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INTERNATIONAL COLLABORATIVE INITIATIVE ON TRADE AND EMPLOYMENT (ICITE): COUNTRY STUDIES

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ABSTRACT

The OECD-led International Collaborative Initiative on Trade and Employment **(ICITE)** is a project that brings together 10 international organisations in an effort to deepen our understanding of the linkages between trade and jobs and to develop policy-relevant conclusions. ICITE is mobilising resources world-wide in an extensive programme of research, dialogue and communications. Participating organisations include: ADB, AfDB, ECLAC, IADB, ILO, OAS, OECD, UNCTAD, World Bank and WTO. Drawing on the ICITE research programme, a series of OECD-ICITE Trade Policy Working Papers is being published, including the papers covered in the present document. The working papers include both thematic papers and country case studies.

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PAPER 1.

TRADE AND LABOUR MARKET OUTCOMES IN GERMANY

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Abstract*

The German economy is characterized by a high degree of foreign exposure through exports and imports. This paper considers the link between trade and labour market outcomes in Germany. To that end we combine individual-level data from the German Socio Economic Panel for the period 1999 to 2007 with industry-level data on various aspects of trade – exports, imports and offshoring. We consider their effects on wages and the probability of moving into unemployment. Our econometric analysis suggests that there is little impact of trade-related variables on individual-level wages, whereas there appears to be some impact with respect to employment. We find some important differences between manufacturing and services sectors, in particular with regard to exporting and offshoring.

Executive Summary

The German economy is characterized by a high degree of foreign exposure through exports and imports. This paper considers the link between trade and labour market outcomes in Germany, looking not only at exports and imports of final goods but also offshoring of intermediates. We also consider some labour market policies related to trade and focus particularly on one that has importantly changed work arrangements in Germany, namely, temporary contracts. We investigate whether trade has had different implications for temporary compared to permanent workers.

Our analysis suggests that there is little impact of trade-related variables on individual level wages, neither positive nor negative. Once controlling for characteristics of the individual (such as education, tenure, work experience, etc.) the extent of exposure of an industry to international competition does not seem to matter much for wages. This is in line with literature for Germany and other countries. For an economy like Germany this may not be too surprising, as the wage setting is rather rigid and one may, therefore, expect adjustments to be through employment levels.

We therefore turn to look into this. We find some important differences between manufacturing and services sectors in particular with regard to exporting and offshoring. Firstly, we find that exporting of final goods in the services industry is positively associated with the probability of becoming unemployed, and this effect is similar for all skill groups. By contrast, we do not find any strong evidence for such an effect for exporting in manufacturing industries. One possible explanation is that German services firms are finding it difficult to compete internationally with other services exporters that may be better placed in world markets, such as the world's top services exporters in the US or UK.

In the services sector, we find that offshoring of material inputs reduces an individual's probability of moving into unemployment by about 60 percent. This seems to affect all skill groups equally. Material offshoring in manufacturing industries also reduces the risk of unemployment, but the effect is much lower.

However, in the services industry, the probability of becoming unemployed increases with the extent of services offshoring, and this effect is stronger for high skilled workers. We do not find this effect for manufacturing industries. This suggests that in services industries, offshoring of services activities substitutes for domestic labour, in particular of high skilled workers.

We also consider some of the labour market policies implemented in Germany in the last decade, and focus our analysis on the increasing use of temporary contracts. While our analysis shows that temporary workers earn on average less than permanent workers (controlling for individual level characteristics), we also investigate whether trade has any differential impact on temporary and permanent workers. We find little evidence for this in the wage regressions. One striking finding is, though, that services offshoring is associated with higher wages only for temporary but not for permanent workers. One explanation may be that industries with high services offshoring are also those with high staff turnover, where temporary workers may be able to negotiate higher wages because of their flexibility.

Looking at unemployment probabilities, we find that an increase in trade intensities is associated with a higher unemployment risk for workers on temporary contracts, in industries that are highly integrated internationally. Given the strong trend in Germany towards dual labour markets with permanent and temporary employees, and increasing levels of globalization through trade and offshoring, this latter result may suggest a trend towards decreasing employment security for temporary workers. This is an important finding from a policy perspective, given the debate as to whether globalization and employment insecurity are linked.

