13.2	9.6	4.9
37	Recycle	0	0	0	0	0	0
	Total	0.9	0.9	3.0	1.3	2.1	0.4

Notes: NA for industry 23 means not available

Table 3: Share of outsourcing firms in Belgium manufacturing industries (finished goods)

Nace	Industry	Share of firms that import finished goods from (%)				Changes (percentage)	
		China 1996	BJS 1996	China 2007	BJS 2007	China 96-07	BJS 96-07
15	Food	0.4	0.5	0.6	0.7	0.2	0.2
16	Tobacco	0.0	7.1	0.0	0.0	0.0	-7.1
17	Textile	0.8	2.4	4.5	4.2	3.7	1.8
18	Apparel	3.1	3.5	7.9	6.0	4.8	2.5
19	Leather product and footwear	7.4	6.7	9.4	5.5	2.0	-1.2
20	Wood products	0.4	0.7	0.8	0.4	0.4	-0.3
21	Paper	0.0	0.0	2.4	0.3	2.4	0.3
22	Publishing	0.4	0.1	0.8	0.3	0.4	0.2
23	Nuclear	0.0	0.0	0.0	7.0	0.0	7.0
24	Chemical	2.8	2.4	7.9	3.7	5.9	1.0
25	Rubber and plastic	0.7	0.9	6.6	1.9	5.1	1.3
26	Non-metallic mineral	0.2	3	4.5	2.3	4.3	-0.7
27	Basic metal	2.5	1.9	5.9	4.2	3.4	2.3
28	Fabricated metal	0.3	0.1	1.0	0.4	0.7	0.3
29	Machinery and equipment	0.8	1.1	4.5	2.1	3.7	1.0
30	Office machinery and computers	2.6	1.3	4.5	1.5	1.9	0.2
31	Electrical machinery	1.7	1.0	9.0	2.8	7.3	1.8
32	Radio. TV and Comm. Equip.	4.4	2.2	14.0	4.1	9.6	1.9
33	Medical and optical instr.	0.6	0.4	3.2	1.3	2.6	0.9
34	Motor vehicles	0.3	0.3	3.9	1.6	3.6	1.3
35	Other transp. Equip.	1.0	0.0	4.2	2.3	3.2	2.3
36	Furniture	1.2	0.7	3.8	1.1	2.6	0.4
37	Recycle	0	0	0	0	0	0
	Total	0.8	1.0	2.8	1.4	2.0	0.4

Table 4: Share of outsourcing firms in Belgium manufacturing industries (intermediate goods)

Nace	Industry	Share of firms that import intermediate goods from (%)				Changes (percentage)	
		China 1996	BJS 1996	China 2007	BJS 2007	China 96-07	BJS 96-07
15	Food	1.1	1.1	2.4	1.3	1.3	0.2
16	Tobacco	14.3	42.9	10.3	51.7	-4.0	8.8
17	Textile	2.2	11.4	9.4	10.2	7.2	-1.2
18	Apparel	2.7	2.9	9.3	6.0	6.6	3.1
19	Leather product and footwear	6.7	4.4	6.3	2.4	-0.4	-2.0
20	Wood products	0.6	0.3	2.8	0.7	2.2	0.4
21	Paper	1.9	1.6	6.9	1.4	5.0	-0.2
22	Publishing	0.6	0.2	1.6	0.2	1.0.	0.0
23	Nuclear	3.1	0.0	9.3	0.0	6.2	0.0
24	Chemical	5.6	4.1	15.1	8.4	9.5	4.3
25	Rubber and plastic	1.3	1.7	10.6	4.8	9.3	3.1
26	Non-metallic mineral	0.8	2.0	5.9	3.1	5.1	1.1
27	Basic metal	4.3	2.8	14.1	6.5	9.8	3.7
28	Fabricated metal	0.5	0.5	3.5	1.0	3.0	0.5
29	Machinery and equipment	1.2	1.3	6.6	2.4	5.4	1.1
30	Office machinery and computers	5.2	0.0	11.4	2.3	6.2	2.3
31	Electrical machinery	2.9	1.3	13.4	5.1	10.5	3.8
32	Radio. TV and Comm. Equip.	6.0	2.2	20.5	9.9	14.5	7.7
33	Medical and optical instr.	0.7	0.4	5.0	2.0	4.3	1.6
34	Motor vehicles	1.2	0.3	7.6	2.6	6.4	2.3
35	Other transp. Equip.	1.9	1.0	5.0	2.3	3.1	1.3
36	Furniture	1.3	1.3	3.6	1.3	2.3	0.0
37	Recycle	0.3	2.4	1.3	1.5	1.0	-0.9
	Total	1.4	1.9	5.0	2.5	3.6	0.6

Table 5: Import Competition Analysis. Employment Growth: ΔE_{it+1}

Dep. Variable:	ΔE_{it+1}					
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	FE	FE	FE	IV	IV	IV
			Controls			
NP/E_{it}	-0.0966^a	-0.1017^a	-0.0953^a	-0.0953^a	-0.1055^a	-0.0941^a
	(0.0131)	(0.0138)	(0.0131)	(0.0125)	(0.0139)	(0.0125)
$\log(K/E)_{it}$	0.0325^a	0.0326^a	0.0325^a	0.0326^a	0.0341^a	0.0325^a
	(0.0021)	(0.0023)	(0.0021)	(0.0019)	(0.0022)	(0.0019)
$\log(VA/E)_{it}$	0.0996^a	0.0985^a	0.0994^a	0.0994^a	0.0973^a	0.0993^a
	(0.0046)	(0.0049)	(0.0046)	(0.0043)	(0.0047)	(0.0043)
$\log(E)_{it}$	-0.2680^a	-0.2682^a	-0.2691^a	-0.2696^a	-0.2703^a	-0.2706^a
	(0.0124)	(0.0124)	(0.0124)	(0.0124)	(0.0125)	(0.0123)
$\log(Age)_{it}$	-0.0161^a	-0.0154^a	-0.0164^a	-0.0154^a	-0.0142^a	-0.0157^a
	(0.0054)	(0.0054)	(0.0054)	(0.0049)	(0.0050)	(0.0049)
$\log(Intang.K/E)_{it}$	0.0196^c	0.0195^c	0.0196^c	0.0199^c	0.0193^c	0.0196^c
	(0.0109)	(0.0109)	(0.0109)	(0.0109)	(0.0110)	(0.0109)
			Import Competition Variables			
OECD $IMPSHARE_{jt}$	0.0296	0.0291	0.0274	0.1164	0.2210	0.0953
	(0.0259)	(0.0259)	(0.0260)	(0.2603)	(0.2914)	(0.2040)
Other $IMPSHARE_{jt}$	0.0268	0.0259	-0.0087	1.0041^b	0.7688^c	0.5654
	(0.0535)	(0.0535)	(0.0535)	(0.4270)	(0.4176)	(0.3967)
BJS $IMPSHARE_{jt}$	-0.4593^a	-0.4932	-0.4842^a	-0.9198^b	-0.0296	-0.7063^c
	(0.1379)	(0.3713)	(0.1448)	(0.4676)	(0.7765)	(0.4145)
$\times NP/E_{it}$		-0.1900			0.3072	
		(0.3623)			(0.5357)	
$\times\log(K/E)_{it}$		0.0670			0.1131	
		(0.0452)			(0.0793)	
$\times\log(VA/E)_{it}$		-0.1199			0.0651	
		(0.0967)			(0.1623)	
China $IMPSHARE_{jt}$	-0.3883^a	-0.2746	-0.5716^a	-0.2035	-0.9210^b	-0.5167^b
	(0.0743)	(0.2476)	(0.0864)	(0.2555)	(0.3753)	(0.2508)
$\times NP/E_{it}$		0.3162^c			0.2437	
		(0.1862)			(0.2643)	
$\times\log(K/E)_{it}$		-0.0409			-0.1253^a	
		(0.0315)			(0.0417)	
$\times\log(VA/E)_{it}$		0.1157^c			0.0334	
		(0.0682)			(0.0801)	
$\times$Medium-low tech.$_{jt}$			0.6773^a			0.7517^b
			(0.1413)			(0.3734)
$\times$Medium-high tech.$_{jt}$			0.3904^b			0.5634^c
			(0.1812)			(0.2961)
$\times$High tech.$_{jt}$			0.4054			-0.0239
			(0.2943)			(0.6602)
Number of endogenous variables				4	10	7
Number of instruments				8	20	14
Under-identification statistic				156.921	191.247	202.851
				(0.0000)	(0.0000)	(0.0000)
Weak identification statistic				21.271	10.027	15.096
Hansen J statistic				42.775	57.086	43.342
				(0.0000)	(0.0000)	(0.0000)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	119,399	119,399	119,399	117,526	117,526	117,526
R-squared	0.1681	0.1682	0.1684	0.1644	0.1654	0.1672
Number of firms	16,915	16,915	16,915	15,289	15,289	15,289

