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Trade and jobs: a description of Swedish labor market dynamics

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Abstract

We perform a granular analysis of Swedish labor market dynamics, using matched employer employee and firm level trade data for Sweden over a 15-year period. The employment share in firms that are directly exposed to international trade has decreased, due to a shift in employment towards personal and public services. Analyzing the dynamics, we find that workers in firms that change export status are slightly less likely to obtain the same wage rise as their peers. However, workers that stay in the same job in trading firms are less affected by changes in export and offshoring volumes, with the exception of high-skilled workers in manufacturing firms who face a downward pressure on wages from services offshoring, but higher wages from services exports. Finally, we find that exports and offshoring of goods and services stimulate labor demand. While exports and offshoring of services increase relative demand for skilled workers, exports and offshoring of goods stimulate relative demand for middle and low skilled workers.

JEL classification: E24, J63, P23, F16, F66

Key words: Worker flows; Job flows; Trade; Wages; Labor Demand

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INTRODUCTION

A popular backlash against globalisation has gained momentum in recent years reflected in new trade restrictions in both goods and services (WTO, 2017; OECD, 2018). Stagnating and even declining real median wages in some countries and a sense of job insecurity can to a large extent explain this backlash (Frieden, 2017).

Sweden is a relatively open economy with a relatively equal income distribution and the third highest labour force participation in the OECD.[1] This raises some interesting questions about cross-country differences related to labour market adjustments that can inform policy making. For instance, is the Swedish labour market less dynamic than other countries? Or are workers better protected against income losses should they be separated from their jobs? These are important questions for policy makers seeking to "make trade work for all" as stated in G20 and OECD policy objectives.

Most economist would agree that open markets are associated with higher levels of income on average. It is also clear that changes in trade patterns create winners and losers. In theory losers can be compensated through redistribution of the gains from trade, but this may be easier said than done. Even when the political will to do so is in place, one still needs to identify who are the winners and losers and set up a policy and institutional framework for redistribution that is compatible with incentives for labour market participation and skills upgrading. This paper contributes to a better understanding of labour market dynamics at the worker level. It maps gross worker and job flows to changes in the income level of individual workers in Sweden and it relates these mappings to the trade status of firms.

Swedish data contain comprehensive and detailed information about workers, jobs and the firms that they work in. Thus, it is possible to trace workers and their earnings over time and assess the gains or costs of changes in jobs and work status. Although establishing the causes of changes in job status is beyond the scope of this paper, it does identify systematic differences across firm and worker characteristics, including firms' exposure to international markets as well as a causal relationship between trade and earnings.

The paper first provides summary statistics and trends in employment and wages across different firm and worker characteristics. It next applies shift-share analysis to study changes in employment patterns by gender, occupation and skill level. Further insights on labour market dynamics are obtained by breaking down overall gross job flows into five components: intra-firm flows, inter-firm intra-sector flows, inter-sector flows and flows between the labour market and unemployment and between the labour market and inactivity, and analysing the transition between

[1] Iceland and Switzerland have the highest labour force participation rates. Sweden's Gini coefficient was 0.28 in 2017 according to OECD latest statistics, while the lowest index was observed for the Slova Republic at 0.24.

these states. A better understanding of the mobility across and within occupations, firms and sectors is essential for possible policy interventions to mitigate adjustment costs for individual workers.

RELATIONS TO PREVIOUS RESEARCH

A striking stylized fact from empirical labour market analysis is that gross job flows can be an order of magnitude larger than net flows. For instance Haltiwanger et al. (2014) found that average net employment growth in a sample of OECD countries during the 1990s was 1.5%, while the job reallocation rate was 28%. In other words more than one in four workers change job or employment status in a year. They also found that job creation and destruction account for about a third of gross job flows, and that job reallocation is largest in firms with less than 20 employees and smallest in firms with more than 100 employees. We find that the Swedish labour market dynamics on these metrics are similar to those reported by Haltiwanger et al. (2014).

Detailed descriptive analyses for individual countries have analysed transition margins between employment and unemployment, between employment and inactivity, inactivity and unemployment and job-to-job transitions across employers. See for instance Haltiwanger and Vodopivec (2002; 2003) for studies of the Estonian and Slovenian labour markets respectively during the transition to a market economy. They found that deep and dramatic reforms were followed by a sharp increase in job and worker flows, starting with a steep rise in the job destruction rate which was overtaken by a precipitous rise in job creation after a few years.

Shift share analysis is most commonly used in regional economics, but it has also been adopted to labour market analysis for instance by Goos et al. (2014). They analyse job polarisation within and between industries in 16 Western European countries during the period 1993 to 2010, using changes in the share of hours worked by occupation as a measure of polarisation. They found that high and low-paying occupations expanded their share of total hours worked at the expense of middling occupations. Furthermore, they also found that the within-industry changes in shares of hours worked by occupation were on average larger than between industry changes, except for low-paying occupations where the opposite was true. We use shift share to study the gender, skills and occupation dimension of labour market developments.

Transition rate dynamics is more commonly used for labour market analysis, mainly focusing on the transition in and out of the labour force or between employment and unemployment within the labour force Shimer (2012).[2] Gomes (2012) also looked at job-to-job transition rates and flows by level of education. Our paper contributes to this literature by analysing multiple margins on a

[2] Interestingly Shimer (2012) finds that changes in the unemployment rate is entirely explained by the job finding rate.

unique and very rich data set on the Swedish labour market covering the universe of Swedish firms and the labour force.

DATA

To study the Swedish labour market, we construct a database covering the universe of Swedish workers and firms. The database is an extremely rich source of information for analysing labour market responses to structural changes in the economy. More specifically, firstly, we identify relevant comprehensive, longitudinal and detailed micro-level register data-sets from Statistics Sweden that are included in the so-called FIEF-database managed by Örebro University, Sweden. Secondly, we exploit the presence of unique identifiers of all residents, plants and firms in Sweden to precisely arrive at a linked employer employee database for our purposes.[3]

Our linked employer employee database contains consistent time-series (annual) information on individuals' age, gender, educational attainment, years of schooling, post-secondary education, tenure, marital status, employer and on the employing firm's age, workforce size,[4] ownership (foreign/domestic), as well as its involvement in international trade (status and values of export and import of goods and services).[5] (We summarize our variables, definitions and sources in Table A1.)

Services trade data are fully covered only from 2003 onwards. Therefore, the analyses that include services trade cover the period 2003-2015. Finally, firm-level trade data do not cover financial services and the public sector which means that firm level analyses of trade and employment do not cover employment in these sectors.

[3] Statistics Sweden has replaced the identities of all involved entities with synthetic ones, to retain confidentiality, and data is accessed in a safe environment provided by Statistics Sweden.

[4] Average number of employees (in full-time equivalents), with employment defined as at least one hour of work per week in November.

[5] Data on trade in goods is comprehensive for trade with countries outside the EU but truncated for trade with other countries. About 96% of intra-EU trade is captured. For intra-EU trade, a firm's annual export/import with the rest of the Union has to amount to SEK X mn to be recorded, with X being: 9 and 4.5 for imports/exports, respectively, in years 2015-; 4.5, from 2009-2014; 2.2 and 4.5 for imports/exports, respectively, in years 2005-2008; and 1.5 in years 1998-2004. Data on trade in services is from a stratified survey (2003-2015) among approximately 6,000 firms (GATS modes 1, 2 and 4), where the largest firms in terms of turnover or trade regularly are included. Trade in services is defined as a cross-border transaction related to a contract on services sales (United Nations, 2002). For further details on the foreign trade in services statistics, see, e.g., Growth Analysis (2010).

BASIC FACTS

This section reports developments in the Swedish labour market over a 15 year period between 1999 and 2014, analysing structural changes in employment and earnings by worker and firm characteristics. The sectoral composition of employment is similar in Sweden as most other rich countries, with primary sectors accounting for about 2% of total employment, industry about 20% and services around 78%. The composition has not changed much over the past 15 years, although within the services sector personal and public services have increased their employment share with about 2 percentage points.[6]

While the sectoral composition of Swedish employment is similar to that of most other rich countries, the institutional setting of the labour market is quite different and the wage structure is quite compressed, with the wage premium of education being low also in a European comparison (UKÄ, 2016). An exceptionally high proportion of the labour force is unionised, and thereby also eligible for unemployment benefits when needed. In the beginning of the period studied, more than 85 % of blue-collar and more than 80% of white-collar workers were members of a trade union (Fredriksson and Holmlund, 2011). Nowadays, the share of workers that is unionised is approximately 74% in Sweden compared to approximately 30% and 15% in the rest of Europe and the US, respectively (Larsson, 2016). The majority of Swedish employers are also organised.

In Sweden, there has been a broad political consensus that wage-setting is within the exclusive remit of the labour market parties. Consequently, there are, for example, no statutory minimum wages, and unionised and non-unionised workers are typically treated the same way. Wage-setting has been semi-centralised, with central negotiations between organisations representing employees and employers within the private industry, which is exposed to international competition through international trade. The central negotiations set the overall framework for the upcoming negotiations, which continue at the sectoral level. Other sectors of the economy are also expected to negotiate within this framework.

Governmental intervention has primarily taken the form of active labour market policies to encourage workers to transit to sectors or occupations where jobs are available. In addition laws on job security contain seniority rules. Employers are therefore limited in their firing decisions and this is likely to increase the costs of hiring and firing as well as reducing the dynamics of the labour market. Unemployment benefit has been high in international comparison but is today less generous than before, particularly for workers in higher paid jobs.