TRADE AND LABOUR MARKET OUTCOMES IN GERMANY

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1.1. Introduction

1. Germany is one of the most important countries for world-wide trade. According to figures available from the World Trade Organization, it was the second largest exporting economy and the third largest importer in the world in 2009.[1] The importance of trade is also evident when putting it in perspective with the size of the economy. With an openness indicator (trade relative to GDP) of more than 80% in 2006, Germany is also a very open economy. In comparison, the US had a ratio of less than 30%, while France and the UK were around 55 to 60 % in the same year (OECD, 2008b).

2. The dependence of the German economy on international trade has spurred much research into the potential consequences, in particular in terms of labour market outcomes (*e.g.*, Geishecker and Görg, 2008, Winkler, 2009, van Suntum *et al.*, 2010). The recent financial and economic crisis has turned the lime light back onto this issue. Initially, given the rapid decreases in world-wide exports, countries dependent on exports were expected to suffer significantly during the crisis (see Baldwin and Evenett, 2009). In Germany, at least, this did not happen. A number of possible explanations for this have been put forward in the literature. For example, Boysen-Hogrefe and Groll (2010) and Gartner and Merkl (2011) argue that wage moderation before the crisis is an important explanatory variable. Because of this, firms were able to adjust employment only marginally during the crisis. Möller (2010) also puts forward other explanations, including the fact that firms were reluctant to let go off highly qualified staff during what was perceived as a temporary slump, given skill shortages and high training costs for new workers. Also, both studies mention the generous provision of short-time work (*Kurzarbeit*) as an important factor in mitigating negative employment effects.

3. In this paper we leave aside the current preoccupation with the recent crisis and take a broader view to investigate the link between trade and employment in Germany over the period 1999 to 2007. We consider not only exports and imports but also look at labour market consequences of trade in intermediate goods – commonly referred to as international outsourcing or offshoring. We also consider some labour market policies related to trade and focus particularly on one that has importantly changed work arrangements in Germany, namely, temporary contracts. We investigate whether trade has had different implications for temporary compared to permanent workers.

1.2. Trade and labour markets: An overview

1.2.1. Trade developments

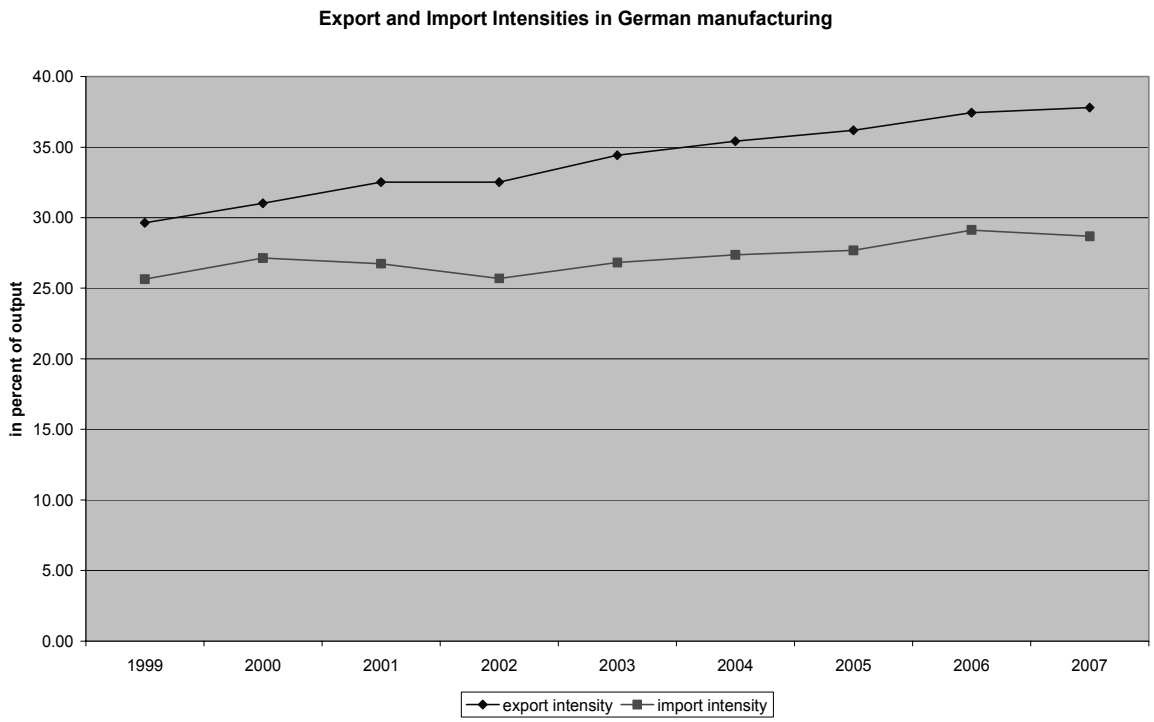
4. This section looks at what happened to trade in Germany between 1999 and 2007. The analysis is based on data from German Input-Output tables from 1999 to 2007, available from the Federal Statistical