1.Robust standard errors (p-values) in parentheses for coefficients (test statistics)

2.^{abc}indicate the significance of the coefficient,^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1

3.*indicates the significance of interaction plus the level coefficient, *** p<0.01, ** p<0.05, * p<0.1

Table 6: Import Competition Analysis. Firm Exit: Death_{it+1}

Dep. Variable:	Death_{it+1}					
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	FE	FE	FE	IV	IV	IV
			Controls			
NP/E_{it}	-0.0008	-0.0012	-0.0010	-0.0005	0.0017	-0.0003
	(0.0047)	(0.0050)	(0.0047)	(0.0044)	(0.0049)	(0.0044)
$\log(K/E)_{it}$	-0.0040^a	-0.0027^a	-0.0039^a	-0.0040^a	-0.0031^a	-0.0040^a
	(0.0009)	(0.0010)	(0.0009)	(0.0009)	(0.0010)	(0.0009)
$\log(VA/E)_{it}$	-0.0287^a	-0.0289^a	-0.0286^a	-0.0288^a	-0.0272^a	-0.0288^a
	(0.0021)	(0.0023)	(0.0021)	(0.0019)	(0.0023)	(0.0019)
$\log(E)_{it}$	-0.0189^a	-0.0189^a	-0.0188^a	-0.0208^a	-0.0201^a	-0.0210^a
	(0.0047)	(0.0047)	(0.0047)	(0.0043)	(0.0043)	(0.0043)
$\log(Age)_{it}$	0.0539^a	0.0541^a	0.0540^a	0.0549^a	0.0547^a	0.0552^a
	(0.0030)	(0.0030)	(0.0030)	(0.0028)	(0.0028)	(0.0028)
$\log(Intang.K/E)_{it}$	0.0075^c	0.0075^c	0.0075^c	0.0063	0.0065	0.0060
	(0.0044)	(0.0043)	(0.0044)	(0.0039)	(0.0039)	(0.0039)
			Import Competition Variables			
OECD $IMPSHARE_{jt}$	0.0102	0.0104	0.0099	0.1614	0.1505	0.1884^c
	(0.0112)	(0.0113)	(0.0113)	(0.1327)	(0.1286)	(0.1100)
Other $IMPSHARE_{jt}$	0.0200	0.0172	0.0270	-0.6189^a	-0.4346^c	-0.5234^b
	(0.0223)	(0.0222)	(0.0223)	(0.2351)	(0.2257)	(0.2172)
BJS $IMPSHARE_{jt}$	0.0795	-0.1486	0.0949	0.5927^b	-0.1735	0.5994^b
	(0.0631)	(0.1609)	(0.0654)	(0.2748)	(0.3381)	(0.2432)
$\times NP/E_{it}$		-0.1567			-0.0102	
		(0.1367)			(0.2066)	
$\times\log(K/E)_{it}$		-0.0134			-0.0299	
		(0.0249)			(0.0402)	
$\times\log(VA/E)_{it}$		-0.0647			-0.1616^c	
		(0.0522)			(0.0928)	
China $IMPSHARE_{jt}$	0.0006	-0.0398	0.0310	-0.2470	0.0193	-0.2167
	(0.0347)	(0.1006)	(0.0398)	(0.1595)	(0.1948)	(0.1496)
$\times NP/E_{it}$		0.1223			-0.0881	
		(0.0884)			(0.1359)	
$\times\log(K/E)_{it}$		-0.0426^b			-0.0155	
		(0.0171)			(0.0231)	
$\times\log(VA/E)_{it}$		0.0515			0.0432	
		(0.0324)			(0.0430)	
$\times$Medium-low tech.$_{jt}$			-0.1621^{b**}			0.2056
			(0.0658)			(0.1821)
$\times$Medium-high tech.$_{jt}$			0.0259			0.4140^b
			(0.0937)			(0.1960)
$\times$High tech.$_{jt}$			-0.1340			-0.3244^*
			(0.1260)			(0.3339)
Number of endogenous variables				4	10	7
Number of instruments				8	20	14
Under-identification statistic				169.221	225.137	193.770
				(0.0000)	(0.0000)	(0.0000)
Weak identification statistic				25.822	12.968	15.826
Hansen J statistic				1.395	23.006	3.005
				(0.8450)	(0.0107)	(0.8845)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	116,140	116,140	116,140	114,474	114,474	114,474
R-squared	0.0261	0.0263	0.0261	0.0150	0.0200	0.0165
Number of firms	17,366	17,366	17,366	15,891	15,891	15,891

1.Robust standard errors (p-values) in parentheses for coefficients (test statistics)
2.$^{a\,b\,c}$indicate the significance of the coefficient,^{a} $p<0.01$, ^{b} $p<0.05$, ^{c} $p<0.1$
3.*indicates the significance of interaction plus the level coefficient, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 7: Firm-Level Outsourcing Analysis. Employment Growth (ΔE_{it+1}) and Firm Exit ($Death_{it+1}$)

Dep. Variable	ΔE_{it+1}	ΔE_{it+1}	ΔE_{it+1}	$Death_{it+1}$	$Death_{it+1}$	$Death_{it+1}$
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	FE	IV1	IV2	FE	IV1	IV2
	Controls (Import Competition Variables not Reported)					
NP/E_{it}	-0.0939^a	-0.0903^a	-0.0916^a	-0.0012	-0.0037	-0.0040
	(0.0132)	(0.0130)	(0.0129)	(0.0047)	(0.0044)	(0.0043)
$\log(K/E)_{it}$	0.0318^a	0.0314^a	0.0314^a	-0.0036^a	-0.0033^a	-0.0033^a
	(0.0021)	(0.0019)	(0.0019)	(0.0009)	(0.0009)	(0.0009)
$\log(VA/E)_{it}$	0.1073^a	0.1154^a	0.1154^a	-0.0320^a	-0.0377^a	-0.0375^a
	(0.0050)	(0.0051)	(0.0051)	(0.0023)	(0.0022)	(0.0022)
$\log(E)_{it}$	-0.2711^a	-0.2827^a	-0.2821^a	-0.0194^a	-0.0252^a	-0.0237^a
	(0.0123)	(0.0107)	(0.0104)	(0.0047)	(0.0043)	(0.0042)
$\log(Age)_{it}$	-0.0119^b	0.0159^b	0.0146^b	0.0512^a	0.0498^a	0.0489^a
	(0.0055)	(0.0064)	(0.0061)	(0.0030)	(0.0034)	(0.0032)
$\log(Intang.K/E)_{it}$	0.0184^c	0.0067	0.0059	0.0074^c	0.0039	0.0049
	(0.0109)	(0.0086)	(0.0084)	(0.0044)	(0.0039)	(0.0038)
	Firm-Level Outsourcing Variables					
OECD $OUTFIN_{it}$	0.0079	-0.0119	-0.0101	-0.0026	0.0603^b	0.0639^a
	(0.0258)	(0.0487)	(0.0475)	(0.0116)	(0.0249)	(0.0246)
OECD $OUTINT_{it}$	0.1008^a	0.1276^a	0.1296^a	-0.0178^b	0.0009	-0.0006
	(0.0198)	(0.0460)	(0.0458)	(0.0083)	(0.0221)	(0.0219)
Other $OUTFIN_{it}$	0.0664	0.1284	0.1596	-0.0457	-0.0744	-0.0804
	(0.0543)	(0.1005)	(0.0988)	(0.0313)	(0.0518)	(0.0518)
Other $OUTINT_{it}$	0.1083	0.1860	0.1478	0.0331	-0.0849	-0.0535
	(0.0979)	(0.1817)	(0.1777)	(0.0382)	(0.1301)	(0.1256)
BJS $OUTFIN_{it}$	-0.0824	0.2898	0.1753	-0.0045	0.0692	0.1147
	(0.1679)	(0.4980)	(0.4786)	(0.0441)	(0.1589)	(0.1536)
BJS $OUTINT_{it}$	-0.0863	-0.4877	-0.4760	-0.0457	-0.2105	-0.2258
	(0.1479)	(0.4229)	(0.4223)	(0.0933)	(0.2282)	(0.2236)
China $OUTFIN_{it}$	-0.3111^b	-0.3050^c	-0.3182^c	-0.1079^b	-0.1684^b	-0.1739^b
	(0.1389)	(0.1832)	(0.1827)	(0.0524)	(0.0799)	(0.0764)
China $OUTINT_{it}$	0.0529	-0.0629	-0.0750	-0.0732	0.2885^c	0.3152^b
	(0.1982)	(0.2399)	(0.2354)	(0.0719)	(0.1564)	(0.1530)
Number of endogenous variables		12	8		12	8
Number of instruments		32	24		32	24
Under-identification statistic		180.346	30.995		178.640	31.330
		(0.0000)	(0.0200)		(0.0000)	(0.0182)
Weak identification statistic		5.935	1.181		6.613	1.356
Hansen J statistic		57.785	18.620		13.114	10.300
		(0.0000)	(0.2889)		(0.8724)	(0.8505)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	118,717	112,490	112,742	115,437	108,919	109,114
R-squared	0.1712	0.1660	0.1702	0.0266	0.0213	0.0272
Number of firms	16,835	14,692	14,707	17,296	15,158	15,171