Following Haltiwanger and Vodopivec (2002) we start by looking at hiring, separation, job creation and job destruction rates between year t - 1 and t, denoted HR, SR, CR and DR. The four rates for the overall economy are depicted in Figure 1, and defined as follows:

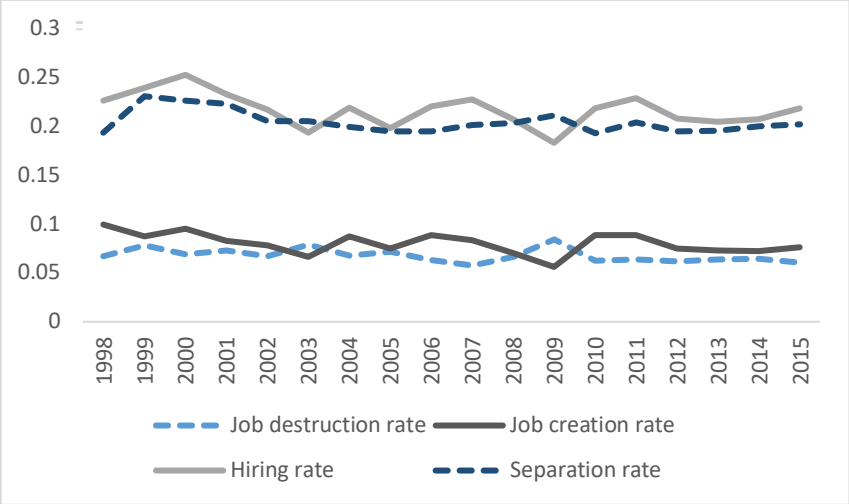
$$HR = (UE_t + IE_t + EE_t)/E_{t-1} \quad (1)$$
$$SR = (EE_t + EI_t + EU_t)/E_{t-1} \quad (2)$$
$$CR = (UE_t + IE_t)/E_{t-1} \quad (3)$$

[6] Personal and public services refer to Swedish National Industrial classification system (SNI), 2-digit categories 84-99. SNI corresponds to NACE.

$$DR = (EI_t + EU_t)/E_{t-1} \quad (4)$$

First, note that the hiring and separation rates include transitions between employers (EE), while job creation and destruction only captures entry and exit respectively from unemployment (U) or inactivity (I).[7]

Figure 1. Annual rates of worker and job flows



Source: Authors' calculations based on Statistics Sweden MONA database

We notice that the gross job flows (hiring and separation rates) are three to four times the net flows (job creation and job destruction rates). It is also noticed that most of the time the net job creation rate is positive, and that the labour market dynamics in terms of job flows fluctuate around a flat trend over time.

Worker characteristics

Table 1 shows the development in employment by gender, broad skills categories and age groups. The gender composition has remained constant with men accounting for about 52 % of total employment throughout. The skills composition, in contrast, has changed rather dramatically with a shift from workers with primary education only to high-skilled workers with tertiary education, while the share of middle-skilled workers has remained fairly constant. In absolute numbers workers with only primary education has declined by almost 40 % during the 15-year period, while the number of workers with tertiary education has increased by about 60 %. There has also been an increase in workers with secondary education in absolute terms although the share has declined somewhat from 50% to 48%.

We observe interesting structural changes in the age composition of workers, with a shift from prime age (25-54 years) to older workers. Thus, the share of the 25-54 year age group declined from 74% to 67%, while the 55 to 64 age group increased its share in total employment from 15 to

[7] In equations (1) to (4) the right hand side combination of letters reflects transition from the first to the second. E.g. UE represents transition from unemployment (U) to employment (E).

18%, although peaking at 20% in 2004. The largest change is, however observed in the oldest age group. The share of workers aged 65 and above increased from 1 to 5% between 1999 and 2014.

The Swedish labour market appears to have undergone a very rapid shift towards high-skilled labour and the labour market appears to have coped well with the aging of the population. The gender gap in terms of labour market participation has, however, remained constant, although the gap is modest compared to many other countries.[8]

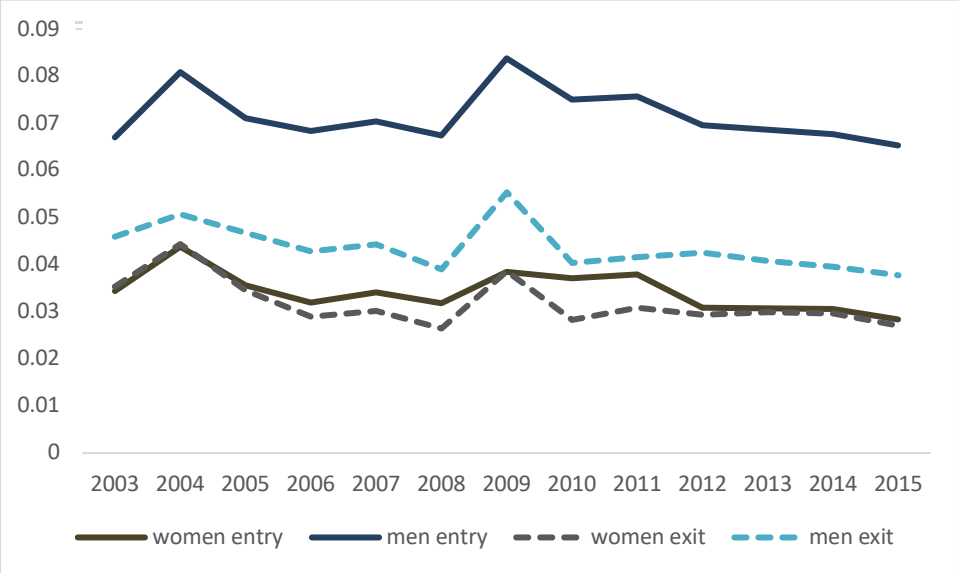
Table 1. Total employment by worker characteristics

		Shares, gender		Shares, education			Shares, age group			
year	Total	Men	Women	Primary	Secondary	Tertiary	15 - 24	25 - 54	55 - 64	65+
1999	3959746	0.52	0.48	0.20	0.50	0.30	0.09	0.74	0.16	0.01
2004	4173004	0.52	0.48	0.15	0.50	0.34	0.09	0.69	0.20	0.02
2009	4290919	0.52	0.48	0.12	0.49	0.38	0.09	0.68	0.20	0.03
2014	4655800	0.52	0.48	0.11	0.48	0.41	0.10	0.67	0.18	0.05

Source: Authors' calculations based on Statistics Sweden MONA database

A closer look at the gender dimension shows that men are about twice as likely to work in start-ups as women and face a somewhat higher risk that their employer will close down as women.[9] As we shall in the next section, men are also slightly more likely to change job than women. We also notice that the market appears to have become less dynamic over time, as the share of the labour force working in new entries or exiting firms have declined somewhat. The trend was broken during the financial crisis, but continued after 2009.

Figure 2. Employment in start-ups and exiting firms by gender



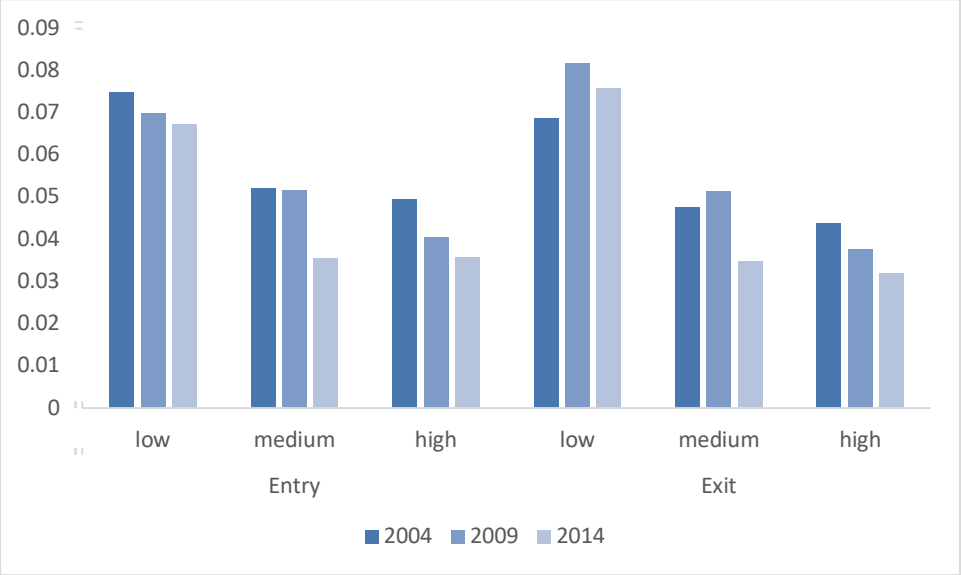
Source: Authors' calculations based on Statistics Sweden MONA database

[8] According to OECD.stat, at 64.2, Sweden had the third highest female full-time equivalent labour force participation rate in 2016, after Iceland (72.9) and Lithuania at 65.1.

[9] New firms are defined as firms that entered the market the year before, while firms exiting the market are firms that exit the year after the year of employment records.

A similar analysis by skill level shows that low-skilled workers face less job security than medium and high skilled workers (Figure 3). Around 7-8% of low-skilled workers work in start-ups and the same figure applies to exiting firms. Medium and high-skilled workers are quite similar on this metrics.

Figure 3. Employment in start-ups and exiting firms by skills category



Source: Authors' calculations based on Statistics Sweden MONA database

Employment by occupation

Table 2 reports employment by one-digit occupation using the Swedish classification system, which, by and large corresponds to ISCO. Information on occupation was patchy in the early years of our database, and there was a change in classification in 2014, so we focus on the period between 2004 and 2013.

