Employment Growth and International Trade: A Small Open Economy Perspective*

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Abstract

In this paper, we use a detailed dataset containing information about all international trade transactions of the population of Danish firms over more than a decade to analyze the relationship between export and import decisions and employment growth. We further distinguish between imports of final goods and imports of intermediate products. We find that both imports and exports decisions are positively related to employment growth. Interestingly, both finished goods and intermediate goods imports have a positive link. We also control for the re-exporting process, i.e. firms importing final goods to re-export them afterwards.

1 Introduction

International trade and outsourcing are often blamed for destroying jobs. Yet, most economists would agree that firms take their international trade decisions in order to increase productivity. They believe that firms to which

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they delegate some tasks from the production process will be more efficient at executing these tasks than they would have otherwise done it themselves, so that firms can redirect their resources towards high value added activities. And more productive firms are also more likely to maintain their workforce and hire new workers.

This productivity effect is often missing from theoretical models of outsourcing. A recent theoretical paper (Grossman and Rossi-Hansberg, forthcoming) provides a novel framework. In their model, reduction in transportation and communication leads to a new global division of tasks between countries. Offshoring some tasks abroad is beneficial for the firm if factor costs are lower, but it can also generate some coordination problems. Firms therefore face a trade-off and take their offshoring decisions to minimize costs. An improvement in the opportunities to offshore induces three different effects: a productivity effect, a relative-price effect, and a labor-supply effect (the next section discusses these issues in details). The authors stress that the productivity effect should prevail in a small open economy. This paper provides an empirical test of this theory from the perspective of a small open economy.

In this paper, we use a detailed dataset containing information about all international trade transactions of the population of Danish firms over more than a decade to analyze the relationship between firms' import and export decisions and employment growth. We further distinguish between imports of final goods and imports of intermediate products. We find that both imports and exports decisions are positively related to employment growth. Interestingly, both finished goods and intermediate goods imports have a positive link. We also control for the re-exporting process, i.e. firms importing final goods to re-export them afterwards.

We perform both a short run and a long run analysis. In the long run, a change in imports is negatively associated with employment growth only for

the subsample of large firms. In addition, we look at the relationship between international trade and employment growth by education category. We find that an increase in imports is more strongly associated with an increase in the demand for college-educated workers in the long run.

The results of the paper contrast with those from a recent paper by Biscourp and Kramarz (2007). They find that increases in both imports of finished goods and imports of intermediate goods are associated with more job destruction in teh long run analysis, although the link with the former is stronger. They also find that the relationship was stronger for large firms. The fact that our results differ so much is not necessarily *so surprising*. Indeed, France and Denmark differ in many dimensions, most notably in terms of market size and product specialization. Therefore this paper provides additional light regarding a politically very sensitive topic from the perspective of a small open economy.

The paper is organized as follows. Section 2 discusses the current debate regarding outsourcing and import decisions and the existing literature. Section 3 describes our unique dataset and our empirical methodology. Section 4 shows our results. Section 5 concludes and offers some policy implications regarding the role of import decisions and outsourcing.

2 Literature

A few years ago, a few sentences in the Economic Report of the President and later comments from Larry Summers regarding the benefits of outsourcing for companies created an uproar in election year[1] (see Mankiw and Swagel,

[1] See e.g. Washington Post, Feb. 11, 2004, Bush, Adviser Assailed for Stance on 'Offshoring' Jobs
(http://www.washingtonpost.com/ac2/wp-dyn?pagename=article&contentId=A30194-2004Feb10&notFound=true)
See also Wall Street Journal, April 2, 2004, Understanding Outsourcing, Special Coverage (http://wsjclassroomedition.com/outsourcing/out_barbell.htm)