1.FG indicates finished goods, IG indicates intermediate goods
2.Coefficients for industry-level trade variables are not reported
3.IV1 use IV's for both firm- and industry-level imports
4.IV2 only use IV's for firm-level imports and treat industry imports as exogenous
5.Firm level imports are measured by imports over turnover
6.Robust standard errors (p-values) in parentheses for coefficients (test statistics)
7.$^{a\,b\,c}$indicate the significance of the coefficient,^{a} $p<0.01$, ^{b} $p<0.05$, ^{c} $p<0.1$

Table 8: Import Competition Analysis. Share of Non-Production Workers: NP/E_{it+1}

Dep. Variable:	NP/E_{it+1}			
Specification	(1)	(2)	(3)	(4)
Estimation Method	FE	FE	IV	IV
		Controls		
$\log(K/E)_{it}$	0.0016^{c}	0.0016^{c}	0.0015^{b}	0.0016^{b}
	(0.0009)	(0.0009)	(0.0006)	(0.0006)
$\log(VA/E)_{it}$	-0.0085^{a}	-0.0084^{a}	-0.0083^{a}	-0.0082^{a}
	(0.0016)	(0.0016)	(0.0013)	(0.0013)
$\log(E)_{it}$	0.0263^{a}	0.0268^{a}	0.0271^{a}	0.0274^{a}
	(0.0044)	(0.0044)	(0.0031)	(0.0031)
$\log(Age)_{it}$	-0.0005	-0.0005	-0.0001	-0.0001
	(0.0027)	(0.0027)	(0.0020)	(0.0020)
$\log(Intang.K/E)_{it}$	0.0112^{a}	0.0114^{a}	0.0115^{a}	0.0116^{a}
	(0.0039)	(0.0040)	(0.0027)	(0.0027)
		Import Competition Variables		
OECD $IMPSHARE_{jt}$	-0.0142	-0.0130	-0.0288	-0.0155
	(0.0114)	(0.0114)	(0.1069)	(0.0773)
Other $IMPSHARE_{jt}$	-0.0236	-0.0103	-0.0156	-0.0600
	(0.0228)	(0.0228)	(0.1681)	(0.1577)
BJS $IMPSHARE_{jt}$	0.1319^{c}	0.1236^{c}	-0.0125	-0.0525
	(0.0688)	(0.0703)	(0.1749)	(0.1537)
China $IMPSHARE_{jt}$	0.0731^{b}	0.1577^{a}	0.2891^{a}	0.3238^{a}
	(0.0357)	(0.0445)	(0.1118)	(0.1065)
$\times$Medium-low $tech._{jt}$		-0.2514^{a}		-0.3949^{a}
		(0.0707)		(0.1364)
$\times$Medium-high $tech._{jt}$		-0.3589^{a**}		-0.6805^{a***}
		(0.1045)		(0.1317)
$\times$High $tech._{jt}$		-0.0477		-0.6550^{b}
		(0.1435)		(0.2980)
Number of endogenous variables			4	7
Number of instruments			8	14
Under-identification statistic			158.868	206.188
			(0.0000)	(0.0000)
Weak identification statistic			21.459	15.308
Hansen J statistic			4.436	12.855
			(0.3502)	(0.0757)
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Observations	119,316	119,316	117,444	117,444
R-squared	0.0195	0.0201	0.0184	0.0190
Number of firms	16,889	16,889	15,267	15,267

1.Robust standard errors (p-values) in parentheses for coefficients (test statistics)
2.^{abc}indicate the significance of the coefficient,^{a} $p<0.01$, ^{b} $p<0.05$, ^{c} $p<0.1$
3.*indicates the significance of interaction plus the level coefficient ***, $p<0.01$, $p<0.05$, * $p<0.1$

Table 9: Import Competition Analysis. Share of Skilled Workers: S/E_{it+1}

Dep. Variable:	S/E_{it+1}			
Specification	(1)	(2)	(3)	(4)
Estimation Method	FE	FE	IV	IV
		Controls		
$\log(K/E)_{it}$	0.0199	0.0195	0.0187	0.0186
	(0.0176)	(0.0176)	(0.0147)	(0.0147)
$\log(VA/E)_{it}$	0.0409	0.0413	0.0449^{c}	0.0452^{c}
	(0.0284)	(0.0284)	(0.0241)	(0.0241)
$\log(E)_{it}$	0.2039^{a}	0.2048^{a}	0.2090^{a}	0.2093^{a}
	(0.0789)	(0.0790)	(0.0669)	(0.0669)
$\log(Age)_{it}$	-0.0461	-0.0457	-0.0561	-0.0527
	(0.0494)	(0.0495)	(0.0357)	(0.0351)
$\log(Intang.K/E)_{it}$	-0.0142	-0.0137	-0.0123	-0.0123
	(0.0128)	(0.0128)	(0.0119)	(0.0120)
		Import Competition Variables		
OECD $IMPSHARE_{jt}$	-0.0411	-0.0432	-0.3874	-0.1898
	(0.0549)	(0.0548)	(0.3493)	(0.2644)
Other $IMPSHARE_{jt}$	-0.1014	-0.1044	-2.2695^{a}	-2.3051^{a}
	(0.1697)	(0.1672)	(0.7345)	(0.7019)
BJS $IMPSHARE_{jt}$	0.1998	0.0443	0.6816	0.4830
	(0.3338)	(0.3443)	(0.4918)	(0.5125)
China $IMPSHARE_{jt}$	0.5492	0.8636^{c}	1.8586^{a}	2.0796^{a}
	(0.3413)	(0.5067)	(0.4978)	(0.5631)
×Medium-low $tech._{jt}$		-0.0517		0.6849
		(0.7464)		(1.1999)
×Medium-high $tech._{jt}$		-1.0516^{b}		-1.9155^{a}
		(0.5347)		(0.5485)
×High $tech._{jt}$		-0.8052		0.2824
		(0.5413)		(1.0544)
Number of endogenous variables			4	7
Number of instruments			8	14
Under-identification statistic			48.547	64.185
			(0.0000)	(0.0000)
Weak identification statistic			5.755	4.987
Hansen J statistic			12.370	23.490
			(0.0148)	(0.0014)
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Observations	20,056	20,056	19,935	19,935
R-squared	0.3280	0.3281	0.3188	0.3201
Number of firms	2,560	2,560	2,463	2,463

1.Robust standard errors (p-values) in parentheses for coefficients (test statistics)
2.^{abc}indicate the significance of the coefficient,^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1
3.*indicates the significance of interaction plus the level coefficient ***, p<0.01, p<0.05, * p<0.1

Table 10: Firm-Level Outsourcing Analysis. Share of Non-Production (NP/E_{it+1}) and Share of Skilled Workers (S/E_{it+1})