Table 2. Employment shares by occupation

	Manager	Professionals	Technician	Clerks	Sales	Craft	Machine operators	Elem.	Other	Unkn.
2004	5.5%	16.7%	17.4%	8.8%	18.6%	8.7%	10.0%	5.7%	1.5%	7.1%
2009	6.1%	17.8%	18.2%	8.1%	19.3%	9.0%	9.3%	5.5%	1.8%	5.0%
2013	5.9%	18.0%	18.6%	7.3%	19.6%	9.2%	8.8%	5.7%	2.3%	4.6%

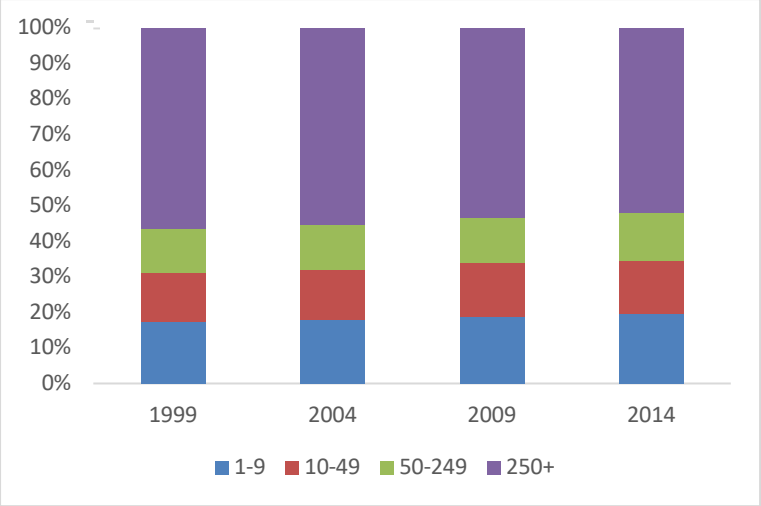
Source: Authors' calculations based on Statistics Sweden MONA database

Over this decade, structural changes at the one-digit level of aggregation are moderate. In keeping with employment by skill, we observe an increase in the share of professionals and technicians. A shift towards personal services is reflected in a rising share of employment in sales occupations, and a decline in the share of machine operators. Machine operators, together with clerks, experienced the largest decline in employment share. These two occupations represent the core of medium skilled workers. Finally, it is interesting to observe a rise in craft related occupations.

By firm characteristics

Turning to firm characteristics, we analyse trends in employment by firm size, broad sector, and export status. Starting with firm size, the distribution of employment has remained fairly stable over the period analysed, as illustrated in Figure 4. We notice that the employment share in the largest firms (250+) has come down from 56% to 52% from 1999 to 2014, while the share in all other categories has increased slightly.

Figure 4. Employment by firm size (number of employees)



Source: Authors' calculations based on Statistics Sweden MONA database

A more granular analyses of worker and job flows by firm size is presented in Table 3.

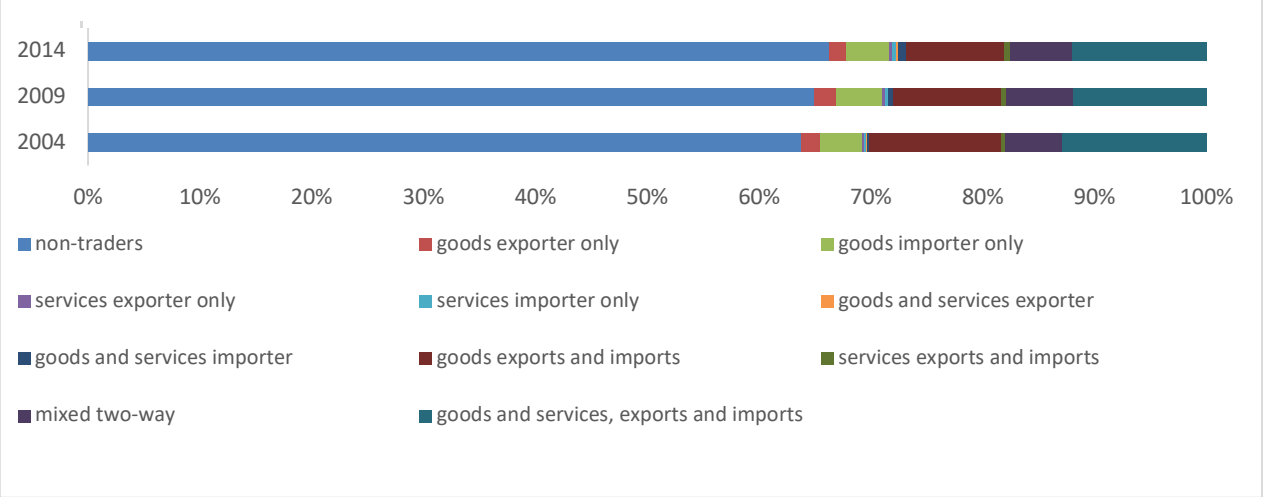
Table 3. Annual hiring, separation, job creation and job destruction rates by firm size

	1-9				10-49				50-249				250+			
	HR	SR	CR	DR	HR	SR	CR	DR	HR	SR	CR	DR	HR	SR	CR	DR
1998	0.35	0.3	0.13	0.09	0.32	0.27	0.12	0.07	0.28	0.24	0.1	0.06	0.23	0.2	0.08	0.05
1999	0.33	0.32	0.11	0.09	0.33	0.3	0.1	0.08	0.28	0.27	0.08	0.07	0.25	0.25	0.07	0.07
2000	0.35	0.32	0.11	0.08	0.36	0.32	0.11	0.07	0.32	0.28	0.1	0.06	0.3	0.27	0.08	0.06
2001	0.31	0.32	0.09	0.09	0.32	0.31	0.08	0.08	0.28	0.29	0.07	0.07	0.26	0.26	0.06	0.07
2002	0.3	0.31	0.09	0.09	0.29	0.28	0.08	0.07	0.26	0.25	0.07	0.06	0.24	0.23	0.06	0.05
2003	0.29	0.31	0.08	0.11	0.26	0.27	0.07	0.09	0.22	0.24	0.06	0.08	0.19	0.21	0.05	0.07
2004	0.32	0.3	0.1	0.09	0.26	0.26	0.08	0.07	0.23	0.23	0.07	0.07	0.21	0.21	0.06	0.06
2005	0.3	0.3	0.09	0.09	0.27	0.26	0.08	0.07	0.23	0.23	0.07	0.07	0.18	0.19	0.05	0.06
2006	0.31	0.29	0.09	0.08	0.29	0.27	0.09	0.06	0.26	0.24	0.08	0.06	0.21	0.19	0.07	0.05
2007	0.32	0.29	0.1	0.07	0.3	0.27	0.09	0.05	0.27	0.24	0.07	0.05	0.24	0.22	0.07	0.05
2008	0.3	0.3	0.08	0.08	0.27	0.26	0.07	0.06	0.26	0.25	0.06	0.06	0.2	0.2	0.05	0.05
2009	0.27	0.31	0.07	0.11	0.22	0.26	0.05	0.09	0.2	0.24	0.04	0.09	0.19	0.23	0.04	0.08
2010	0.31	0.28	0.11	0.08	0.27	0.24	0.09	0.06	0.25	0.23	0.08	0.06	0.21	0.19	0.07	0.05
2011	0.3	0.29	0.09	0.08	0.27	0.25	0.08	0.06	0.26	0.25	0.07	0.05	0.22	0.2	0.06	0.05
2012	0.29	0.28	0.09	0.08	0.25	0.24	0.07	0.06	0.23	0.23	0.06	0.05	0.2	0.2	0.05	0.05
2013	0.29	0.28	0.09	0.08	0.25	0.24	0.07	0.06	0.23	0.23	0.06	0.06	0.19	0.19	0.05	0.05
2014	0.28	0.28	0.08	0.08	0.25	0.24	0.07	0.06	0.24	0.23	0.06	0.06	0.2	0.2	0.05	0.05
2015	0.29	0.28	0.08	0.08	0.26	0.25	0.07	0.06	0.25	0.24	0.07	0.05	0.21	0.2	0.06	0.05

Source: Authors' calculations based on Statistics Sweden MONA database

Some interesting patterns can be observed in Table 3. For instance, looking at large enterprises in 2015, the hiring rate was 21%, of which 6% came from inactivity or unemployment. Likewise, the separation rate was 20% of which 5% left employment. Similar to other studies, we find that the gross job flow rates are much higher than the net flows, and there appears to be a negative correlation between firm size and gross job flows. While the net job creation rate has fluctuated between -5 and + 4 over time, gross hiring rates are between a third and a fifth of the number of employees in any year. In other words a lower bound estimate suggest that on average about a third of workers change jobs, enter or exit the labour market every year. In most years there is net job creation, although the recession year 2009 saw net job destruction for all firm size categories. We finally notice that on average small firms are prone to net job destruction more often than large firms.