2006 for more about this). These comments simply reflected the common belief among economists in favor of free trade, and the fact that they see offshoring as just another measure of trade. Yet, few theoretical models were available that could explain the exact mechanisms through which offshoring was actually different. A recent paper by Grossman and Rossi-Hansberg (forthcoming)[2] fills a gap in the literature in that respect. They focus on the consequence on wages for unskilled workers, but a similar analysis can be conducted on labor demand. The intuition is the following: the production process can be divided into tasks. Some tasks must be performed by high skilled workers, while some others can be performed by low skilled workers, either domestically or abroad. There are two sectors: one high-skill intensive and one low-skill intensive. Lower transportation and communication costs make offshoring easier. When foreign wages are lower than domestic wages, firms have an incentive to offshore parts of their production process, although they suffer some coordination costs. Therefore, the equilibrium allocation of tasks depends on this trade-off. This equilibrium division of tasks will be affected when lower transportation and communication costs make offshoring easier. Some tasks that use to be made domestically are now offshored to the foreign country. This leads to a labor cost reduction for the firm (the productivity effect), an increase in profitability and in labor demand for low skilled workers, as the low skill intensive sector expands relatively more.

Now, offshoring might also affect the type of labor that the firm wants to employ, and therefore the skill composition of the workforce, as the firm will focus on its core activities, those with more value added. There will be less tasks for low skilled workers to be executed domestically, what might lower the demand for low skilled workers (labor supply effect).

More generally, they show that, when new opportunities for offshoring

[2]Note that their model assumes perfectly competitive markets. If offshoring enhances firms' market power, this could be another channel affecting employment and wages. See footnote 13.

arise (as a consequence of falling trade or communication costs), whether low-skilled[3] domestic workers are going to be negatively affected depends on the strength of three different effects:

- a productivity effect (the firm benefits from cost saving and this benefits the workers as well, as it raises labor demand for low-skilled),
- a relative-price effect (the new opportunities from offshoring alter the country's terms of trade; if the relative price of the labor-intensive good falls, this leads to a downward pressure on low-skill wage)
- a labor-supply effect (reallocated labor must be reabsorbed in the economy, what might lead to a decline in their wage).

In a small open economy such as Denmark, Belgium, or the Netherlands, the terms of trade are likely to be fixed, while wages could react to factor supplies, but we expect that the productivity effect will be the strongest force.

On the empirical side, a recent paper by Biscourp and Kramarz (2007) looked at the link between changes in firm level trade and employment growth. They find that increases in both imports of finished goods and imports of intermediate goods are associated with more job destruction, although the link with the former is stronger. They also find that the relationship was stronger for large firms.

A few recent papers use a similar Danish dataset to analyze the effect of international trade on workers' well being. Rosholm et al. (2007) look at relative skill composition and international trade; Munch and Skaksen (2005) look at the impact of outsourcing on wages; and Munch and Skaksen (2008) looks at the link between export status and wages.

[3]The authors also discuss the implication for high-skilled workers. We will get back to this later on.

3 Data

We use several data sources provided by Statistics Denmark. Our main dataset is the *Foreign Trade Statistics* (Udenrigshandelsstatistikken)[4], a dataset that includes both values and quantities[5] of import and export of goods at the firm level by product (8 digit CN, combined nomenclature) and origin, or destination. The data is available for the period 1993-2003. Table 1 shows some summary statistics. We see that the number of firms involved in international trade has decreased over time , while the number of transactions and the average value has increased.

We merge this dataset with the *Firm Statistics* dataset that adds information about turnover, material costs, number of full time employees, industry at the firm level and type of firm (private, public) for the population of Danish firms. Table 2 shows the number of firms according to different size tresholds. We can clearly observe a data break in 2000. Indeed, until 1999, only firms subject to VAT and from the private sector were sampled, while all firms are covered from 2000 onwards. On the other hand, Statistics Denmark also cleant the dataset by including only firms that were actually active, while it included all registered entities previously.

For robustness reasons, we also use the *Accounting Statistics* dataset (Regnskab) that contains information on less firms, for a shorter period (1995-2003), but provides more accounting variables. In particular, it provides information on the capital stock in the firm, so that we can control for differences in capital-output ratio.