[1] See the *International Trade Statistics 2010*, at www.wto.org/english/res_e/statis_e/its2010_e/its10_toc_e.htm.

Office (*Statistisches Bundesamt*).[2] The data is also used in the econometric analysis on the link between trade and labour markets further below.

5. A look at the aggregate data shows that the first decade in the new millennium was a period of strong growth in the German trade performance. As shown in Figure 1.1 the aggregate export intensity of the manufacturing sector increased from about 30 to 38% between 1999 and 2007. Over the same period, imports grew also, but at a much slower rate, leading to a strongly increasing net export ratio for Germany.[3]

Figure 1.1. Export and import intensities in German manufacturing

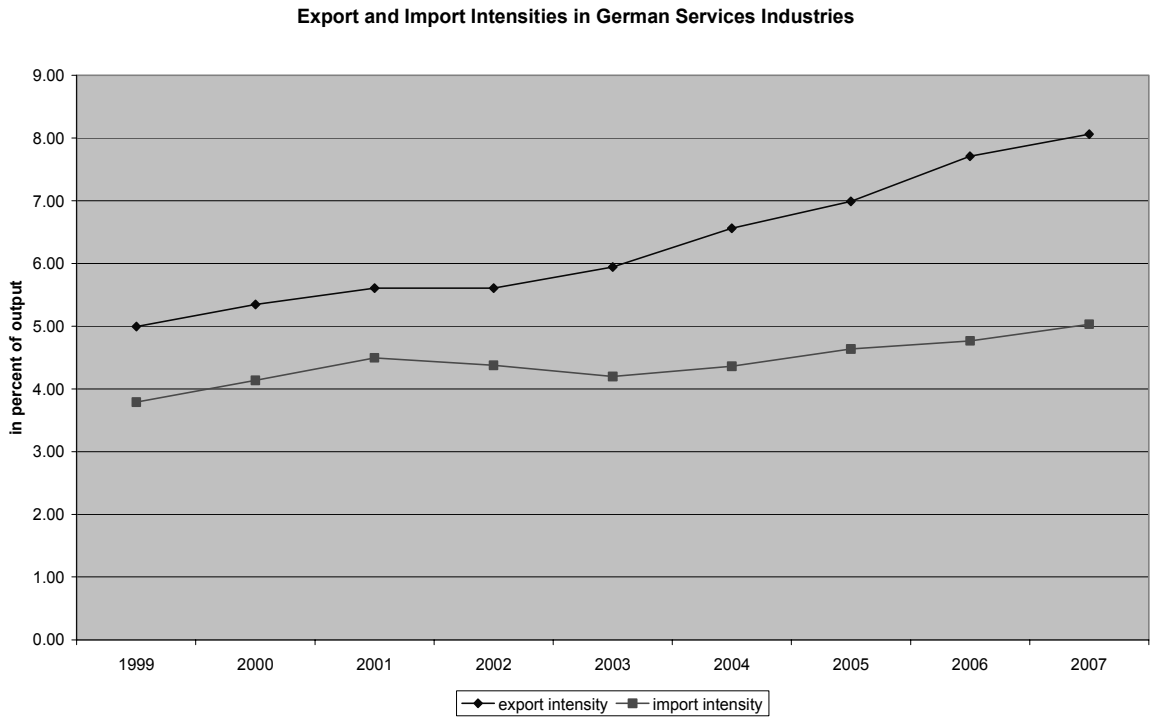


6. A similar development is evident for the services sector, albeit at a much smaller scale. Services sector exports increased from 5% to about 8% of output between 1999 and 2007, while imports increased from about 4% to 5% over the same period. Again, this contributed to an increasingly positive trade balance for Germany.