Figure 5. Employment shares by export status of the firm



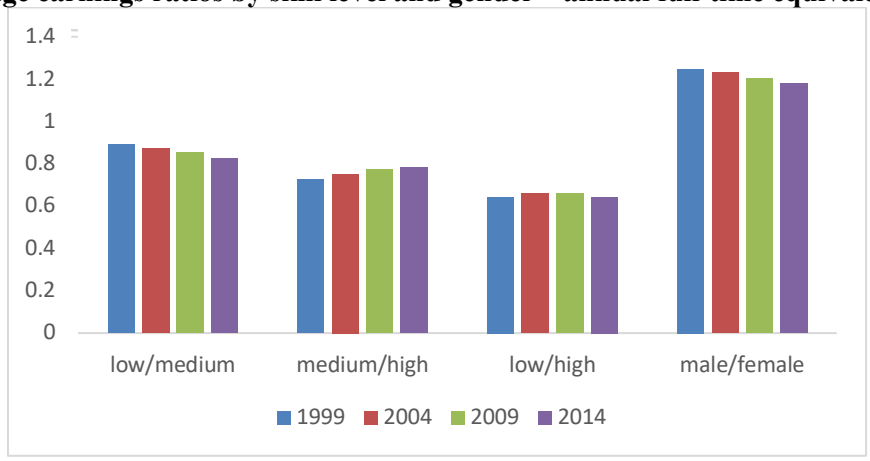
Source: Authors' calculations based on Statistics Sweden MONA database

Figure 5 depicts employment shares by export status of firms. It is noticed that the share of employment in firms that do not participate in international trade has increased over time. This is explained in its entirety by a shift in employment towards personal and public services. When considering manufacturing only, 73% of workers were employed in firms that engaged in international trade in 2014, up from 71.5% in 1999. Among trading firms, the bulk of employment is in firms that engage in two-way trade (both exports and imports). About 12% of workers are employed in firms that export and import both goods and services. The rise in the employment share in non-trading firms is mirrored by a decline in the employment share in firms that import goods only (from 12% to 9%). In sum, fewer workers are directly exposed to international trade in 2014 compared to 2004, while those who are exposed to trade increasingly work in firms with a diversified trade status.

EARNINGS

This section studies earnings by worker and firm characteristics along different dimensions. We start by comparing the earnings ratios across skill level and gender. According to these metrics, Sweden has had a relatively low level of wage dispersion over this period. Low-skilled workers earn a bit more than 80% of medium skilled workers and the ratio has declined somewhat over time. Medium skilled workers in turn earn a bit less than 80% of high-skilled workers. The gender wage gap has declined somewhat over the period with men earning 18% more than women in 2014.

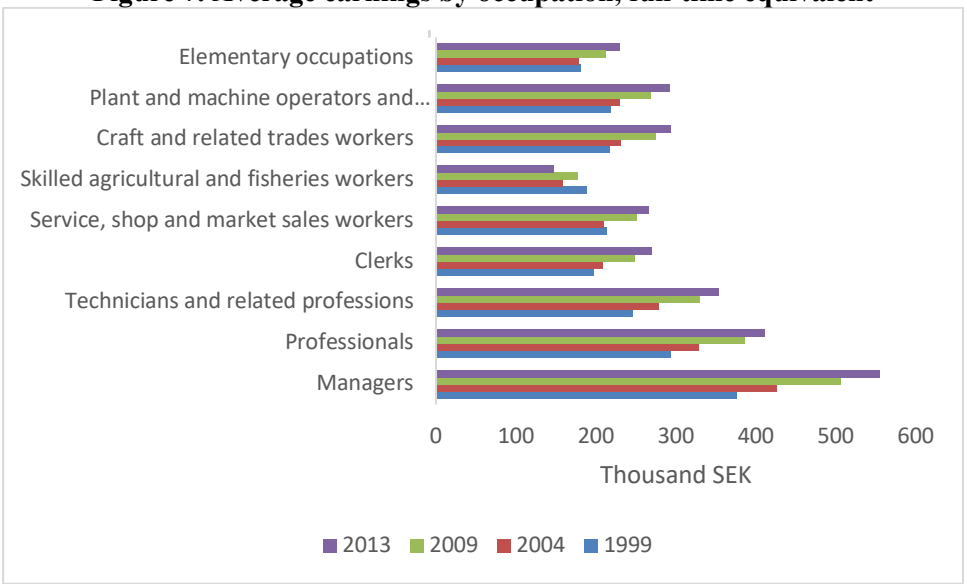
Figure 6. Average earnings ratios by skill level and gender – annual full-time equivalent wages



Source: Authors' calculations based on Statistics Sweden MONA database

Figure 7 reports average wages by occupation. As one would expect, the occupations requiring university degrees and managers have the highest incomes on average. It is also notable that the typical services occupations at middle and lower skill levels, such as clerks and shop and market sales workers on average earn somewhat less than typical manufacturing occupations such as machine operators.

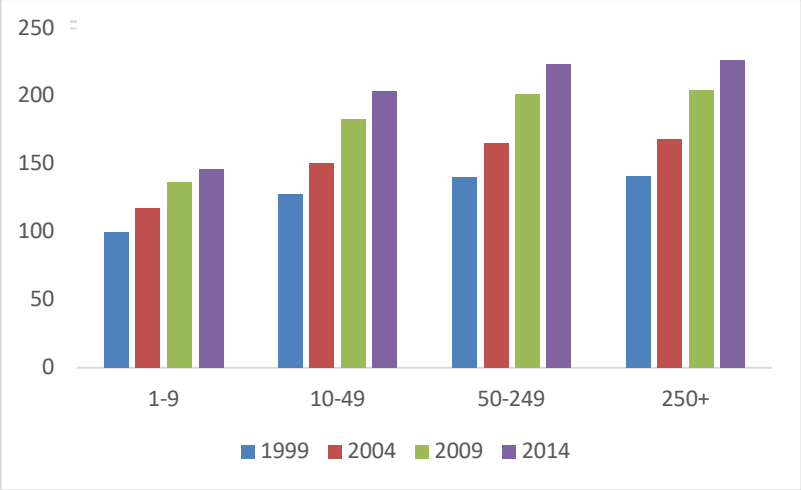
Figure 7. Average earnings by occupation, full-time equivalent



Source: Authors' calculations based on Statistics Sweden MONA database

There are also quite significant differences in average earnings depending on the size of the firm of employment. Figure 8 shows earnings relative to the average for employees in enterprises with 1-9 employees. Earnings increase monotonically with firm size, although the difference between the two largest categories is small. Average wages have also increased faster over time in the largest category. Thus, average earnings were about 40% higher in the 250+ category compared to the 1-9 category in 1999, while in 2014 the gap had widened to 55%. As noted in the previous section, the share of the work force working in large firms have gone down during the same period.[10]

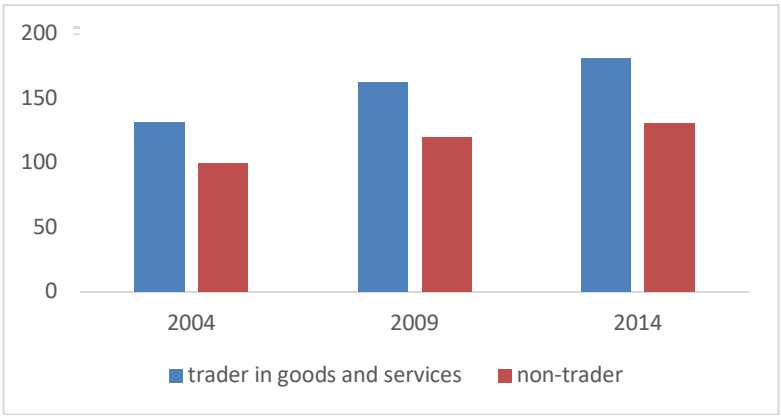
Figure 8. Average earnings by firm size; 1-9 employees in 1999=100



Source: Authors' calculations based on Statistics Sweden MONA database

We finally break down average earnings on the export status of the firm. Figure 9 compares average earnings in non-trading firms with firms that both export and imports goods and services. In 2004 workers in trading firms earned about 30% more on average than workers in non-trading firms. The difference had widened to almost 40% by 2014.

Figure 9. Average earnings in non-trading and goods and services trading firms; non-trading firms in 2004=100



Source: Authors' calculations based on Statistics Sweden MONA database

[10] Value added per worker increases with firm size and is on average about a third higher in the largest category compared to the two smallerst firm size categories. Furthermore, the productivity gap between large and small firms has widened during the period analysed.

WORKER FLOWS: A SHIFT SHARE ANALYSIS

This section explores structural labour market developments along three dimensions: gender, skill and occupation. Starting with the gender dimension, Table 1 suggests that the gender composition of overall employment has been stable over the past 15 years. The aggregate may, however conceal interesting dynamics. To explore this, we study changes in the gender composition of

employment within and across firms and sectors, using a shift-share technique (See Box 1).

Shift share analysis

Female share of employment

The share of women in total employment can be expressed as follows:

$$fsh_t = \sum_j \sum_i \tau_{fit} * \pi_{ijt} * \theta_{jt} \quad (4)$$

Where the left hand side represents the share of women in total employment at time t and the right-hand side breaks down this share on firm and industry level. Thus, τ_{fit} depicts the share of female employment in firm *i*, π_{ijt} denotes firm *i*'s share of employment in sector *j* while θ_{jt} represents the employment share of sector *j* in total employment. Differentiating equation (4) with respect to time reveals possible structural changes beneath the flat overall trend:

$$\frac{\delta fsh_t}{\delta t} = \sum_j \sum_i [\frac{\delta \tau_{fit}}{\delta t} \pi_{ijt} \theta_{jt} + \tau_{fit} \theta_{jt} \frac{\delta \pi_{ijt}}{\delta t} + \tau_{fit} \pi_{ijt} \frac{\delta \theta_{sit}}{\delta t} + interaction\ terms] \quad (5)$$

The first term on the right hand side represent the contribution from changes in the female share of employment within firms, keeping the composition relative size of firms and sectors constant. The second term shows the contribution from changes in the relative size of firms in sectoral employment, keeping the share of women at the firm level and the composition of sectors in total employment constant. The third term depicts the contribution from structural changes in sectoral employment keeping the gender composition of firms and firm contribution to sectoral employment constant. The interaction terms represent dynamic structural changes as the elements in equation (4) change simultaneously.