[4] See http://www.dst.dk/HomeUK/Statistics/focus_on/focus_on_show.aspx?sci=1202 for more information on the dataset. See also Pedersen (2008) and Eriksson, Smeets and Warzynski (2008) for detailed summary statistics.

[5] In this paper, we only use the information about the value of the transaction. See Warzynski (2008) for an analysis of price behavior.

Table 1: Summary Statistics from Foreign Trade Statistics

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Number of firms importing	24,378	23,119	19,920	19,471	18,315	18,364	18,805	18,892	18,800	22,435	23,648
Number of firms exporting	18,461	18,053	16,106	15,899	15,119	15,270	15,303	15,361	15,402	16,329	16,686
Number of import transactions	441,226	422,388	420,860	417,652	399,164	411,084	423,235	437,287	408,615	513,448	527,369
Number of export transactions	322,409	328,564	335,129	345,686	350,775	369,258	386,036	402,813	356,096	454,380	494,353
Average value of import transaction	454.8	545.7	606.4	621.3	731.8	750.3	733.2	806.6	801.8	668.3	628.6
Average value of export transaction	754.7	813.4	847.7	848.9	907.3	892.2	916.9	1,031.7	1,140.6	929.8	835.5

Note: Average value in thousands DKK

Table 2: Summary Statistics from Firm Statistics

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Number of firms	338,559	331,938	328,634	326,716	325,854	324,884	326,820	284,446	284,166	281,653	275,712
- with at least 1 emp.	95,365	94,589	94,942	95,632	95,802	96,197	97,720	126,191	127,237	126,254	125,684
- with at least 10 emp.	15,859	16,298	17,061	17,356	17,700	18,046	18,498	24,500	24,392	24,129	23,755
- with at least 50 emp.	2,547	2,666	2,781	2,844	2,930	2,994	3,043	4,373	4,479	4,424	4,294

Finally, we use the IDA database, a longitudinal database that contains information about all individuals aged 15 to 74 (demographic characteristics, education, labor market experience, tenure and earnings) and employees in all workplaces in Denmark during the period 1980-2005 and information on all workplaces (industry, geographical placement, changes in status, type of firm) in the same period. This information has been collected by merging information from several registers in Statistics Denmark with the help of unique identification numbers for individuals and workplaces. Persons and workplaces are matched at the end of November each year. We mostly need the information from IDA to look at workforce composition by type of education.

4 Empirical Methodology

Our methodology differs from Biscourp and Kramarz (2007) in a few dimensions. We discuss also how our results are likely to be affected by these differences and test the robustness of our findings. First, we create a year-by-year employment growth variable following Davis and Haltiwanger (1992):

$$\Delta n_{it} = \frac{(N_{it} - N_{it-1})}{\frac{(N_{it}+N_{it-1})}{2}}$$

This measure of firm growth is bounded between -2 (exit) and 2 (entry).

As explanatory variables, we include the growth of output as a measure of economic shock. We also include firm size and firm size squared. We are mostly interested in the relationship between employment growth and change in international trade at the firm level. We compute a few measures: the change in export intensity and the change in import over sales. We further divide imports into imports of finished products (defined as products from the same 2-digit industry) and imports of intermediary products (defined as products from different industries)

Therefore the regression that we estimate is the following:

$$\begin{aligned}\Delta n_{it} &= c + \alpha_1 \Delta \log(Sales)_{it} + \alpha_2 \Delta(FG \text{ Imports}/Sales)_{it} \\ &+ \alpha_3 \Delta(II \text{ Imports}/Sales)_{it} + \alpha_4 \Delta(Exports/Sales)_{it} \\ &+ \alpha_5 \log(\text{Size})_{it-1} + \alpha_6 \left[\log(\text{Size})_{it-1}\right]^2 \\ &+ YearDummies + IndustryDummies + \varepsilon_{it}\end{aligned} \tag{1}$$

We also tested various alternative specifications: using firm age as additional controls; using the capital output ratio. We also run the regressions separately for the manufacturing and service industry. We also look at the sensitivity of the measured relationships by size category.