Dep. Variable	NP/E_{it+1}	NP/E_{it+1}	NP/E_{it+1}	S/E_{it+1}	S/E_{it+1}	S/E_{it+1}
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	FE	IV1	IV2	FE	IV1	IV2
	Controls (Import Competition Variables not Reported)					
$\log(K/E)_{it}$	0.0017^{c}	0.0014^{b}	0.0015^{b}	0.0182	0.0136	0.0149
	(0.0009)	(0.0007)	(0.0007)	(0.0174)	(0.0145)	(0.0144)
$\log(VA/E)_{it}$	-0.0102^{a}	-0.0108^{a}	-0.0111^{a}	0.0456	0.0553^{b}	0.0494^{b}
	(0.0016)	(0.0014)	(0.0014)	(0.0293)	(0.0250)	(0.0247)
$\log(E)_{it}$	0.0259^{a}	0.0272^{a}	0.0267^{a}	0.2014^{b}	0.2015^{a}	0.1967^{a}
	(0.0044)	(0.0032)	(0.0031)	(0.0788)	(0.0673)	(0.0671)
$\log(Age)_{it}$	-0.0030	-0.0031	-0.0040	-0.0410	-0.0441	-0.0353
	(0.0028)	(0.0026)	(0.0025)	(0.0500)	(0.0360)	(0.0354)
$\log(Intang.K/E)_{it}$	0.0113^{a}	0.0122^{a}	0.0122^{a}	-0.0139	-0.0113	-0.0135
	(0.0039)	(0.0028)	(0.0028)	(0.0127)	(0.0122)	(0.0119)
	Firm-Level Outsourcing Variables					
OECD $OUTFIN_{it}$	0.0460^{a}	0.0990^{a}	0.0928^{a}	0.1440	0.3494^{b}	0.2577^{c}
	(0.0128)	(0.0208)	(0.0202)	(0.1053)	(0.1621)	(0.1553)
OECD $OUTINT_{it}$	-0.0018	0.0112	0.0077	0.1266^{b}	0.4094^{b}	0.3940^{b}
	(0.0076)	(0.0158)	(0.0157)	(0.0644)	(0.1883)	(0.1870)
Other $OUTFIN_{it}$	0.0207	0.1053^{b}	0.1106^{b}	-0.0906	-0.0802	-0.2264
	(0.0298)	(0.0493)	(0.0493)	(0.1141)	(0.1830)	(0.1835)
Other $OUTINT_{it}$	0.0770^{b}	0.0043	0.0051	0.1501	-0.0943	0.0675
	(0.0318)	(0.0741)	(0.0737)	(0.1278)	(0.4419)	(0.4143)
BJS $OUTFIN_{it}$	0.0627	0.5238^{b}	0.5581^{b}	0.8007	1.5001	1.7324
	(0.0717)	(0.2343)	(0.2406)	(0.6109)	(1.0666)	(1.3139)
BJS $OUTINT_{it}$	0.1106	0.0728	0.0926	0.2988	1.6237^{c}	1.4384
	(0.0995)	(0.1656)	(0.1641)	(0.3212)	(0.8799)	(0.8767)
China $OUTFIN_{it}$	0.1074^{c}	0.1658^{b}	0.2029^{a}	-0.1443	-0.7165	-0.5608
	(0.0553)	(0.0693)	(0.0688)	(0.3911)	(0.6576)	(0.7116)
China $OUTINT_{it}$	0.1722^{b}	0.2618^{b}	0.2727^{b}	-0.0500	-0.4062	-0.4041
	(0.0721)	(0.1100)	(0.1075)	(0.2636)	(0.4605)	(0.3915)
Number of endogenous variables		12	8		12	8
Number of instruments		32	24		32	24
Under-identification statistic		180.203	30.493		77.875	28.208
		(0.0000)	(0.0230)		(0.0000)	(0.0426)
Weak identification statistic		6.086	1.205		2.700	1.182
Hansen J statistic		40.743	35.725		24.555	18.038
		(0.0040)	(0.0032)		(0.2190)	(0.3217)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	118,629	112,390	112,643	20,036	19,897	19,921
R-squared	0.0204	0.0184	0.0192	0.3296	0.3150	0.3273
Number of firms	16,803	14,652	14,666	2,558	2,461	2,461

1.FG indicates finished goods, IG indicates intermediate goods
2.Coefficients for industry-level trade variables are not reported
3.IV1 use IV's for both firm- and industry-level imports
4.IV2 only use IV's for firm-level imports and treat industry imports as exogenous
5.Firm level imports are measured by imports over turnover
6.Robust standard errors (p-values) in parentheses for coefficients (test statistics)
7.^{abc}indicate the significance of the coefficient,^{a} $p<0.01$, ^{b} $p<0.05$, ^{c} $p<0.1$

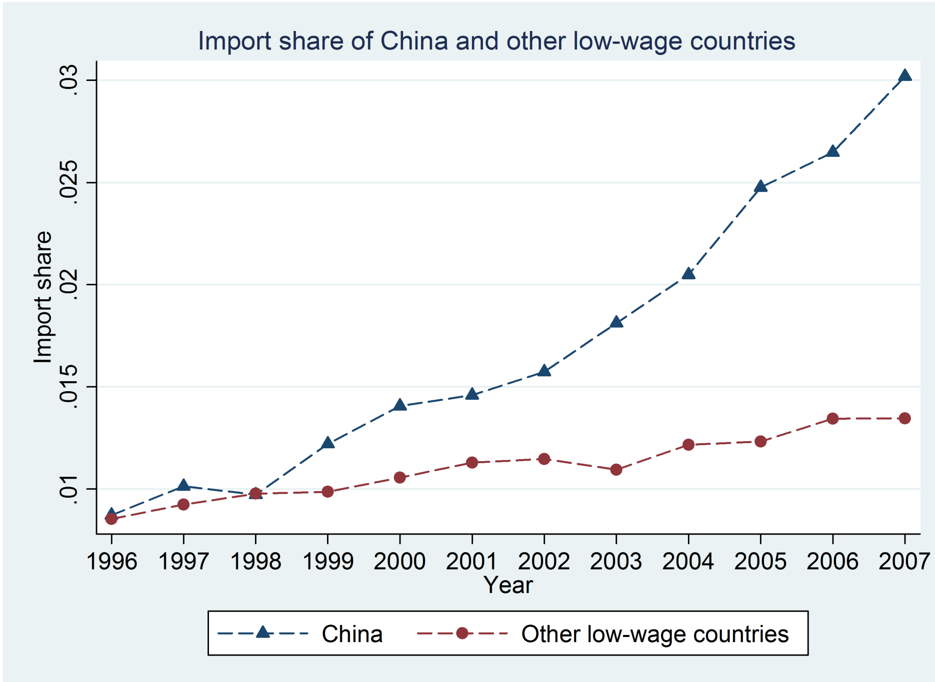

Figure 1: Import share of China and other low-wage countries over the period 1996-2007.

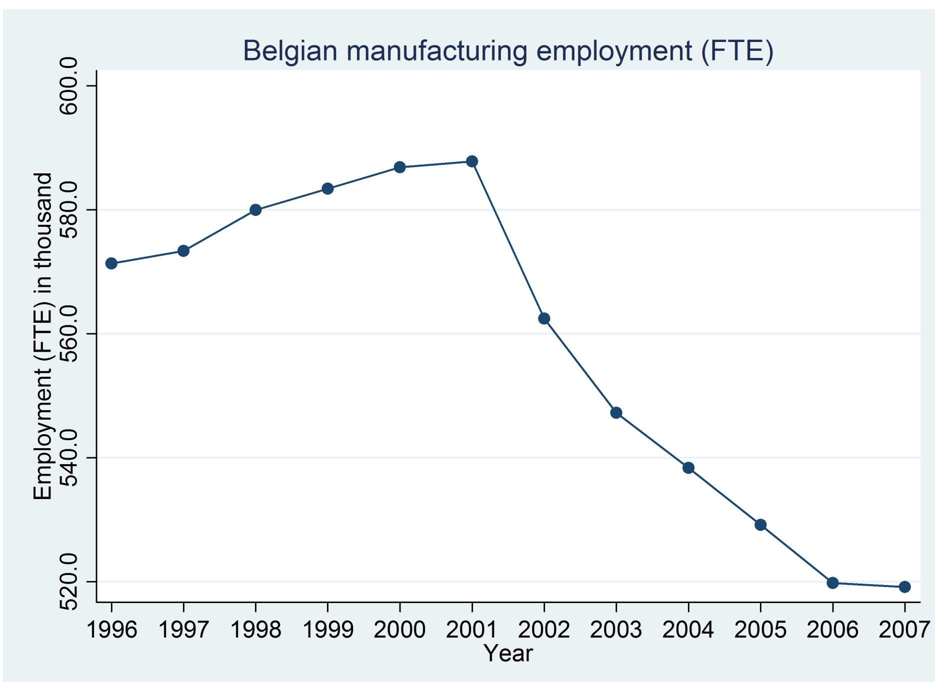

Figure 2: Belgian manufacturing employment in full time equivalent (FTE) over the period 1996-2007.