Occupation share of employment

The shift share analysis of employment by occupation follows a simpler approach with only two elements, within and across sectors. The within firm dimension is dropped since most firms except the largest ones would employ a limited number of occupations.

$$occ\_sh_t = \sum_i s_{jt} * \mu_{jtotal,t} \quad (6)$$

$$\Delta s_{jt} = (s_{jt} - s_{jt-n})\mu_{jtotal,t} + (\mu_{jtotal,t} - \mu_{jtotal,t-n})s_{jt-n} \quad (7)$$

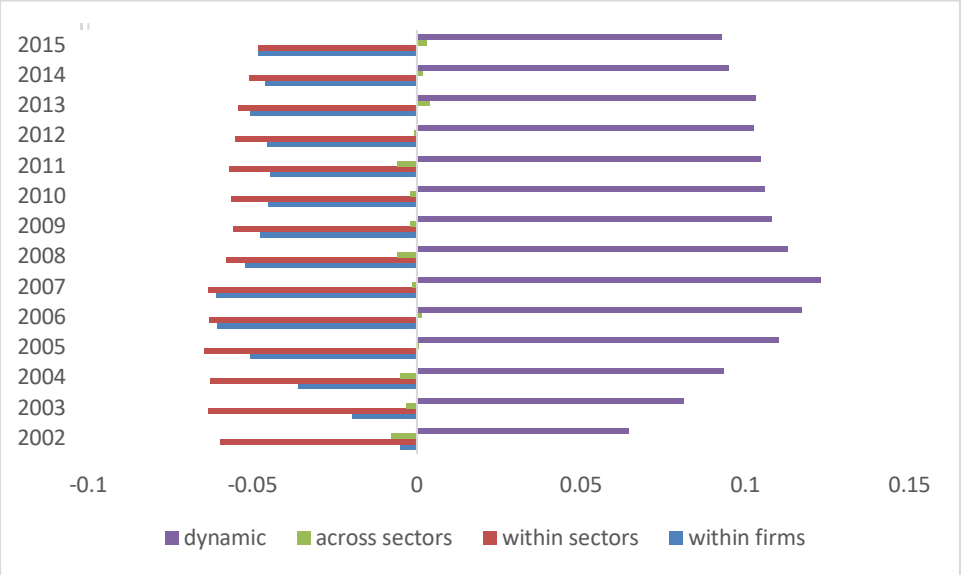
The first term on the right-hand side represents within sector changes, while the second term shows across sector contribution to occupational changes.

We computed changes in the share of women in employment at the firm, sector and economy level over five year spans from 1997 to 2015, and the contribution from each element.[11] Figure 10 reports the results. Clearly, beneath the flat trend significant structural changes have taken place. It is first noted that static changes contribute to reducing the share of women in total employment. Thus, on average, the female share of employment has declined somewhat at the firm level. Furthermore, the within sector element also contributes to a decline in the share of women in total employment. Recall, however that the contribution from this element is evaluated at the initial

[11] Sectors are defined at the 3-digit level using the SNI classification system.

gender composition of employment. The largest impact comes from the dynamic combination of within firm and within sector effects where the firms that reduce the share of women in employment also significantly reduce their share of sectoral employment. Finally, towards the end of the period there is also a positive contribution from a shift in employment towards sectors that traditionally employ more women. In sum, the shift share analysis shows that although the female share of employment is high and stable, the labour market has become more segmented along the gender dimension with a relative expansion of firms and sectors that already employ women intensively rather than women moving into male-dominated firms and sectors.

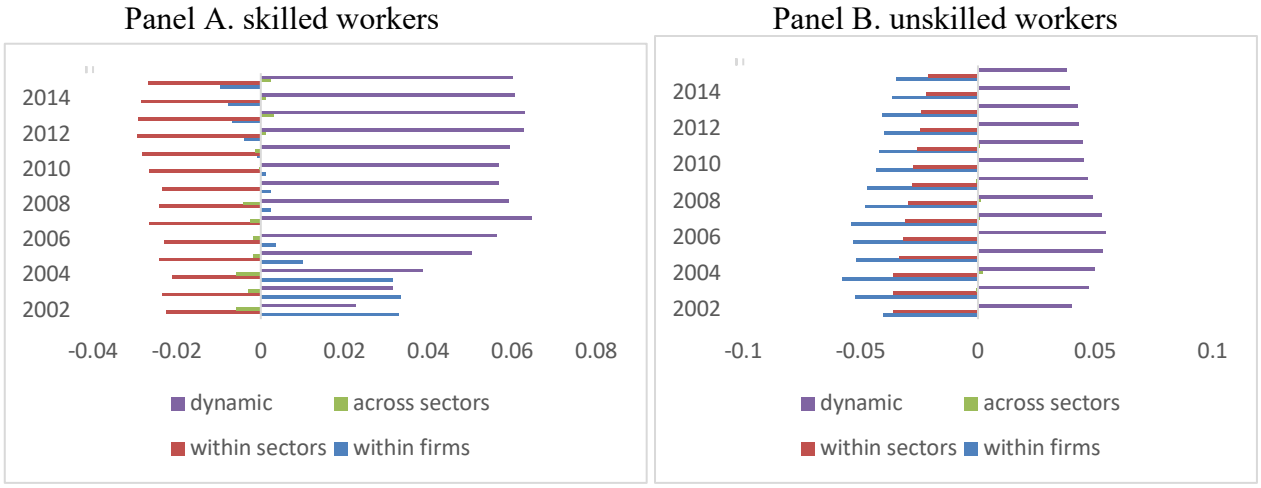
Figure 10. Shift in employment shares by gender



Source: Authors' calculations based on Statistics Sweden MONA database. The graphs shows changes over a 5-year periods.

Turning to skills, we use the same approach as depicted in equation (5) replacing the share of female workers with the share of high-skilled workers and next the share of low-skilled workers. Recall from Table 1 that the share of high-skilled workers in overall employment has increased significantly at the expense of low-skilled workers. Figure 11 portrays the structural changes.

Figure 11. Shift in employment share by skill level



Source: Authors' calculations based on Statistics Sweden MONA database. The graphs show changes over 5-year periods.

The shift share for high-skilled workers (Panel A) shows that on average firms became much more skills intensive from the late 1990s to the mid-2000s after which the contribution from restructuring of firms levelled off. The within sector contribution has been negative throughout, while the across sector contribution is small. The largest impact comes from the combined dynamic effect of within firm and within sector changes. Thus, if a firm becomes less skills intensive at the same time as its share in sectoral employment declines, this adds up to a positive contribution to overall skills intensity.

The share of low-skilled workers in total employment has declined continuously throughout the period, albeit at a diminishing pace. Figure 11, Panel B shows that both the within firms and the within sector contributions are negative. The dynamic effect dampens the overall impact somewhat as the firms that reduce their share of unskilled labour also reduces their share of sectoral employment, which add up to a positive contribution to the overall share of low-skilled workers in employment. The dynamic effect is, however, not sufficient to counterbalance the negative contribution from the within firm and within sector effects.

Finally, following Goos et al. (2014) we did a shift share analysis for changes in employment by occupation. Table 4 reports the results for selected occupations. Since firms, particularly small firms tend to employ a limited number of occupations, the analysis focussed on changes within and across sectors.

Table 4. Shift share occupations within and across sectors, selected occupations

	Professionals			Clerks			Sales			Machine operators		
	Total	Within	Across	Total	Within	Across	Total	Within	Across	Total	Within	Across
2003	6.19%	6.64%	-0.45%	4.00%	4.16%	-0.16%	6.01%	6.57%	-0.55%	5.79%	6.09%	-0.30%
2004	5.11%	5.70%	-0.59%	3.70%	3.87%	-0.17%	6.37%	6.97%	-0.60%	5.49%	5.72%	-0.23%
2005	5.83%	6.10%	-0.27%	3.70%	3.79%	-0.09%	6.89%	7.04%	-0.15%	4.70%	4.99%	-0.29%
2006	1.40%	1.61%	-0.21%	-0.43%	-0.58%	0.15%	1.18%	0.88%	0.30%	0.15%	0.53%	-0.38%
2007	1.05%	1.33%	-0.28%	-0.66%	-0.78%	0.11%	1.22%	1.16%	0.06%	-0.04%	0.19%	-0.23%
2008	0.53%	0.82%	-0.30%	-0.73%	-0.82%	0.09%	0.97%	1.25%	-0.28%	-0.27%	-0.10%	-0.17%
2009	1.08%	1.07%	0.00%	-0.75%	-0.72%	-0.03%	0.67%	0.67%	0.00%	-0.71%	-0.20%	-0.50%
2010	0.64%	0.70%	-0.06%	-0.81%	-0.77%	-0.03%	0.58%	0.54%	0.04%	-0.65%	-0.20%	-0.45%
2011	0.47%	0.53%	-0.06%	-0.93%	-0.90%	-0.04%	0.19%	0.40%	-0.21%	-0.72%	-0.32%	-0.40%
2012	0.52%	0.38%	0.14%	-0.93%	-0.84%	-0.09%	0.45%	0.38%	0.06%	-0.87%	-0.22%	-0.66%
2013	0.78%	0.51%	0.28%	-1.00%	-0.89%	-0.11%	0.56%	0.26%	0.30%	-1.04%	-0.30%	-0.74%

Source: Authors' calculations based on Statistics Sweden MONA database

What is notable from this table is first, the dynamics of occupational changes have declined steadily over time. Second, the changes are mostly observed within sectors with the notable exception of machine operators in recent years where the changes have been mainly across sectors. A possible explanation for the latter observation is that machine operators are relatively sector-specific to manufacturing and construction.