[2] More recent input-output tables at the same level of detail are not yet available for Germany, hence the cut-off at 2007. We use these data rather than trade statistics because we are also interested in computing measures of international outsourcing, for which we also need input-output data. This is discussed further below.

[3] This is consistent with firm level evidence by Vogel *et al.* (2009), who show that the number of manufacturing firms not involved in exporting or importing has declined from 67% to 61% between 2001 and 2005. This shows that the increase in exports and imports is not just due to an expansion along the intensive margin, but also at the extensive margin, as more firms enter into exporting and importing activity.

Figure 1.2. Export and import intensities in German services industries



7. The aggregate figures, however, hide a strong degree of sectoral heterogeneity in the trade performance. In order to gain further insight into this issue, Tables 1.1 and 1.2 present export and import ratios by industry for 1999 and 2007, for the manufacturing and services sector respectively. In manufacturing, especially transport equipment (NACE 35), motor vehicles (34), machinery & equipment (29) are industries with consistently high export ratios. This is in line with the popular view that Germany has a strong export performance in particular in machinery, automobiles and related industries (see also Godart and Görg, 2011).

8. One noteworthy point in a comparison between 1999 and 2007 is that at the end of the period, the lowest export ratio in a sector is 19% (food, NACE 15). In 1999, by contrast, there are a few industries with export ratios well below this mark, such as wood (NACE 20) at 10%, publishing & printing (22) at 11% or food (15) at 13%. This again indicates the strong export growth in the German economy in the manufacturing sector. There is no two-digit industry that experienced any substantial decline in the export ratio over the period under investigation.[4]

9. Imports grew similarly in all manufacturing industries. The most important importer industries are office machinery (NACE 30), wearing apparel (18) and leather (19) where imports account for between roughly two-thirds and three-quarters of output. At the other end of the spectrum are publishing and printing (22), fabricated metals (28) and non-metallic minerals (26), where the import ratio is well below 20% of output.

[4] The export ratio in Transport Equipment (NACE 35) declined slightly from 51 to 49 percent.

10. We use the information in the table to classify industries as export- or import-intensive in 2007.[5] An industry is classified as export-intensive when its share of exports exceeds the average export share across all industries. The averages are calculated separately for manufacturing industries (15 to 36) and service industries (40 to 74) in order to account for the different trade levels in these two groups. Import-intensive industries are also classified along these lines. We mark these industries in the table using bold print for the export and import data. For example, all industries with NACE codes between 29 and 35 (generally high-tech industries) are considered export-intensive, as are NACE industries 24 and 25, and 16 and 17, 30, 32, 33 and 35 are also considered import intensive.

11. The trade performance of individual industries is much more diverse in the services sector. Perhaps not surprisingly, a number of sectors have virtually no trade or only very low export and import ratios (*e.g.* water (NACE 41), construction (45), retail (52), real estate (70) and renting of machinery (71)). By contrast, water transport (NACE 61) has an export ratio of almost 75% in 2007. Other sectors with high export ratios are research and development (73), air transport (62) and wholesale trade (51), although exports only account for about 25% of output in those industries. On the import side, research and development (73), auxiliary financial intermediation (67) and water transport (61) have the highest import penetration ratios.

12. An important facet of today's world economy is that trade is no longer concentrated in final goods only. Instead, the recent wave of globalization is characterized by the strong emergence of vertical specialization and offshoring of production (see Yi, 2003). While the exact magnitude of offshoring is difficult to measure, empirical work in international trade generally gauges its importance by looking at imports of intermediate goods. Following Feenstra and Hanson (1999), many studies, including Geishecker and Görg (2008) for Germany, use input-output tables to estimate the importance of intermediate goods trade for certain industries. We follow this approach here and calculate these figures for manufacturing and services industries separately.