To compare our analysis with Biscourp and Kramarz (2007), we also run a long run regression. We compute the long run employment growth the following way by first defining enployment at the beginning of the period and at the end:

$$N_i^B = \frac{N_i^{93} + N_i^{94}}{2}, \qquad N_i^E = \frac{N_i^{02} + N_i^{03}}{2}$$

and then by looking at the growth rate between the two periods:

$$\Delta n_i^{LR} = \frac{N_i^E - N_i^B}{\frac{N_i^E + N_i^B}{2}}$$

We then run a similar analysis than before, where all our right hand side variables are expressed over the long run as well. It should be obvious that, by using this methodology, we only consider surviving firms and that we end up with one observation by firm, therefore limiting the dynamics.

Our second test tries to distinguish between skilled (N^S) and unskilled labor (N^U):

$$\begin{aligned}\Delta n_i^{LR,S} &= c + \alpha_1 \Delta \log(Sales)_i + \alpha_2 \Delta(FG \text{ Imports}/Sales)_i \\ &+ \alpha_3 \Delta(II \text{ Imports}/Sales)_i + \alpha_4 \Delta(Exports/Sales)_i \\ &+ \alpha_5 \log(\text{Size})_{iB} + \alpha_6 \left[\log(\text{Size})_{iB}\right]^2 \\ &+ YearDummies + IndustryDummies + \varepsilon_{it}\end{aligned} \tag{2}$$

$$\begin{aligned}\Delta n_i^{LR,U} &= c + \alpha_1 \Delta \log(Sales)_i + \alpha_2 \Delta(FG \text{ Imports}/Sales)_i \\ &+ \alpha_3 \Delta(II \text{ Imports}/Sales)_i + \alpha_4 \Delta(Exports/Sales)_i \\ &+ \alpha_5 \log(\text{Size})_{iB} + \alpha_6 \left[\log(\text{Size})_{iB}\right]^2 \\ &+ YearDummies + IndustryDummies + \varepsilon_{it}\end{aligned} \tag{3}$$

5 Results

Table 3 shows the OLS results from the estimation of Eq. (1), as we are mostly interested in looking at the correlation, not the causality. Results are almost not affected when we add industry dummies, but the coefficients change quite dramatically when we include a fixed effect, especially for the effect of firm size. The coefficient of the change in export intensity is always positive and significant, while the link between the change in import share and employment growth is positive in some specifications, sometimes not significant, but never negative. The effect is generally stronger for finished goods than for intermediate goods in manufacturing. This can be interpreted as a consequence of the productivity effect stresed in the model, or as a selection effect. Those firms that became more involved in international activities are also the ones that increased employment. Table 4 controls for the re-exporting possibility by distinguishing between exports from the same industry and exports from a different industry.