To summarize the descriptive statistics, the most striking developments in the Swedish labour market over the past 15 years are a sharp rise in the share of skilled workers in employment and a reduction in the share of workers directly exposed to international trade. Unskilled workers and workers in small firms are more exposed to labour market churning than medium and high skilled workers. Finally, underneath the high and stable share of women in employment there appears to be a trend towards segmentation of the labour market along the gender dimension.

LABOUR MARKET ADJUSTMENTS TO TRADE IN SERVCIES

This section relates the observed changes in employment and earnings patterns presented above to international trade in goods and services.

Earnings

Trade theory predicts that trade and specialisation based on comparative advantage changes relative wages in favour of the abundant factor in the economy. Sweden is relatively abundant in skilled labour, and one would therefore expect that trade benefits high-skilled workers. On the other hand, competition from external suppliers may put downward pressure on wage levels. Furthermore, offshoring of intermediate inputs may improve labour productivity as firms get access to better and cheaper inputs. The net effect is

an empirical questions to which we now turn. We start by analysing the relationship between labour market churning, entry and exit into foreign market and earnings, followed by an analysis of the impact of exports and offshoring on earnings within job spells, i.e. for workers that stay in the same firm. The latter regressions are run using instrument variables and thus capture causalities.

Earnings dynamics at the extensive margin

To study earnings at the extensive margin, we analyse the probability that a worker obtains a higher wage rise than his or her peers, conditioned on changes in employment and the trade status of the firm.[12] This sheds light on the wage impacts of the dynamics reported in Table 3, which shows large gross flows of workers between jobs. We measure the wage impact by the probability that a worker obtain a wage rise above the average of comparable workers if he or she change job or the company they work in change export status.

Starting with some general observations, men are slightly less likely to obtain an above average wage rise than women, which reflects the slight narrowing of the gender wage gap reported in Figure 6 above. Age is positively associated with obtaining a higher wage increase, but at a declining rate with rising age, while tenure is negatively associated with obtaining a higher wage rise, but at a declining rate.

Interestingly, the probability of gaining a wage rise above average is always negatively associated with a change in export status of the firm of employment. Whether the firm enters or exit export markets or starts or stops offshoring, there is a slightly lower probability that workers in the firm gain an above average wage increase. Furthermore, wages seem to be more sensitive to services exports and offshoring than to trade in goods. Recall that workers in trading firms have higher wages than those working in non-trading firms (see Figure 9 above). The sensitivity of wage increases to change in export status is therefore likely driven by firms that trade only occasionally and thus change trade status frequently. These are only marginally competitive in foreign markets, and thus more sensitive to changes in exposure to competition from foreign firms. Our finding also suggest that firms at the margin of changing export status show more moderation as far as raising wages are concerned relative to less exposed firms.

Workers do, however gain from switching job. Moving to another company within the same sector or changing occupation is associated with a higher probability for wage gain. Furthermore, changing occupation within a firm is associated with a higher probability of wage gains as one would expect, since these are likely to reflect promotions. Nevertheless, changing job to another industry is associated with a smaller wage rise than peers. These observations suggest that job changes within sectors and change of occupations are mostly voluntary as workers find better opportunities outside their current job. An exception from this is workers that change industry.

Finally we explore the earnings implications of changing job at the same time as the firm of employment change export status. The most relevant and easy to interpret is a change of occupation within the firm at the same time as the firm changes export status. We find that in this case the probability to gain a higher than average wage is strengthened. This holds true for most changes in export status and the impact is strongest in firms that enter services export markets or start offshoring services. A likely explanation is that dealing with foreign customers or suppliers requires different skills and capabilities that are rewarded as workers are promoted and take up new tasks.

Earnings, exports and offshoring

We next regressed earnings on the trade activity of the firm controlling for worker and firm characteristics using a similar approach as Hummels et al (2014) for Denmark. Following Hummels et al, we study the impact of exports and offshoring on wages within job spells and thus focus on workers that remain in their

[12] For this purpose we use a population averaged probit model controlling for worker characteristics.

current job. Our analysis differs from Hummels et al. (2014) in two important ways. First, and most importantly while the study from Denmark was limited to manufacturing companies and trade in goods, this study includes both manufacturing and services firms and covers goods and services exports and offshoring. To obtain comparable results we ran the regressions for services and manufacturing separately.[13] Second, our study includes more recent data, covering the period 2003-2014.

The results for the manufacturing sector is reported in Annex table A2.3 and for services in Annex table A2.4 and summarized in Table 5. The regression using instruments for offshoring and exports of goods show a similar but an order of magnitude smaller overall wage effect as in the study of Denmark. Thus, a 10% increase in offshoring of goods leads to a 0.04% overall decline in average wages for all workers. However, as opposed to the Danish study, skilled workers are more affected, with an average decline in earnings of 0.2% following a 10% increase in offshoring.[14] Offshoring of services by manufacturing firms on the other hand, leads to an overall increase in wages which in its entirety benefits low and medium skilled workers. Exports of goods on the other hand, raises overall wages and the skilled workers gain more than low and medium skilled workers. Finally, exports of services by manufacturing firms lead to lower overall wages but, higher wages for skilled workers.

Table 5. Impact on wages of a 10% increase in offshoring or exports

	Manufacturing firms		Services firms	
	High-skilled	Low and middle skilled	High-skilled	Low and middle skilled
Offshoring				
Goods	-0.2%	-0.04%	-0.4%	-0.3%
Services	-1.3%	0.6%	0	0
Exports				
Goods	0.3%	0.14%	-0.3%	-0.3%
Services	1.6%	-0.5%	-0.6%	-0.6%

Note: The table is based on the elasticities reported in Tables A2.2 and A2.3 Panel B, columns 2 and 4.

Services firms exhibit a somewhat different pattern when it comes to the wage effect of offshoring. Offshoring of services has no discernible effect on wages, while exports of services reduce wages slightly for all workers. Goods exports and offshoring also have a negative impact on wages for all workers, although the marginal as well as the absolute impact is small, given that the extent to which services firms export and offshore goods is quite limited.

Skilled workers are negatively affected by offshoring in Swedish manufacturing while the effect is positive in Denmark. A possible explanation is the difference in industrial structure between the two countries where Sweden is more specialised in medium to high-technology industries. High-technology industries tend to employ more high-skilled workers that may face competition from offshored high-skill services. A comparative analysis between Sweden and Denmark is beyond the scope of this paper, but could be an interesting area for future analysis.[15]

To summarize this section, workers in firms that change export status are slightly less likely to obtain wage rises in line with the average of their peers, while workers that stay in the same job on average face only

[13] We also ran pooled IV regressions for all firms. These gave statistically insignificant results for the impact of services offshoring and exports, while a small negative impact on all workers were found for goods offshoring and goods exports for all workers.

[14] Arguably, following Hummels et al (2014) and controlling for both output and employment takes out the impact of productivity, which may be the major channel through which offshoring and exports affect wages. We therefore focus on the results where sales and employment are not controlled for in the discussion.

[15] This study is part of a larger project on trade and jobs focusing on services sectors. A comparative analysis of results from micro data analysis from several countries will be part of the final report.

marginal impact on earnings of exports or offshoring, with the exception of high-skilled workers in manufacturing firms who face a downward pressure on wages from services offshoring and higher wages from services exports.

Labour demand

We start with an analysis of how the probability of changing job is related to change in the firms' export status, controlling for worker characteristics. We study four margins of job change: Change firm across sectors, change firm within sector, change occupation and change occupation within firms. Starting with the control variables, we observe that men are somewhat less likely to change jobs than women on any of these margins. The probability to change occupation or job across firms within sector increases with age albeit at a diminishing rate, while the probability to change job to a different sector diminishes with age. Furthermore, the probability to change job diminishes with tenure, except for changing occupation within firms. The latter probably reflects promotion based on seniority. Skilled workers are less likely to change employer whether within or across sectors, but more likely to change occupation.

Turning to change in export status and labour market churning, it appears that the direction of change in export status is less important than the fact that there is a change. However, the effect of a change in export status is different across margins of job change. Thus, workers in a firm that change export status are less likely to move to another sector, but more likely to change job within the sector.[16] Second, a change in export status is associated with a higher probability of a change in occupation in general as well as change in occupation within firms. Annex Table A2.4 presents the detailed results.

We finally study labour demand at the firm level using a standard factor demand regression. We estimate labour demand by skill level, distinguishing between high, medium and low skill workers. Labour demand is a function of relative wages and we extend the model by adding a number of trade-related shift parameters.[17] To reduce sensitivity to measurement error, we estimate the equation in five-year differences.

We first notice that all the trade variables are positively related to labour demand at all three skill levels. The elasticities of labour demand to goods and services exports and offshoring are relatively small, however, indicating that a 10% increase in exports or offshoring is associated with between 0.1% and 0.5% higher labour demand. Interestingly, we find that both exports and offshoring of services shift labour demand towards high-skilled workers, while exports and offshoring of goods raise the relative demand for unskilled workers. Furthermore, after controlling for export volume, exporting goods to a larger number of countries gives an additional boost to labour demand particularly for unskilled workers. It also appears that the impact of trade on labour demand is non-linear. A dummy variable that distinguishes traders from non-traders is negatively associated with labour demand, but as noted, labour demand rises with export and offshoring value.

The elasticity of labour demand to wages exhibits an interesting pattern. While demand for high and low-skilled labour is relatively inelastic to wages, demand for middle-skilled workers is quite sensitive to changes in wages. Thus, while a 1% increase in the wage rate reduces demand for high and low skilled workers by about 0.1%, the same wage increase reduces demand for middle skilled workers by about 0.8%. Moreover, an increase in the wage rate for middle-skilled workers has a stronger negative impact on

[16] The only exception from this is for firms that exit services export markets in which case workers are less likely to move to another firm in the same sector.