13. In each case, we calculate a measure of narrow offshoring, which is defined as the amount of intermediate inputs used by the domestic 2-digit industry *j*, which is imported from the same industry *j* abroad. This is scaled by total output of the domestic industry *j*. Note that *j* can be any manufacturing (*m*) or services industry (*s*). This measure can be considered as the offshoring of core competencies that could have been carried out by the industries themselves (cf. Feenstra and Hanson, 1999).

14. We also calculate for each 2-digit manufacturing industry (*m*) the amount of services offshored by the industry, as total services imports by manufacturing industry *m* over total output of industry *m*. This is, thus, similar to Amiti and Wei (2005) who investigate the increasing importance of services offshoring in manufacturing industries. Similarly, we also calculate, for each 2-digit manufacturing industry the amount of materials offshoring as imports from all other manufacturing industries, including the own industry *m*. These three types of offshoring, thus, encompass the various possibilities of offshoring from the own industry, other manufacturing industries, and services industries.[6]

15. Similar to manufacturing we also calculate three measures of offshoring for 2-digit services industries (*s*). The first one is narrow offshoring, which is defined as described above. The second is other services offshoring, which includes intermediate imports from services industries, including the own

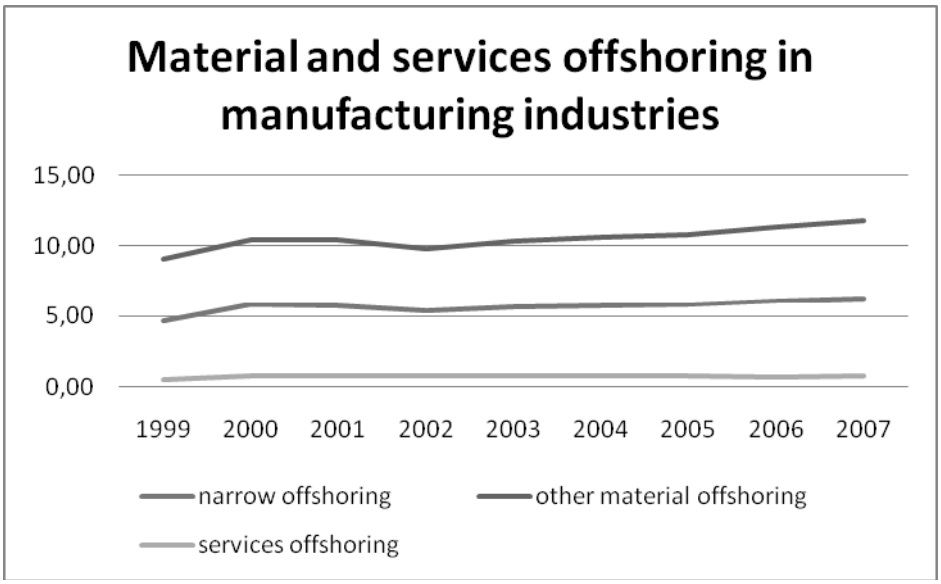
[5] As Godart and Görg (2011) show, export-intensive industries are of particular importance for economic activity in Germany, in terms of total employment and net value added. Moreover, since many of these industries are also characterised by large import shares, they are subject to a high degree of international competition. Hence, they may arguably be likely to display stronger trade-related labour market effects.

[6] The exact definitions of our offshoring measures are described in the appendix.

industry *s*. Finally, there is materials offshoring as imports of intermediate inputs from manufacturing industries.