Table 3: Employment Growth and Trade

A. OLS

Dep. var.: Δn_{it}	All	Manuf.	All More than 10 emp.	Manuf More than 10 emp.
$\Delta \log(Sales)_{it}$	0.563*** (0.001)	0.612*** (0.004)	0.774*** (0.004)	0.741*** (0.009)
$\Delta(FG$ Imports$/Sales)_{it}$	0.033 (0.021)	0.042** (0.021)	0.035 (0.023)	0.039* (0.022)
$\Delta(II$ Imports$/Sales)_{it}$	0.026*** (0.008)	0.008 (0.013)	0.019* (0.010)	0.013 (0.014)
$\Delta(Exports/Sales)_{it}$	0.140*** (0.017)	0.129*** (0.022)	0.139*** (0.031)	0.132*** (0.033)
$\log(\text{Size})_{it-1}$	-0.037*** (0.002)	-0.008* (0.004)	-0.021 (0.019)	-0.066* (0.038)
$[\log(\text{Size})_{it-1}]^2$	0.006*** (0.0005)	0.001 (0.001)	0.003 (0.003)	0.009 (0.006)
$\Delta \log(K/Sales)_{it}$	0.010*** (0.001)	0.031*** (0.004)	0.049*** (0.004)	0.055*** (0.008)
$Importer_{it-1}$	0.022*** (0.005)	0.017** (0.008)	0.023*** (0.006)	0.020** (0.009)
$Exporter_{it-1}$	-0.007*** (0.002)	-0.002 (0.003)	-0.0005 (0.004)	0.004 (0.005)
Industry Dummies	NO			
Year Dummies	YES			
Firm Fixed Effect	NO			
Adj.R2	0.28	0.30	0.36	0.35
Nr. obs.	395,976	62,840	60,316	14,073

part B: with industry dummies

Dep. var.: Δn_{it}	All	Manuf.	All More than 10 emp.	Manuf More than 10 emp.
$\Delta \log(Sales)_{it}$	0.564*** (0.001)	0.610*** (0.004)	0.771*** (0.004)	0.740*** (0.009)
$\Delta(FG$ Imports$/Sales)_{it}$	0.037* (0.021)	0.046** (0.021)	0.034 (0.023)	0.041* (0.022)
$\Delta(II$ Imports$/Sales)_{it}$	0.030*** (0.008)	0.010 (0.013)	0.022** (0.010)	0.014 (0.014)
$\Delta(Exports/Sales)_{it}$	0.140*** (0.017)	0.129*** (0.022)	0.143*** (0.031)	0.144*** (0.033)
$\log(\text{Size})_{it-1}$	-0.040*** (0.002)	-0.016*** (0.005)	-0.018 (0.019)	-0.032 (0.041)
$[\log(\text{Size})_{it-1}]^2$	0.007*** (0.0005)	0.002* (0.001)	0.002 (0.003)	0.003 (0.006)
$\Delta \log(K/Sales)_{it}$	0.009*** (0.001)	0.032*** (0.004)	0.048*** (0.004)	0.056*** (0.009)
$Importer_{it-1}$	0.028*** (0.005)	0.024*** (0.008)	0.027*** (0.006)	0.031*** (0.010)
$Exporter_{it-1}$	-0.001 (0.003)	0.006 (0.004)	0.002 (0.004)	0.007 (0.005)
Industry Dummies	YES			
Year Dummies	YES			
Firm Fixed Effect	NO			
Adj.R2	0.29	0.30	0.37	0.36
Nr. obs.	395,976	62,840	60,316	14,073

Part C: with firm fixed effect

Dep. var.: Δn_{it}	All	Manuf.	All More than 10 emp.	Manuf More than 10 emp.
$\Delta \log(Sales)_{it}$	0.410*** (0.002)	0.467*** (0.004)	0.56*** (0.005)	0.55*** (0.010)
$\Delta(FG$ Imports$/Sales)_{it}$	0.032 (0.023)	0.046* (0.025)	0.047* (0.025)	0.054** (0.026)
$\Delta(II$ Imports$/Sales)_{it}$	0.014 (0.009)	0.008 (0.016)	-0.001 (0.011)	0.013 (0.017)
$\Delta(Exports/Sales)_{it}$	0.083*** (0.018)	0.087** (0.024)	0.084** (0.034)	0.095** (0.038)
$\log(\text{Size})_{it-1}$	-0.561*** (0.004)	-0.435*** (0.012)	-0.319*** (0.046)	-0.530*** (0.095)
$[\log(\text{Size})_{it-1}]^2$	0.063*** (0.001)	0.046*** (0.003)	0.015** (0.007)	0.051*** (0.015)
$\Delta \log(K/Sales)_{it}$	0.008*** (0.002)	0.030*** (0.004)	0.046*** (0.004)	0.043*** (0.009)
$Importer_{it-1}$	0.023*** (0.007)	0.025** (0.012)	0.016* (0.009)	0.028** (0.014)
$Exporter_{it-1}$	0.012*** (0.004)	0.016*** (0.006)	0.011* (0.006)	0.007 (0.009)
Industry Dummies	NO			
Year Dummies	YES			
Firm Fixed Effect	YES			
Adj.R2	0.47	0.44	0.54	0.49
Nr. obs.	395,976	62,840	60,316	14,073