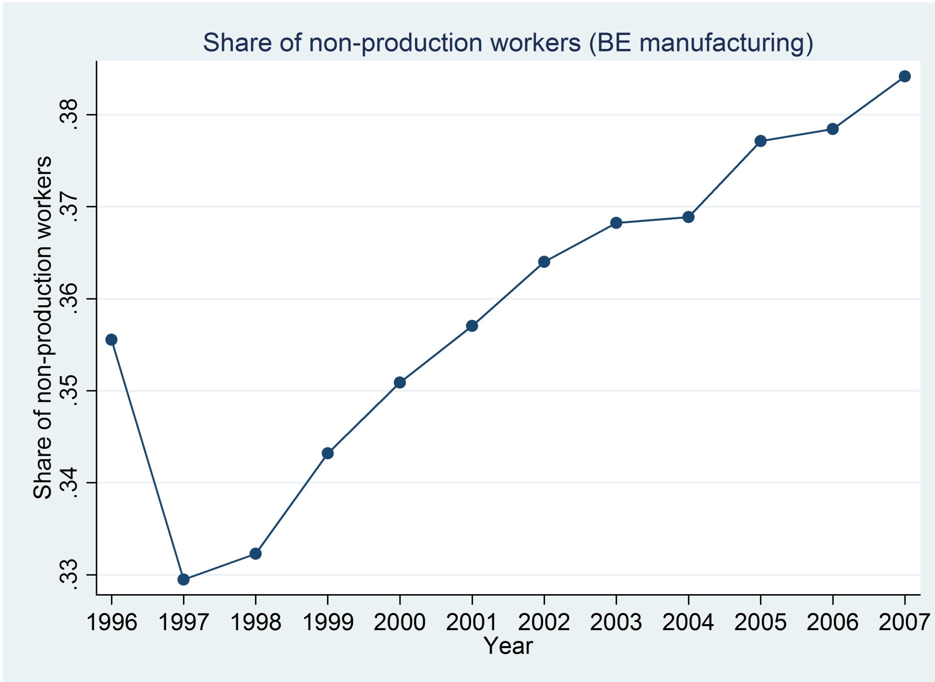

Figure 3: Share of non-production workers in Belgian manufacturing over the period 1996-2007.

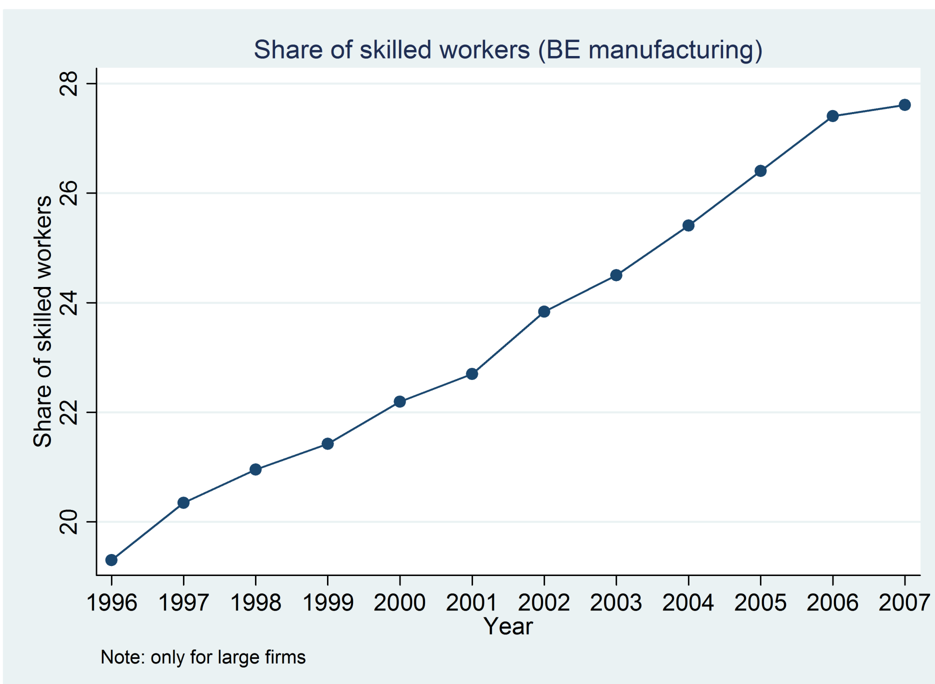

Figure 4: Share of skilled workers in Belgian manufacturing over the period 1996-2007.

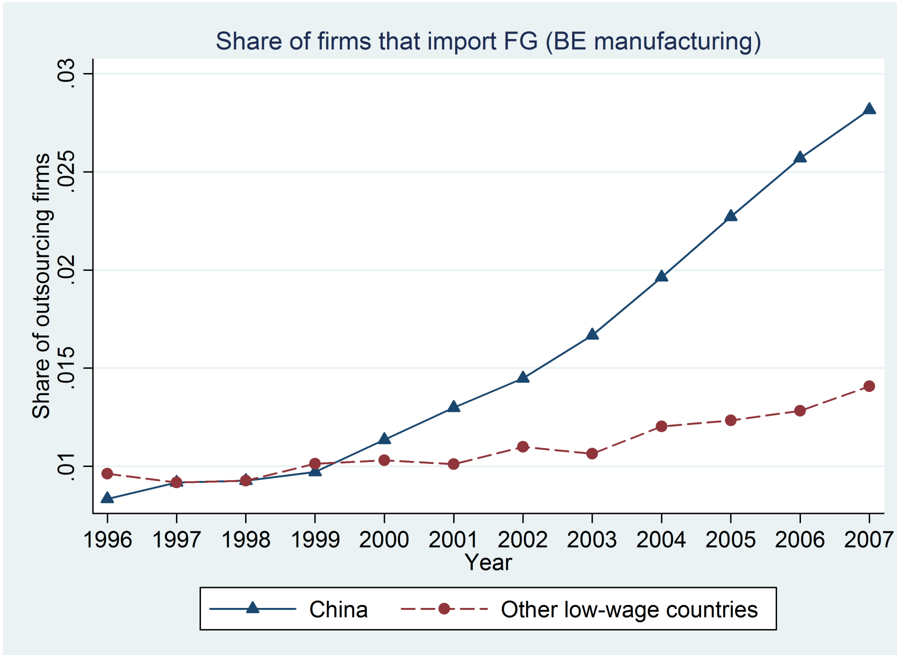

Figure 5: Share of firms involved in outsourcing of final goods from China and LW countries in Belgian manufacturing over the period 1996-2007.

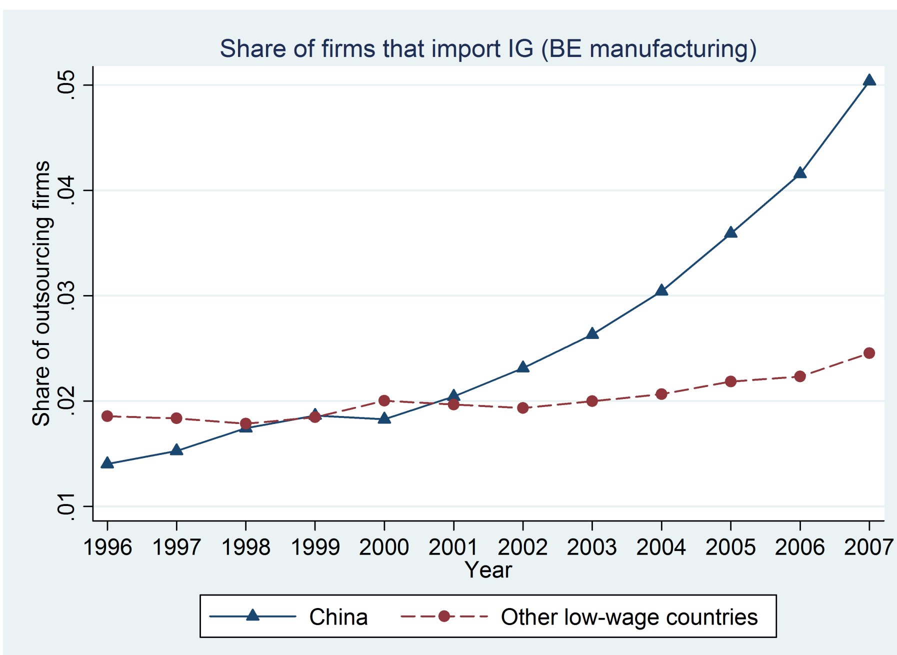

Figure 6: Share of firms involved in outsourcing of intermediate goods from China and LW countries in Belgian manufacturing over the period 1996-2007.