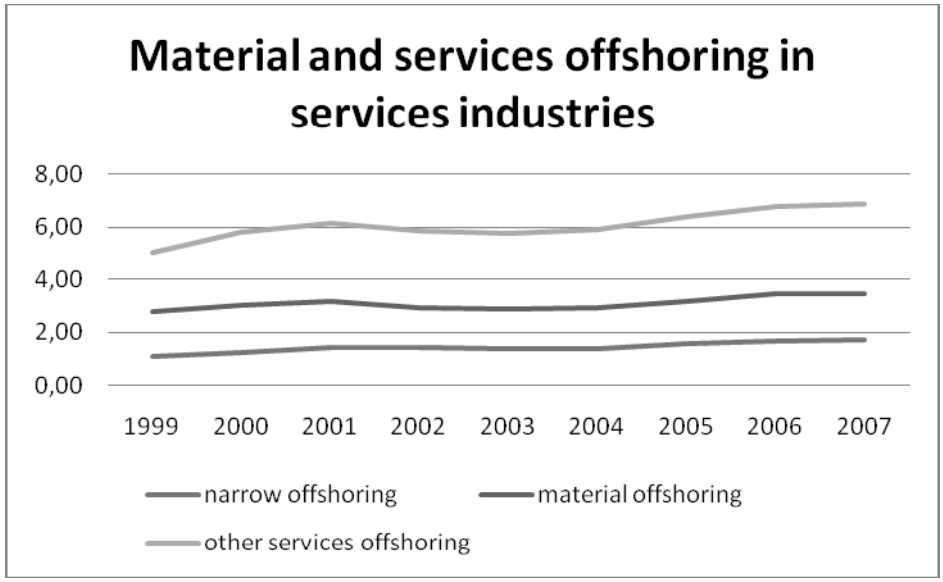
16. Figure 1.3 shows the aggregate data for the German manufacturing sector. Note that all three offshoring measures in manufacturing industries have risen between 1999 and 2007. Notable, however, is the level difference, with inputs imported from manufacturing industries being much more important than services offshoring.[7] The picture is less clear for the services sector in Figure 1.4. Offshoring of services (narrow or other) has clearly risen considerably, while material offshoring has fluctuated somewhat, but was at roughly the same level in 1999 and 2007. Not surprisingly, services offshoring is much more important in the services sector than in manufacturing industries.

Figure 1.3. Materials and services outsourcing in German manufacturing



[7] This is consistent with evidence at the industry level for the UK by Amiti and Wei (2005) and firm-level evidence for Ireland by Görg *et al.* (2008).

Figure 1.4. Materials and services outsourcing in German services industries



17. Tables 1.3 and 1.4 look at sectoral heterogeneity.[8] A number of manufacturing sectors use narrow offshoring more intensively than the aggregate figure of roughly 6% in 2007. These are mainly high-tech sectors such as communication equipment (NACE 32), office machinery (30), motor vehicles and transport equipment (34 and 35) and chemicals (24), but also other industries such as basic metals (27), which would not generally be regarded as high-tech. The growth of materials offshoring has been most pronounced in communication equipment with an increase from 3 to almost 13% of output between 1999 and 2007. As regards services offshoring, most manufacturing industries have levels below one percent, with the exception of tobacco (16), chemicals (24) and non-metallic minerals (26).

18. In the services sector, the industries most heavily engaged in offshoring of services activities are electricity and gas (NACE 40), telecommunications (64) and auxiliary financial intermediation (67). A number of industries do not engage in any offshoring of services at all, such as water (41), services related to motor vehicles (50), retail (52), water and air transport (61, 62), insurance (66) and renting of machinery (71). Hence, this shows that the level of offshoring of core competencies of the industry (captured by the narrow offshoring measure) is not as pronounced yet as was shown by narrow offshoring in manufacturing industries.

19. Materials offshoring is also at relatively low levels with one important exception: the air transport industry imports material inputs accounting for roughly 20%of total output in 2007. This dwarfs all other services sectors.

1.2.2. Labour market developments

20. Having described trade developments we now direct our attention to the labour market. We first present aggregate trends in total employment, employment by skill group, and wages over the period 1999 to 2009. Then, we present labour market outcomes by industry. This allows us to compare labour market

[8] In order to save space, we do not report figures on the third category of offshoring, "other" materials respectively services. These are strongly positively correlated with the narrow offshoring measures and, hence, do not add much to the discussion.