[17] The capital stock is omitted from the regressions due to limited information. The estimated equation is the following: $\Delta lnl_{sit} = \alpha_0 + \sum \alpha_j \Delta lnw_{sit} + \sum \gamma_l \Delta lnz_{ilt} + \varepsilon_{sit}$, where subscript s denote skill level, i denotes firm and z represents trade related shift parameters.

the demand for low-skilled workers than for middle skilled workers. This surprising finding is consistent with previous studies of polarisation of the labour market, where the tasks traditionally performed by middle-skilled workers are more offshorable and automatable than both high-skilled and low-skilled tasks. A twist here is that low and middle-skilled workers are strongly complementary. Middle and low skilled workers often work in teams where the middle-skill worker supervise one or more low-skilled workers. When demand for middle-skilled workers go down, the low-skilled team member become obsolete as well. The detailed results are reported in Annex Table A2.5. More research is needed to explore complementarities between skill levels and could be extended to occupations as well.

CONCLUSIONS

This study has analysed the relationship between trade and jobs using matched employer employee data for Sweden. It has uncovered rich and multifaceted labour market developments at the worker and firm level that may inform policy action in response to disruptions from international trade. As predicted by economic theory, trade is associated with reallocation of jobs within and across sectors. Moreover, as found in a number of studies from other countries, the largest effect is within sectors. We also find evidence that the impact of trade on job flows and earnings is moderate to small and appears to affect small firms and firms that are marginally competitive in international markets and trade only occasionally – and the workers in these firms. Both exports and offshoring are associated with higher labour demand and in some cases slightly lower wages.

In the introduction we raised the question whether the Swedish labour market is less dynamic and Swedish workers better protected than in other countries. Although no rigorous comparison has been made to other countries, it appears that the answer to both these questions are in the affirmative, as also pointed out in two recent Swedish studies (Eklund and Thulin, 2018; Enegren et al., 2019). However, both argue that lack of flexibility also has costs in terms of a poorer match of skills demand and supply, loss of competitiveness and lagging behind the frontier as far as productivity gains are concerned.

The study has covered many aspects of the links between trade and labour market developments that deserve further analysis. Among these are the job flows and earnings across occupations at a more detailed level. Changing occupation can be costly for workers but could improve the matching problem identified in the Swedish labour market.

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STATISTICAL ANNEX

Table A1: Variable definitions and sources

Variables	Definitions	Sources
UE	Nr. of individuals from unemployment to employment	LISA and own calculation
IE	Nr. of individuals from inactive to employment	LISA and own calculation
EE	Nr. of individual from employment in one firm to another	LISA and own calculation
E	Nr. of individual employed	LISA and own calculation
Male (1,0)	Male, zero otherwise	LISA
Age	Age of individuals	LISA
Age square	Squared term of individuals' age	LISA and own calculation
Tenure	Nr. of years that an individual has worked at the same firm	LISA and own calculation
Tenure square	Squared term of individuals' tenure	LISA
High skill (1, 0)	Received tertiary education, zero otherwise	LISA and own calculation
Share high skilled	Share of employees that have post-secondary education	LISA and own calculation
Change job (1, 0)	Change from one firm to another	LISA
Change export status (1, 0)	From non-exporter to exporter, zero otherwise	FTS
Ln offshoring	Log value of the total value of imports	FTS
Ln exports	Log value of the total value of exports	FTS
Civil (1, 0)	Married, zero otherwise	FTS
Ln Employment	Log value of the number of (full-time equivalent) employees	SBS
Ln Sale	Log value of the turnover	SBS
Ln wage high-skilled	Log value of the full-time equivalent earnings of high-skill (i.e., tertiary educ. two year or longer) workers	LISA and own calculation
Ln wage middle-skilled	Log value of the full-time equivalent earnings of medium-skill (i.e., secondary educ. or less than two year tertiary educ.) workers	LISA and own calculation
Ln wage low-skilled	Log value of the full-time equivalent earnings of low-skill (i.e., less than secondary educ.) workers	LISA and own calculation
Ln services exports	Log value of the service exports	FTS
Ln services import	Log value of the service imports	FTS
Foreign owned (0, 1)	Larger than 50 percent foreign ownership, zero otherwise	EGR
Number of markets S	Number of markets for service exports	FTS and own calculation
Number of markets G	Number of markets for good exports	FTS and own calculation
Ln goods exports	Log value of goods exports	FTS
Ln goods imports	Log value of goods imports	FTS
Services exporter (1, 0)	Service exporter, zero otherwise	FTS
Services importer (1, 0)	Service importer, zero otherwise	FTS
Goods exporter (1, 0)	Goods exporter, zero otherwise	FTS
Goods importer (1, 0)	Goods importer, zero otherwise	FTS

Notes: Sources from Statistics Sweden are Structural Business Statistics (Företagens ekonomi), SBS; Longitudinal Integration Database for Health Insurance and Labour Market Studies, LISA; Enterprise Group Register (Koncernregistret), EGR; Foreign Trade Statistics (Utrikeshandel med varor, Utrikeshandel med tjänster), FTS; Compensation of Employees and Current Transfers (Löner och transfereringar), FTS.

TECHNICAL ANNEX, REGRESSION RESULTS

We calculated average wage increase from one year to the next by year, gender, tenure, skill level, industry and occupation. Next, we estimated the probability that a worker would gain more than average if he or she changed job, conditioned on whether the firm of employment in year *t*-1 changed export status using population averaged probit. Table A2.1 reports the results. Panel A shows the regression of the core control variables while panel B depicts the coefficient on change in job and change in export status of the firms of employment. These are introduced one by one in the regressions. Since the coefficients on the core variables are robust to the inclusion of additional variables, in the interest of space we only report the coefficients of the variable of interest in Panel B. Since our main interest is trade in services, we also limit the reporting to change in export status to services. The coefficients for change in export status for goods are typically similar in sign and statistical significant but in most cases smaller.

Table A2.1 Probability of obtaining higher wage rise than average

Panel A. Core variables

	Core variables
Male	-0.055***
	(166.89)
Age	0.017***
	(215.36)
Age squared	-0.000***
	(248.16)
Tenure	-0.017***
	(205.06)
Tenure squared	0.001***
	(202.94)
High-skill	-0.010***
	(29.53)
Log likelihood	-50,609,122.45
N	74,657,536

Panel B. Change job and export status

Job change	Coefficient	Change export status	Coefficient	Interaction
Change firm	-0.0280***	Entry service exports	-0.176***	0.127***
Change firm within sector	0.208***	Exit services exports	-0.176***	-
Change sector	-0.0575***	Entry services offshoring	-0.181***	0.127***
Change occupation	0.0111***	Exit services offshoring	-0.185***	0.0917*
Change occupation within firm	0.0563***			

Note: Probability that a worker will obtain an above average wage increase in a given year. Average is calculated by year, gender, age, tenure, occupation and industry of employment. T-statistics are reported in parenthesis where ***, ** and * signify statistical significance at the 1%, 5% and 10% level respectively. The interaction term is between the change in occupation within firm and change in the export status of the firm as indicated in the row.

Table A2.2 Worker level wage regressions, manufacturing firms

Panel A. fixed effect regressions

	Services		Goods		Goods and services	
	(1)	(2)	(3)	(4)	(5)	(6)
Ln offshoring	-0.001***	-0.001	-0.001*	0.002***	-0.001*	0.002***
	(4.31)	(1.54)	(1.85)	(7.78)	(1.75)	(8.02)
High-skilled*ln offshoring	-0.000	-0.001**	-0.000	-0.002***	-0.000	-0.002***
	(0.14)	(2.02)	(0.71)	(6.51)	(0.73)	(6.43)
Ln exports	0.000	0.001	-0.001	0.002***	-0.001	0.002***
	(1.09)	(1.36)	(1.64)	(5.73)	(1.16)	(6.59)
High-skilled*ln exports	-0.000	-0.000	-0.002***	-0.003***	-0.002***	-0.003***
	(0.95)	(0.91)	(3.86)	(10.17)	(4.12)	(10.30)
Tenure	0.009***	0.012***	0.009***	0.012***	0.009***	0.012***
	(6.25)	(9.70)	(6.32)	(9.59)	(6.31)	(9.58)
Tenure squared	-0.000***	-0.001***	-0.000***	-0.001***	-0.000***	-0.001***
	(12.34)	(23.73)	(12.24)	(23.21)	(12.25)	(23.21)
Civil	-0.005***	-0.002**	-0.005***	-0.002**	-0.005***	-0.002**
	(4.29)	(2.49)	(4.22)	(2.46)	(4.22)	(2.46)
Share of high-skilled	0.229***		0.193***		0.192***	
	(21.03)		(16.96)		(16.86)	
Ln Employment	0.007		0.009		0.009	
	(0.62)		(0.76)		(0.74)	
Ln sale	0.040***		0.041***		0.041***	
	(3.02)		(3.07)		(3.04)	
R-squared	0.72	0.74	0.72	0.74	0.72	0.74
Observations	4,828,689	7,582,837	4,834,193	7,588,972	4,834,175	7,588,934

Note: the dependent variable is log of annual full-time equivalent earnings. The regressions are run on all Swedish manufacturing firms using industry-year and worker fixed effects. Standard errors are clustered on firm-year. T-statistics are shown in parenthesis and ***, ** and * denote statistical significance at a 1%, 5% and 10% level respectively.