Manufacturing industries	NACE Rev 1.1 codes
High-technology	**24.4** Manufacture of pharmaceuticals, medicinal chemicals and botanical products; **30** Manufacture of office machinery and computers; **32** Manufacture of radio, television and communication equipment and apparatus; **33** Manufacture of medical, precision and optical instruments, watches and clocks; **35.3** Manufacture of aircraft and spacecraft
Medium-high-technology	**24** Manufacture of chemicals and chemical product, **excluding 24.4** Manufacture of pharmaceuticals, medicinal chemicals and botanical products; **29** Manufacture of machinery and equipment n.e.c.; **31** Manufacture of electrical machinery and apparatus n.e.c.; **34** Manufacture of motor vehicles, trailers and semi-trailers; **35** Manufacture of other transport equipment, **excluding 35.1** Building and repairing of ships and boats **and excluding 35.3** Manufacture of aircraft and spacecraft.
Medium-low-technology	**23** Manufacture of coke, refined petroleum products and nuclear fuel; **25 to 28** Manufacture of rubber and plastic products; basic metals and fabricated metal products; other non-metallic mineral products; **35.1** Building and repairing of ships and boats.
Low-technology	**15 to 22** Manufacture of food products, beverages and tobacco; textiles and textile products; leather and leather products; wood and wood products; pulp, paper and paper products, publishing and printing; **36 to 37** Manufacturing n.e.c.

Figure 7: Breakdown of NACE industries depending on their technological intensity,

Appendix: Robustness checks Tables with EU15 import shares

Table 11: Import Competition Analysis. Employment Growth: ΔE_{it+1} (Robust EU15 Imports)

Dep. Variable:	ΔE_{it+1}					
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	FE	FE	FE	IV	IV	IV
Controls						
NP/E_{it}	-0.1016^a	-0.1071^a	-0.1010^a	-0.0990^a	-0.1025^a	-0.0989^a
	(0.0141)	(0.0150)	(0.0141)	(0.0136)	(0.0158)	(0.0136)
$\log(K/E)_{it}$	0.0321^a	0.0331^a	0.0321^a	0.0316^a	0.0356^a	0.0318^a
	(0.0022)	(0.0024)	(0.0022)	(0.0020)	(0.0025)	(0.0020)
$\log(VA/E)_{it}$	0.1001^a	0.0984^a	0.1000^a	0.1002^a	0.1010^a	0.1002^a
	(0.0049)	(0.0053)	(0.0049)	(0.0046)	(0.0059)	(0.0046)
$\log(E)_{it}$	-0.2614^a	-0.2617^a	-0.2620^a	-0.2637^a	-0.2623^a	-0.2638^a
	(0.0126)	(0.0126)	(0.0126)	(0.0127)	(0.0125)	(0.0126)
$\log(Age)_{it}$	-0.0180^a	-0.0172^a	-0.0180^a	-0.0178^a	-0.0175^a	-0.0177^a
	(0.0057)	(0.0058)	(0.0057)	(0.0051)	(0.0052)	(0.0051)
$\log(Intang.K/E)_{it}$	0.0204^c	0.0202^c	0.0202^c	0.0206^c	0.0205^c	0.0203^c
	(0.0110)	(0.0109)	(0.0110)	(0.0111)	(0.0109)	(0.0110)
Import Competition Variables						
OECD $IMPSHARE_{jt}$	0.0797^c	0.0787	0.0697	0.8679^b	0.2529	0.5932
	(0.0480)	(0.0480)	(0.0483)	(0.4335)	(0.4387)	(0.3878)
Other $IMPSHARE_{jt}$	-0.0442	-0.0446	-0.0588	-0.5000	0.1896	-0.3386
	(0.0767)	(0.0767)	(0.0772)	(0.4320)	(0.4567)	(0.4183)
BJS $IMPSHARE_{jt}$	-0.6803^b	-0.8002	-0.5710^c	-2.3836^b	-1.9124	-1.3861
	(0.2834)	(0.9478)	(0.3007)	(0.9719)	(2.8830)	(1.0427)
$\times NP/E_{it}$		-0.5445			-0.9548	
		(0.6098)			(1.4035)	
$\times\log(K/E)_{it}$		0.0332			-0.1634	
		(0.0809)			(0.1968)	
$\times\log(VA/E)_{it}$		-0.1379			-0.4320	
		(0.2230)			(0.4815)	
China $IMPSHARE_{jt}$	-0.4082^a	-0.3883	-0.5042^a	-0.2604	-0.5634	-0.4930^c
	(0.0915)	(0.2991)	(0.1094)	(0.2412)	(0.5372)	(0.2567)
$\times NP/E_{it}$		0.4516^b			0.5148	
		(0.2066)			(0.3881)	
$\times\log(K/E)_{it}$		-0.0553			-0.0605	
		(0.0362)			(0.0592)	
$\times\log(VA/E)_{it}$		0.1264^c			0.1756^c	
		(0.0718)			(0.1017)	
$\times$Medium-low tech.$_{jt}$			0.5757^a			0.9332^b
			(0.2119)			(0.4750)
$\times$Medium-high tech.$_{jt}$			0.2909			0.5680^c
			(0.2048)			(0.3027)
$\times$High tech.$_{jt}$			0.2470			-0.3978**
			(0.2488)			(0.5365)
Number of endogenous variables				4	10	7
Number of instruments				8	20	14
Under-identification statistic				361.929	469.684	248.384
				(0.0000)	(0.0000)	(0.0000)
Weak identification statistic				46.402	22.561	19.360
Hansen J statistic				46.495	69.702	44.599
				(0.0000)	(0.0000)	(0.0000)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	108,277	108,277	108,277	106,597	106,597	106,597
R-squared	0.1651	0.1652	0.1652	0.1604	0.1642	0.1632
Number of firms	15,123	15,123	15,123	13,717	13,717	13,717

1.Robust standard errors (p-values) in parentheses for coefficients (test statistics)
2.$^{a\,b\,c}$indicate the significance of the coefficient,^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1
3.*indicates the significance of interaction plus the level coefficient, *** p<0.01, ** p<0.05, * p<0.1

Table 12: Import Competition Analysis. Firm Exit: Death_{it+1} (Robust EU15 Imports)

Dep. Variable:			Death_{it+1}			
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	FE	FE	FE	IV	IV	IV
			Controls			
NP/E_{it}	-0.0010	-0.0008	-0.0010	-0.0019	-0.0034	-0.0024
	(0.0050)	(0.0054)	(0.0050)	(0.0046)	(0.0054)	(0.0046)
$\log(\text{K/E})_{it}$	-0.0039^{a}	-0.0021^{b}	-0.0039^{a}	-0.0037^{a}	-0.0016	-0.0037^{a}
	(0.0010)	(0.0011)	(0.0010)	(0.0009)	(0.0012)	(0.0009)
$\log(\text{VA/E})_{it}$	-0.0281^{a}	-0.0287^{a}	-0.0281^{a}	-0.0282^{a}	-0.0303^{a}	-0.0283^{a}
	(0.0022)	(0.0025)	(0.0022)	(0.0020)	(0.0025)	(0.0020)
$\log(\text{E})_{it}$	-0.0182^{a}	-0.0181^{a}	-0.0182^{a}	-0.0177^{a}	-0.0179^{a}	-0.0176^{a}
	(0.0047)	(0.0047)	(0.0047)	(0.0042)	(0.0042)	(0.0043)
$\log(\text{Age})_{it}$	0.0523^{a}	0.0526^{a}	0.0523^{a}	0.0526^{a}	0.0530^{a}	0.0523^{a}
	(0.0032)	(0.0032)	(0.0032)	(0.0029)	(0.0029)	(0.0029)
$\log(\text{Intang.K/E})_{it}$	0.0070	0.0069	0.0069	0.0070^{c}	0.0071^{c}	0.0069^{c}
	(0.0043)	(0.0043)	(0.0043)	(0.0039)	(0.0039)	(0.0039)
			Import Competition Variables			
OECD $IMPSHARE_{jt}$	0.0073	0.0063	0.0046	-0.1641	0.0034	-0.4062^{b}
	(0.0231)	(0.0231)	(0.0234)	(0.2512)	(0.2357)	(0.2070)
Other $IMPSHARE_{jt}$	-0.0096	-0.0086	-0.0097	0.2426	0.0271	0.3554
	(0.0250)	(0.0251)	(0.0250)	(0.2441)	(0.2403)	(0.2531)
BJS $IMPSHARE_{jt}$	0.1363	-0.1134	0.1591	1.0210	-0.3585	1.8134^{b}
	(0.1175)	(0.3126)	(0.1220)	(0.7016)	(0.6633)	(0.7216)
$\times\text{NP/E}_{it}$		-0.4266^{c}			0.7217	
		(0.2542)			(0.4604)	
$\times\log(\text{K/E})_{it}$		-0.0443			-0.2514^{a}	
		(0.0425)			(0.0906)	
$\times\log(\text{VA/E})_{it}$		-0.0528			0.2651	
		(0.0903)			(0.1626)	
China $IMPSHARE_{jt}$	-0.0069	-0.1110	-0.0206	-0.1334	0.1341	-0.3173^{c}
	(0.0413)	(0.1156)	(0.0477)	(0.1688)	(0.2267)	(0.1757)
$\times\text{NP/E}_{it}$		0.1954^{c}			-0.2194	
		(0.1005)			(0.1729)	
$\times\log(\text{K/E})_{it}$		-0.0510^{b}			0.0265	
		(0.0199)			(0.0297)	
$\times\log(\text{VA/E})_{it}$		0.0538			-0.0383	
		(0.0360)			(0.0511)	
$\times\text{Medium-low tech.}_{jt}$			-0.2050^{c**}			-0.1309^{*}
			(0.1091)			(0.2178)
$\times\text{Medium-high tech.}_{jt}$			0.0810			0.4164^{b}
			(0.1050)			(0.2070)
$\times\text{High tech.}_{jt}$			0.1579			0.6886^{b*}
			(0.1242)			(0.3171)
Number of endogenous variables				4	10	7
Number of instruments				8	20	14
Under-identification statistic				185.995	271.800	174.608
				(0.0000)	(0.0000)	(0.0000)
Weak identification statistic				26.614	15.186	13.393
Hansen J statistic				13.991	35.103	13.548
				(0.0073)	(0.0001)	(0.0598)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	105,206	105,206	105,206	103,743	103,743	103,743
R-squared	0.0261	0.0265	0.0262	0.0238	0.0253	0.0184
Number of firms	15,509	15,509	15,509	14,263	14,263	14,263