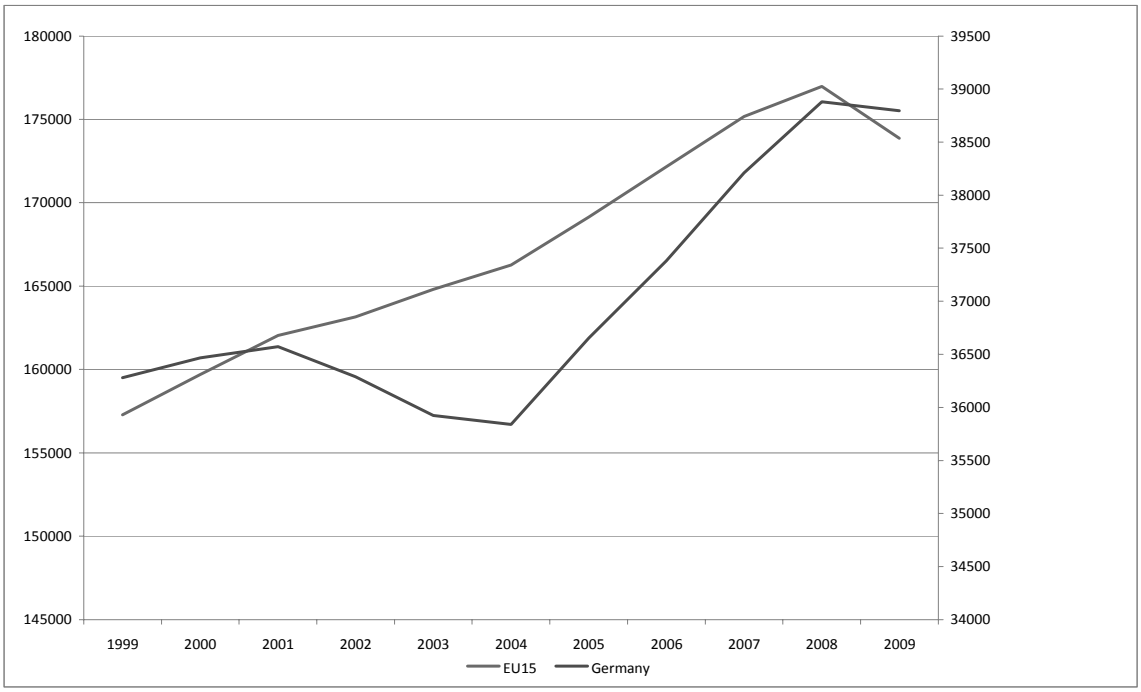
trends between import-, export-, and offshoring-intensive industries, and, hence, to link labour market and trade developments.[9]

Aggregate trends 1999-2009

Total employment

21. Germany's performance in total employment throughout the decade of 1999 to 2009 was mixed (Figure 1.5). Total employment increased between 1999 and 2001 due to an economic upswing since 1999 (OECD, 2001). Compared to earlier periods of sluggish growth and weak labour market performance, employment gains have been rather strong.[10] While total employment in the EU-15 further increased after 2001, in Germany it declined between 2001 and 2004. The bad performance relative to other countries has often been attributed to the continuing adjustment costs of the reunification (*e.g.* OECD, 2004). Moreover, Germany experienced a recession in 2003, so that reduced employment also reflects the stagnation in output and weak confidence. In 2004, the German economy recovered from the recession and started a period of impressive employment growth, strongly outperforming that of other EU-15 countries. For several years, real wage growth has been low compared to changes in labour productivity, allowing for the robust recovery of the labour market (OECD, 2008a).

Figure 1.5. Total Employment (LFS)



Source: Eurostat, based on Labour Force Survey

[9] We use employment data provided by Eurostat, originating from the National Accounts (*e.g.* total employment, employment by industry) and the Labour Force Survey (*e.g.* employment by skill group). Wage data stems from the National Accounts, and the German Socio-Economic Panel (SOEP).

[10] However, these increases in total employment mask that hours worked have increased at a much slower rate, suggesting that the overall increase was mainly driven by the creation of part-time employment (OECD, 2001).