Panel B FE-IV regressions

	Services		Goods	
	(1)	(2)	(3)	(4)
Ln offshoring	0.024*	0.063***	-0.025***	-0.004***
	(1.66)	(5.26)	(7.29)	(2.69)
High-skilled*ln offshoring	-0.029	-0.191***	-0.002	-0.021***
	(0.53)	(4.46)	(0.14)	(3.81)
Ln exports	-0.008	-0.048***	0.015**	0.014***
	(0.68)	(3.85)	(2.19)	(6.27)
High-skilled*ln exports	0.032	0.211***	0.001	0.016***
	(0.54)	(4.25)	(0.09)	(3.06)
Tenure	0.015***	0.018***	0.016***	0.018***
	(26.61)	(30.86)	(38.45)	(44.68)
Tenure squared	-0.001***	-0.001***	-0.001***	-0.001***
	(39.44)	(24.77)	(119.17)	(160.66)
Civil	0.000	-0.001	-0.001	-0.000
	(0.11)	(1.10)	(1.41)	(0.44)
Share of high-skilled	0.202**		0.226***	
	(2.25)		(28.42)	
Ln Employment	0.027***		0.031***	
	(6.32)		(11.54)	
Ln sale	0.009*		0.031***	
	(1.82)		(3.88)	
R-squared	0.71	0.58	0.72	0.72

Observations	4,726,678	6,111,141	4,731,981	6,117,054

Note. IV regressions only includes observations of firms that both export and import. Firms that both imports and exports goods and services are too few to include in this specification. The offshoring instrument is the trading partner export supply to all countries except Sweden of the product in question. The export instrument is trading partner's total purchases of the product in question less imports from Sweden.

Table A2.3 Worker level wage regressions, services firms

Panel A. fixed effect regressions

	Services		Goods		Goods and services	
	(1)	(2)	(3)	(4)	(5)	(6)
Ln offshoring	0.000	0.001***	0.000*	0.002***	0.000*	0.002***
	(0.16)	(2.91)	(1.76)	(13.13)	(1.75)	(14.55)
High-skill*ln offshoring	-0.001*	-0.001**	-0.001***	-0.001***	-0.001***	-0.001***
	(1.80)	(2.00)	(5.35)	(7.95)	(5.46)	(7.89)
Ln exports	-0.001***	-0.001**	0.000	0.001***	-0.000	0.001***
	(3.00)	(1.98)	(0.51)	(5.74)	(0.52)	(5.86)
High-skill* ln exports	-0.000	-0.000	-0.001***	-0.001***	-0.001***	-0.001***
	(1.00)	(0.11)	(3.16)	(5.62)	(3.03)	(4.79)
Tenure	0.018***	0.018***	0.018***	0.018***	0.018***	0.018***
	(3.92)	(4.01)	(3.94)	(4.00)	(3.94)	(4.00)
Tenure squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(17.00)	(44.70)	(17.09)	(44.65)	(17.12)	(44.63)
Civil	-0.020***	-0.007***	-0.020***	-0.007***	-0.020***	-0.007***
	(20.80)	(13.10)	(20.77)	(13.12)	(20.78)	(13.13)
Share of high-skill	0.166***		0.152***		0.151***	
	(22.73)		(21.43)		(21.26)	
Ln employment	0.016***		0.015***		0.015***	
	(4.47)		(4.22)		(4.24)	
Ln sale	0.025***		0.024***		0.024***	
	(7.53)		(7.03)		(7.24)	
R-squared	0.70	0.68	0.70	0.68	0.70	0.68
Observations	11,186,009	42,798,610	11,199,473	42,813,395	11,195,162	42,809,027

Panel B IV-FE regressions

	(1)	(2)	(3)	(4)
Ln offshoring	0.088***	-0.002	-0.039***	-0.028***
	(7.44)	(0.11)	(14.78)	(7.72)
High-skilled*offshoring	-0.206***	-0.014	0.004	-0.011*
	(3.16)	(0.25)	(1.25)	(1.94)
Ln exports	-0.084***	-0.063***	-0.003	-0.034***
	(4.83)	(6.14)	(1.14)	(8.03)
High-skill*exports	0.220***	0.005	-0.007*	0.009
	(3.11)	(0.08)	(1.88)	(1.46)
Tenure	0.033***	0.025***	0.027***	0.024***
	(27.99)	(70.74)	(124.91)	(132.78)
Tenure squared	-0.001***	-0.001***	-0.001***	-0.001***
	(18.89)	(37.62)	(97.42)	(181.80)
Civil	-0.021***	-0.010***	-0.015***	-0.008***
	(16.24)	(15.84)	(15.73)	(15.11)
High-skill share	-0.008		0.185***	
	(0.10)		(34.22)	
Ln employment	0.009**		0.016***	

	(2.43)		(8.97)	
Ln sale	-0.009		0.075***	
	(0.63)		(25.97)	
R-squared	0.62	0.64	0.71	0.65
Observations	6,309,188	16,731,455	6,319,405	16,742,849

Table A2.4. Probability to change job and change in export status

	Sector	Firm within sector	Occupation	Occupation within firm
Male	-0.0966***	-0.00564***	-0.0386***	-0.00402***
	(225.68)	(6.71)	(126.36)	(-10.83)
Age	-0.0414***	0.0530***	0.0335***	0.0185***
	(414.71)	(243.66)	(345.47)	(152.3)
Age squared	0.000434***	-0.000503***	-0.000487***	-0.000273***
	(361.3)	(188.17)	(427.99)	(194.20)
Tenure	-0.245***	-0.356***	-0.0269***	0.0209***
	(1558.89)	(662.96)	(269.79)	(159.98)
Tenure squared	0.00790***	0.0119***	0.00146***	0.0000652***
	(1124.67)	(596.45)	(340.25)	(11.6)
Skill	-0.0694***	-0.0146***	0.0470***	0.0756***
	(208.66)	(22.98)	(189.09)	(254.66)
Exit services exports	-0.136***	-0.0209***	0.227***	0.137***
	(50.85)	(4.06)	(91.64)	(44.31)
Exit goods exports	-0.204***	0.152***	0.00174	0.0298***
	(129.55)	(59.25)	(0.97)	(13.67)
Entry services exports	-0.0447***	0.0626***	0.168***	-0.00582
	(17.29)	(12.86)	(66.08)	(1.73)
Entry goods exports	-0.203***	0.0303***	0.157***	0.206***
	(125.69)	(10.53)	(94.35)	(106.36)
Exit services offshoring	-0.161***	0.105***	0.247***	0.146***
	(44.34)	(16.78)	(67.68)	(32.00)
Exit goods offshoring	-0.265***	0.175***	0.0539***	0.128***
	(110.83)	(44.26)	(20.82)	(42.50)
Entry services offshoring	-0.171***	0.194***	0.0531***	-0.0700***
	(47.63)	(34.96)	(14.31)	(14.44)
Entry goods offshoring	-0.276***	0.0951***	-0.0788***	0.0254***
	(113.74)	(22.53)	(29.07)	(8.14)
N	57355516	57355516	57355516	57355516

Note: Probability that a worker will change job in a given year. T-statistics are reported in parenthesis where ***, ** and * signify statistical significance at the 1%, 5% and 10% level respectively. Regressions are population-averaged probit.

Table A2.5 unconditional labour demand by skills category

	Trade volume			Trader and volume		
	High-skilled	Medium skilled	Low-skilled	High-skilled	Medium skilled	Low-skilled
Ln wage high-skilled	-0.138***	-0.116***	-0.0312	-0.144***	-0.122***	-0.0384
	(3.97)	(3.52)	(0.70)	(4.15)	(3.69)	(0.85)
Ln wage middle-skilled	-0.332***	-0.828***	-1.050***	-0.353***	-0.849***	-1.074***
	(6.54)	(17.18)	(16.08)	(6.96)	(17.50)	(16.32)
Ln wage low-skilled	0.0462	-0.0497*	-0.0895**	0.0414	-0.0550*	-0.0961**
	(1.95)	(2.21)	(2.94)	(1.75)	(2.43)	(3.13)
Ln services exports	0.0123***	0.00711***	0.00543*	0.0346***	0.0246***	0.0202***
	(6.85)	(4.15)	(2.34)	(8.74)	(6.52)	(3.94)
Ln services offshoring	0.0185***	0.0114***	0.0123***	0.0377***	0.0245***	0.0282***
	(7.60)	(4.93)	(3.91)	(8.92)	(6.06)	(5.16)
Foreign owned	0.023	-0.0236	-0.017	0.00889	-0.0366	-0.0326
	(1.03)	(1.12)	(0.59)	(0.4)	(1.72)	(1.13)
Number of markets S	0.000627	0.00123*	0.00187**	0.000705	0.00161**	0.00258***
	(1.15)	(2.38)	(2.66)	(1.29)	(3.08)	(3.64)
Ln goods exports	0.0102***	0.0127***	0.0152***	0.0265***	0.0344***	0.0486***
	(6.26)	(8.25)	(7.28)	(9.52)	(12.93)	(13.46)
Ln goods offshoring	0.0208***	0.0304***	0.0304***	0.0318***	0.0441***	0.0475***
	(9.74)	(15.02)	(11.06)	(10.54)	(15.29)	(12.14)
Number of markets G	0.00962***	0.0114***	0.0155***			
	(12.83)	(16.02)	(16.04)			
Services exporter				-0.263***	-0.213***	-0.194***
				(7.26)	(6.13)	(4.11)
Services importer				-0.261***	-0.179***	-0.210***
				(6.25)	(4.48)	(3.88)
Goods exporter				-0.212***	-0.283***	-0.439***
				(6.12)	(8.56)	(9.79)
Goods importer				-0.248***	-0.301***	-0.381***
				(5.29)	(6.70)	(6.25)
N	5856	5856	5856	5856	5856	5856

Note: Seemingly unrelated regressions (SUR). All variables are in five year differences. The time period is 2003-2015. ***, ** and * denote statistical significance at a 1%, 5% and 10% level respectively.