1.Robust standard errors (p-values) in parentheses for coefficients (test statistics)
2.^{abc}indicate the significance of the coefficient,^{a} $p<0.01$, ^{b} $p<0.05$, ^{c} $p<0.1$
3.*indicates the significance of interaction plus the level coefficient, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 13: Firm-Level Outsourcing Analysis. Employment Growth (ΔE_{it+1}) and Firm Exit ($Death_{it+1}$): Robust EU15 Imports

Dep. Variable	ΔE_{it+1}	ΔE_{it+1}	ΔE_{it+1}	$Death_{it+1}$	$Death_{it+1}$	$Death_{it+1}$
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	FE	IV1	IV2	FE	IV1	IV2
Controls (Import Competition Variables not Reported)						
NP/E_{it}	-0.0991^a	-0.0961^a	-0.0988^a	-0.0011	-0.0046	-0.0039
	(0.0141)	(0.0140)	(0.0139)	(0.0050)	(0.0046)	(0.0045)
$\log(K/E)_{it}$	0.0314^a	0.0303^a	0.0307^a	-0.0036^a	-0.0033^a	-0.0034^a
	(0.0021)	(0.0020)	(0.0020)	(0.0010)	(0.0009)	(0.0009)
$\log(VA/E)_{it}$	0.1068^a	0.1144^a	0.1143^a	-0.0312^a	-0.0361^a	-0.0360^a
	(0.0053)	(0.0054)	(0.0054)	(0.0024)	(0.0023)	(0.0023)
$\log(E)_{it}$	-0.2647^a	-0.2776^a	-0.2759^a	-0.0185^a	-0.0223^a	-0.0225^a
	(0.0125)	(0.0108)	(0.0106)	(0.0047)	(0.0042)	(0.0042)
$\log(Age)_{it}$	-0.0142^b	0.0095	0.0085	0.0496^a	0.0482^a	0.0481^a
	(0.0059)	(0.0065)	(0.0065)	(0.0032)	(0.0034)	(0.0034)
$\log(Intang.K/E)_{it}$	0.0192^c	0.0071	0.0065	0.0069	0.0045	0.0046
	(0.0109)	(0.0086)	(0.0084)	(0.0043)	(0.0038)	(0.0038)
Firm-Level Outsourcing Variables						
OECD $OUTFIN_{it}$	0.0140	-0.0144	-0.0012	-0.0032	0.0570^b	0.0578^b
	(0.0256)	(0.0506)	(0.0478)	(0.0117)	(0.0276)	(0.0246)
OECD $OUTINT_{it}$	0.0991^a	0.1372^a	0.1360^a	-0.0179^b	-0.0024	-0.0027
	(0.0199)	(0.0479)	(0.0464)	(0.0085)	(0.0236)	(0.0222)
Other $OUTFIN_{it}$	0.0702	0.1791^c	0.1625	-0.0438	-0.0805	-0.0790
	(0.0548)	(0.0994)	(0.0994)	(0.0316)	(0.0521)	(0.0520)
Other $OUTINT_{it}$	0.1170	0.1720	0.1748	0.0346	-0.0338	-0.0467
	(0.1010)	(0.1833)	(0.1829)	(0.0396)	(0.1307)	(0.1297)
BJS $OUTFIN_{it}$	-0.0822	0.1620	0.1316	-0.0053	0.1363	0.1151
	(0.1683)	(0.4635)	(0.4718)	(0.0446)	(0.1586)	(0.1535)
BJS $OUTINT_{it}$	-0.0713	-0.4605	-0.4490	-0.0452	-0.2625	-0.2325
	(0.1470)	(0.4220)	(0.4223)	(0.0934)	(0.2236)	(0.2242)
China $OUTFIN_{it}$	-0.3160^b	-0.3022^c	-0.3188^c	-0.1091^b	-0.1746^b	-0.1741^b
	(0.1345)	(0.1815)	(0.1816)	(0.0522)	(0.0777)	(0.0757)
China $OUTINT_{it}$	0.0694	-0.0603	-0.0409	-0.0781	0.2978^b	0.2882^c
	(0.2027)	(0.2453)	(0.2443)	(0.0738)	(0.1502)	(0.1497)
Number of endogenous variables		12	8		12	8
Number of instruments		32	24		32	24
Under-identification statistic		443.504	30.742		242.704	31.478
		(0.0000)	(0.0215)		(0.0000)	(0.0175)
Weak identification statistic		17.830	1.182		11.129	1.363
Hansen J statistic		57.689	16.523		18.507	10.233
		(0.0000)	(0.4171)		(0.5541)	(0.8542)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	107,684	102,370	102,651	104,595	99,085	99,308
R-squared	0.1679	0.1631	0.1668	0.0267	0.0264	0.0272
Number of firms	15,050	13,222	13,239	15,447	13,661	13,676

1.FG indicates finished goods, IG indicates intermediate goods
2.Coefficients for industry-level trade variables are not reported
3.IV1 use IV's for both firm- and industry-level imports
4.IV2 only use IV's for firm-level imports and treat industry imports as exogenous
5.Firm level imports are measured by imports over turnover
6.Robust standard errors (p-values) in parentheses for coefficients (test statistics)
7.$^{a\,b\,c}$indicate the significance of the coefficient,^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1

Table 14: Import Competition Analysis. Share of Non-Production Workers: NP/E$_{it+1}$ (Robust EU15 Imports)

Dep. Variable:	NP/E$_{it+1}$			
Specification	(1)	(2)	(3)	(4)
Estimation Method	FE	FE	IV	IV
	Controls			
log(K/E)$_{it}$	0.0020^b	0.0020^b	0.0021^a	0.0020^a
	(0.0009)	(0.0009)	(0.0007)	(0.0007)
log(VA/E)$_{it}$	-0.0060^a	-0.0059^a	-0.0059^a	-0.0058^a
	(0.0016)	(0.0016)	(0.0013)	(0.0013)
log(E)$_{it}$	0.0253^a	0.0259^a	0.0265^a	0.0268^a
	(0.0044)	(0.0045)	(0.0031)	(0.0031)
log(Age)$_{it}$	-0.0030	-0.0029	-0.0024	-0.0024
	(0.0029)	(0.0029)	(0.0020)	(0.0020)
log(Intang.K/E)$_{it}$	0.0118^a	0.0121^a	0.0120^a	0.0124^a
	(0.0039)	(0.0040)	(0.0028)	(0.0027)
	Import Competition Variables			
OECD $IMPSHARE_{jt}$	-0.0403^b	-0.0295^c	-0.5015^a	-0.2369
	(0.0174)	(0.0175)	(0.1866)	(0.1580)
Other $IMPSHARE_{jt}$	0.0269	0.0401^c	0.6155^a	0.4597^b
	(0.0226)	(0.0230)	(0.1945)	(0.1785)
BJS $IMPSHARE_{jt}$	0.2114^c	0.1132	0.8957^b	-0.0124
	(0.1221)	(0.1264)	(0.4008)	(0.4402)
China $IMPSHARE_{jt}$	0.1026^b	0.1854^a	0.1751^c	0.3818^a
	(0.0477)	(0.0560)	(0.1020)	(0.1129)
×Medium-low tech.$_{jt}$		-0.3244^a		-0.6451^a
		(0.1132)		(0.1614)
×Medium-high tech.$_{jt}$		-0.4286^{a**}		-0.7210^{a***}
		(0.1215)		(0.1368)
×High tech.$_{jt}$		-0.1581		-0.3618
		(0.1438)		(0.2257)
Number of endogenous variables			4	7
Number of instruments			8	14
Under-identification statistic			339.737	242.889
			(0.0000)	(0.0000)
Weak identification statistic			45.080	19.009
Hansen J statistic			17.365	13.431
			(0.0016)	(0.0623)
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Observations	108,217	108,217	106,536	106,536
R-squared	0.0172	0.0178	0.0002	0.0118
Number of firms	15,101	15,101	13,697	13,697