Table 4: Employment Growth and Trade (with re-export)

A.OLS (with re-export

Dep. var.: Δn_{it}	All	Manuf.	All More than 10 emp.	Manuf More than 10 emp.
$\Delta \log(Sales)_{it}$	0.561*** (0.001)	0.607*** (0.004)	0.775*** (0.004)	0.757*** (0.011)
$\Delta(FG$ Imports$/Sales)_{it}$	0.029 (0.038)	0.064 (0.041)	0.041 (0.044)	0.069 (0.046)
$\Delta(II$ Imports$/Sales)_{it}$	0.020* (0.010)	-0.007 (0.024)	0.022 (0.014)	0.017 (0.027)
$\Delta(ExportsSameInd/Sales)_{it}$	0.081*** (0.021)	0.079*** (0.021)	0.078*** (0.023)	0.078*** (0.023)
$\Delta(ExportsDiffInd/Sales)_{it}$	0.036*** (0.012)	0.039 (0.026)	0.023 (0.015)	0.034 (0.028)
$\log(\text{Size})_{it-1}$	-0.039*** (0.002)	-0.011** (0.005)	-0.026 (0.021)	-0.075 (0.049)
$[\log(\text{Size})_{it-1}]^2$	0.007*** (0.0005)	0.001 (0.001)	0.004 (0.003)	0.051*** (0.015)
$\Delta \log(K/Sales)_{it}$	0.006*** (0.002)	0.017*** (0.004)	0.039*** (0.004)	0.030*** (0.010)
$Importer_{it-1}$	0.013** (0.006)	0.008 (0.015)	0.026*** (0.008)	0.042** (0.018)
$Exporter_{it-1}$	0.018** (0.007)	0.018 (0.012)	0.026*** (0.008)	0.018 (0.014)
Industry Dummies	NO	NO	NO	NO
Year Dummies	YES	YES	YES	YES
Firm Fixed Effect	NO	NO	NO	NO
Adj.R^2	0.28	0.30	0.36	0.35
Nr. obs.	378,363	53,421	53,115	9,732

B. with industry dummies

Dep. var.: Δn_{it}	All	Manuf.	All More than 10 emp.	Manuf More than 10 emp.
$\Delta \log(Sales)_{it}$	0.562*** (0.001)	0.604*** (0.004)	0.772*** (0.004)	0.751*** (0.011)
$\Delta(FG$ Imports$/Sales)_{it}$	0.028 (0.038)	0.064 (0.041)	0.042 (0.045)	0.074 (0.046)
$\Delta(II$ Imports$/Sales)_{it}$	0.026** (0.011)	-0.004 (0.024)	0.028* (0.015)	0.025 (0.028)
$\Delta(ExportsSameInd/Sales)_{it}$	0.085*** (0.021)	0.085*** (0.021)	0.075*** (0.024)	0.077*** (0.023)
$\Delta(ExportsDiffInd/Sales)_{it}$	0.036*** (0.012)	0.043 (0.026)	0.021 (0.015)	0.038 (0.028)
$\log(\text{Size})_{it-1}$	-0.042*** (0.002)	-0.019*** (0.005)	-0.020 (0.021)	-0.010 (0.054)
$[\log(\text{Size})_{it-1}]^2$	0.008*** (0.0005)	0.003* (0.001)	0.003 (0.003)	0.001 (0.008)
$\Delta \log(K/Sales)_{it}$	0.005*** (0.002)	0.018*** (0.004)	0.038*** (0.004)	0.028*** (0.010)
$Importer_{it-1}$	0.023*** (0.006)	0.014 (0.015)	0.031*** (0.009)	0.048*** (0.018)
$Exporter_{it-1}$	0.018** (0.007)	0.027** (0.012)	0.024*** (0.009)	0.019 (0.014)
Industry Dummies	NO	NO	NO	NO
Year Dummies	YES	YES	YES	YES
Firm Fixed Effect	NO	NO	NO	NO
Adj.R^2	0.29	0.30	0.37	0.49
Nr. obs.	378,363	53,421	53,115	9,732