1.Robust standard errors (p-values) in parentheses for coefficients (test statistics)
2.$^{a\,b\,c}$indicate the significance of the coefficient,^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1
3.*indicates the significance of interaction plus the level coefficient ***, p<0.01, p<0.05, * p<0.1

Table 15: Import Competition Analysis. Share of Skilled Workers: S/E_{it+1} (Robust EU15 Imports)

Dep. Variable:	S/E_{it+1}			
Specification	(1)	(2)	(3)	(4)
Estimation Method	FE	FE	IV	IV
	Controls			
$\log(K/E)_{it}$	0.0216	0.0213	0.0199	0.0199
	(0.0184)	(0.0184)	(0.0152)	(0.0152)
$\log(VA/E)_{it}$	0.0400	0.0401	0.0409^c	0.0397^c
	(0.0288)	(0.0288)	(0.0240)	(0.0239)
$\log(E)_{it}$	0.2045^b	0.2057^b	0.2070^a	0.2069^a
	(0.0802)	(0.0802)	(0.0682)	(0.0680)
$\log(Age)_{it}$	-0.0460	-0.0448	-0.0548	-0.0493
	(0.0503)	(0.0503)	(0.0357)	(0.0353)
$\log(Intang.K/E)_{it}$	-0.0148	-0.0141	-0.0138	-0.0136
	(0.0130)	(0.0130)	(0.0125)	(0.0124)
	Import Competition Variables			
OECD $IMPSHARE_{jt}$	0.0087	0.0198	-0.4520	-0.4840
	(0.0673)	(0.0683)	(0.7754)	(0.6540)
Other $IMPSHARE_{jt}$	-0.0075	0.0070	-0.7593	-0.1927
	(0.0938)	(0.0931)	(1.1224)	(1.0348)
BJS $IMPSHARE_{jt}$	0.5608	0.4041	3.0185	1.5828
	(0.5676)	(0.6155)	(2.2692)	(2.1392)
China $IMPSHARE_{jt}$	0.5951^c	0.9952^c	0.6074	1.1318^c
	(0.3165)	(0.5407)	(0.5813)	(0.5879)
$\times$Medium-low tech.$_{jt}$		-0.3621		-2.2835
		(0.6015)		(2.6313)
$\times$Medium-high tech.$_{jt}$		-1.0753^c		-1.3977^b
		(0.5562)		(0.6107)
$\times$High tech.$_{jt}$		-0.6178		0.7927^{***}
		(0.5601)		(0.6934)
Number of endogenous variables			4	7
Number of instruments			8	14
Under-identification statistic			180.321	209.659
			(0.0000)	(0.0000)
Weak identification statistic			23.524	18.840
Hansen J statistic			9.185	10.193
			(0.0566)	(0.1779)
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Observations	19,602	19,602	19,454	19,454
R-squared	0.3287	0.3289	0.3242	0.3261
Number of firms	2,505	2,505	2,406	2,406

1.Robust standard errors (p-values) in parentheses for coefficients (test statistics)
2.$^{a\,b\,c}$indicate the significance of the coefficient,^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1
3.*indicates the significance of interaction plus the level coefficient ***, p<0.01, p<0.05, * p<0.1

Table 16: Firm-Level Outsourcing Analysis. Share of Non-Production (NP/E_{it+1}) and Share of Skilled Workers (S/E_{it+1}): Robust EU15 Imports

Dep. Variable	NP/E_{it+1}	NP/E_{it+1}	NP/E_{it+1}	S/E_{it+1}	S/E_{it+1}	S/E_{it+1}
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	FE	IV1	IV2	FE	IV1	IV2
	Controls (Import Competition Variables not Reported)					
$\log(K/E)_{it}$	0.0021^b	0.0019^a	0.0018^a	0.0199	0.0154	0.0164
	(0.0009)	(0.0007)	(0.0007)	(0.0182)	(0.0151)	(0.0150)
$\log(VA/E)_{it}$	-0.0072^a	-0.0074^a	-0.0078^a	0.0447	0.0486^c	0.0487^c
	(0.0017)	(0.0015)	(0.0015)	(0.0296)	(0.0249)	(0.0249)
$\log(E)_{it}$	0.0251^a	0.0265^a	0.0256^a	0.2019^b	0.2003^a	0.1967^a
	(0.0044)	(0.0033)	(0.0031)	(0.0800)	(0.0689)	(0.0683)
$\log(Age)_{it}$	-0.0050^c	-0.0043^c	-0.0052^b	-0.0404	-0.0465	-0.0341
	(0.0030)	(0.0026)	(0.0026)	(0.0509)	(0.0370)	(0.0361)
$\log(Intang.K/E)_{it}$	0.0119^a	0.0127^a	0.0127^a	-0.0145	-0.0130	-0.0143
	(0.0039)	(0.0029)	(0.0028)	(0.0129)	(0.0125)	(0.0121)
	Firm-Level Outsourcing Variables					
OECD $OUTFIN_{it}$	0.0472^a	0.0937^a	0.0960^a	0.1352	0.3584^b	0.2514
	(0.0129)	(0.0215)	(0.0204)	(0.1077)	(0.1745)	(0.1588)
OECD $OUTINT_{it}$	-0.0010	0.0233	0.0141	0.1326^b	0.3162^c	0.4196^b
	(0.0076)	(0.0168)	(0.0157)	(0.0666)	(0.1897)	(0.1956)
Other $OUTFIN_{it}$	0.0171	0.0887^c	0.1085^b	-0.0905	-0.2869	-0.2371
	(0.0299)	(0.0497)	(0.0495)	(0.1155)	(0.2024)	(0.1862)
Other $OUTINT_{it}$	0.0741^b	0.0011	-0.0034	0.1331	-0.0076	0.0503
	(0.0324)	(0.0720)	(0.0749)	(0.1361)	(0.4589)	(0.4558)
BJS $OUTFIN_{it}$	0.0657	0.5211^b	0.5762^b	0.8196	1.5988	1.7165
	(0.0725)	(0.2359)	(0.2438)	(0.6256)	(1.2021)	(1.3042)
BJS $OUTINT_{it}$	0.1052	0.0908	0.0846	0.2289	1.0330	1.3026
	(0.0982)	(0.1624)	(0.1634)	(0.3091)	(0.8483)	(0.8750)
China $OUTFIN_{it}$	0.1135^b	0.1893^a	0.2137^a	-0.1392	-0.5321	-0.5248
	(0.0560)	(0.0691)	(0.0697)	(0.3943)	(0.6640)	(0.7099)
China $OUTINT_{it}$	0.1793^b	0.3259^a	0.3094^a	-0.0183	-0.1494	-0.2077
	(0.0728)	(0.1090)	(0.1067)	(0.2994)	(0.5057)	(0.5063)
Number of endogenous variables		12	8		12	8
Number of instruments		32	24		32	24
Under-identification statistic		419.407	30.584		171.866	28.319
		(0.0000)	(0.0224)		(0.0000)	(0.0413)
Weak identification statistic		12.805	1.215		6.098	1.175
Hansen J statistic		56.815	36.786		25.862	18.092
		(0.0000)	(0.0022)		(0.1704)	(0.3185)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	107,619	102,295	102,577	19,583	19,418	19,469
R-squared	0.0182	0.0014	0.0164	0.3304	0.3219	0.3279
Number of firms	15,022	13,193	13,209	2,503	2,404	2,406

1.FG indicates finished goods, IG indicates intermediate goods
2.Coefficients for industry-level trade variables are not reported
3.IV1 use IV's for both firm- and industry-level imports
4.IV2 only use IV's for firm-level imports and treat industry imports as exogenous
5.Firm level imports are measured by imports over turnover
6.Robust standard errors (p-values) in parentheses for coefficients (test statistics)
7.$^{a\,b\,c}$indicate the significance of the coefficient,^{a} $p<0.01$, ^{b} $p<0.05$, ^{c} $p<0.1$

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