C. with firm fixed effect

Dep. var.: Δn_{it}	All	Manuf.	All More than 10 emp.	Manuf More than 10 emp.
$\Delta \log(Sales)_{it}$	0.407*** (0.002)	0.458*** (0.005)	0.557*** (0.005)	0.534*** (0.011)
$\Delta(FG$ Imports$/Sales)_{it}$	0.031 (0.042)	0.081* (0.049)	0.065 (0.050)	0.118** (0.055)
$\Delta(II$ Imports$/Sales)_{it}$	0.010 (0.012)	-0.018 (0.028)	-0.012 (0.017)	0.028 (0.032)
$\Delta(ExportsSameInd/Sales)_{it}$	0.047** (0.023)	0.043** (0.025)	0.060** (0.026)	0.055** (0.027)
$\Delta(ExportsDiffInd/Sales)_{it}$	0.015 (0.014)	0.040 (0.031)	0.013 (0.018)	0.044 (0.033)
$\log(\text{Size})_{it-1}$	-0.560*** (0.0015)	-0.421*** (0.013)	-0.309*** (0.050)	-0.478*** (0.125)
$[\log(\text{Size})_{it-1}]^2$	0.061*** (0.001)	0.038*** (0.004)	0.012** (0.008)	0.038* (0.020)
$\Delta \log(K/Sales)_{it}$	0.004*** (0.002)	0.016*** (0.004)	0.038*** (0.004)	0.020*** (0.011)
$Importer_{it-1}$	0.011 (0.010)	0.013 (0.027)	0.006 (0.013)	0.051* (0.027)
$Exporter_{it-1}$	0.006 (0.012)	0.001 (0.020)	0.015 (0.014)	0.006 (0.022)
Industry Dummies	NO	NO	NO	NO
Year Dummies	YES	YES	YES	YES
Firm Fixed Effect	NO	NO	NO	NO
Adj.R^2	0.48	0.45	0.54	0.35
Nr. obs.	378,363	53,421	53,115	9,732

5.1 Long Run Analysis

Table 5 shows the results of the long run analysis. We can see again that both imports and exports are positively related to firm growth, but the effect of imports is not significant for firms with more than 10 employees. However, in table 6, when we look at a more selected sample of firms larger than 50 employees (at the beginning and at the end of the period), the results change dramatically, suggesting that employment decisions of large firms were more sensitive to international trade behavior, as suggested by Biscourp and Kramarz (2007).

Table 5: Employment Growth and Trade. Long Run Analysis

Dep. var.: Δn_i^{LR}	All	Manuf.	All, more than 10 emp.	Manuf., more than 10 emp.
$\Delta \log(Sales^{LR})_i$	0.204^{***} (0.002)	0.200^{***} (0.004)	0.272^{***} (0.005)	0.256^{***} (0.006)
$\Delta(\text{Imports}/Sales)_i^{LR}$	0.166^{**} (0.074)	0.181^{*} (0.094)	0.134 (0.093)	0.119 (0.096)
$\Delta(Exports/Sales)_i^{LR}$	0.242^{***} (0.053)	0.199^{***} (0.058)	0.131^{**} (0.059)	0.147^{***} (0.057)
	Controls: $\Delta \log(K/Sales)_i^{LR}, \text{Im}\, porter_{iB}, Exporter_{iB}$			
	$\log(\text{Size})_{iB}, [\log(\text{Size})_{iB}]^2$			
Industry Dummies	YES			
Year Dummies	YES			
Adj.R2	0.39	0.35	0.57	0.46
Nr. obs.	23,455	6,969	5,349	2,748

Table 6: Employment Growth and Trade. Long Run Analysis for Large Firms

Dep. var.: Δn_i^{LR}	All	Manuf.
$\Delta \log(Sales^{LR})_i$	0.517^{***} (0.019)	0.514^{***} (0.022)
$\Delta(\text{Imports}/Sales)_i^{LR}$	-0.163^{**} (0.069)	-0.164^{**} (0.074)
$\Delta(Exports/Sales)_i^{LR}$	0.081^{*} (0.049)	0.047 (0.043)
	Controls: $\Delta \log(K/Sales)_i^{LR}, \text{Im}\, porter_{iB},$	
	$Exporter_{iB}, \log(\text{Size})_{iB}, [\log(\text{Size})_{iB}]^2$	
Industry Dummies	YES	
Year Dummies	YES	
Adj.R2	0.32	0.40
Nr. obs.	1,670	802

5.2 Workforce Composition

Finally, we also look at the relationship between firm level trade and workforce composition. We want to see whether the growth of import is related to the change in the share of college educated people in the firm. At this stage, we only look at the long run relationship for the subsample of large firms. When we looked at the short run relationship, we did not find any effect.

Table 7 and 8 show that an increase in the share of college educated workers was more likely in firms where imports grew, while an increase in the share of workers with basic education was more likely when exports were growing.

Table 7: Change in the share of college educated workers

Dep. var.: $\Delta n_i^{LR,S}$	
$\Delta \log(Sales^{LR})_i$	-0.017*** (0.004)
$\Delta(\text{Imports}/Sales)_i^{LR}$	0.042*** (0.015)
$\Delta(Exports/Sales)_i^{LR}$	-0.009 (0.011)
	Controls$\Delta \log(K/Sales)_i^{LR}$ Im$porter_{iB}Exporter_{iB}$
	$\log(\text{Size})_{iB}, [\log(\text{Size})_{iB}]^2$
Industry Dummies	YES
Year Dummies	YES
Adj.R2	0.04
Nr. obs.	1,669

Table 8: Change in the share of workers with basic education

Dep. var.: $\Delta n_i^{LR,U}$	
$\Delta \log(Sales^{LR})_i$	0.011** (0.005)
$\Delta(\text{Imports}/Sales)_i^{LR}$	-0.026 (0.018)
$\Delta(Exports/Sales)_i^{LR}$	0.032** (0.013)
	Controls$\Delta \log(K/Sales)_i^{LR}$ Im$porter_{iB}$
	$Exporter_{iB}$, $\log(\text{Size})_{iB}$, $[\log(\text{Size})_{iB}]^2$
Industry Dummies	YES
Year Dummies	YES
Adj.R2	0.04
Nr. obs.	1,669

Table 9: Summary statistics

	Mean	Median	Std. dev.
Change in the share of college educated workers	2.39%	1.75%	0.053
Change in the share of workers with basic education	-2.63%	-2.38%	0.059
1836 observations			

6 Conclusion

In this paper, we look at the relationship between employment growth and the growth of trade at the firm level. Contrary to a previous study from France, we found that the growth of imports in the short run analysis had a positive effect in some specifications, but the effect was never negative. On teh other hand, in the long run analysis, as change in import share had a negative effect on employment growth, but only for large firms. Additionally, the share of college educated workers increased in large firms that also increased their import shares . Therefore, our results suggests that both a productivity effect and a supply effect, or workforce composition effect, can be detected in the Denmark, a small open economy.

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