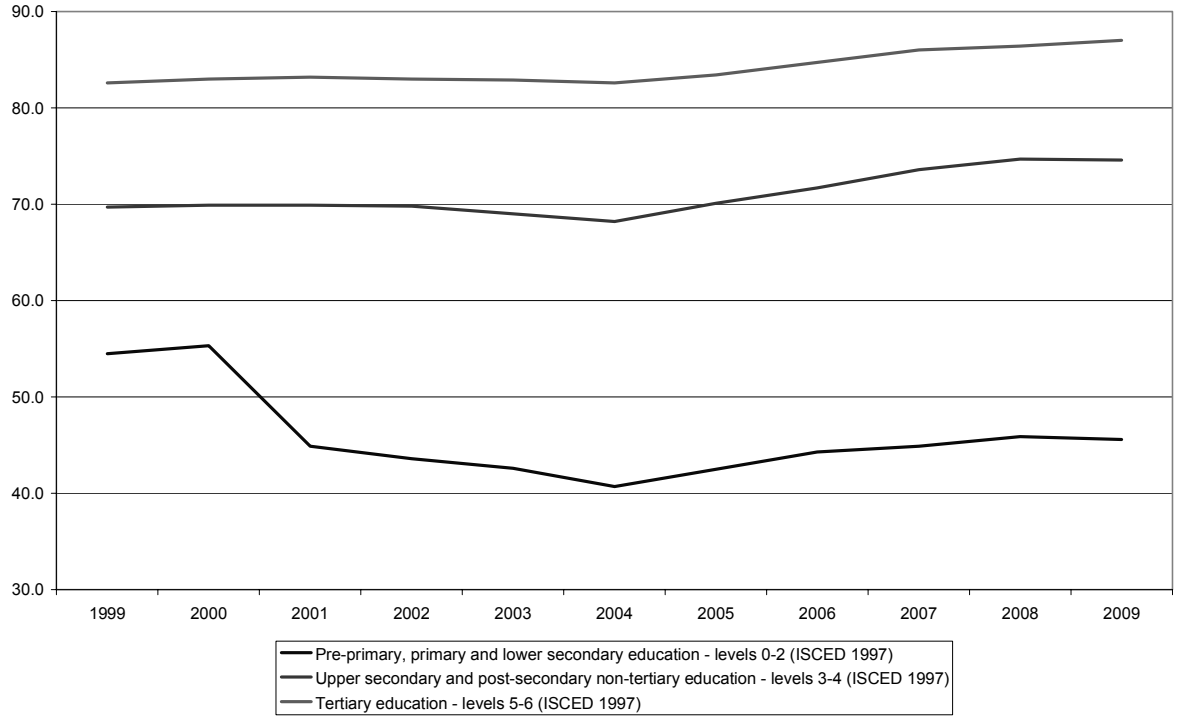
22. In contrast to other European Union countries, the financial crisis in early 2008 had rather muted effects on total employment in Germany. Also unemployment increased only slightly. It has been suggested that a major reason for the small effects was that previously introduced government policies allowed firms to flexibly decrease working hours of their employees. Short-time work schemes, additionally subsidized by the government, have also been a very popular instrument for firms to deal with the economic downturn, even though these schemes have not been the major source of employment stability (Boysen-Hogrefe & Groll, 2010, Gartner and Merkl, 2011). Also, firms hoarded qualified workers due to experienced, and expected, skill shortages (Möller, 2010).

Employment by skill group

23. In Table 1.5, total employment is broken down by workers' educational attainment.[11] The last row shows the growth rates for each group during the decade: employment of workers with primary education has decreased by 12.8%, while employment of workers with secondary and tertiary education has increased by 13% and 21.5%, respectively. Note, however, that these numbers partly reflect composition effects, as can be seen from the evolution of employment *rates* by education group (Figure 1.6). While employment rates of workers with primary education experienced a sharp drop in 2001, they moved in tandem with those of medium- and high-skilled workers thereafter. Yet, the 2003 recession had a stronger impact on low-skilled workers. Similarly, the employment rate of low-skilled workers declined after the 2008 financial crisis, while it stagnated or even increased for medium- and high-skilled workers, respectively.

[11] The time series on total employment described above is based on the German microcensus (labour force survey). Due to data availability, we employ a different time series from the national accounts (NA) for the breakdown of employment by industry at the 2-digit level. That series is partly based on the LFS, but also other data sources are taken into account. For completeness, the two series are compared in the appendix, Figure A2. Employment levels in the NA series are higher than in the LFS series, but the development of employment over time is mostly identical, even though the strong increase only starts in 2005 in the NA series.

Figure 1.6. Employment rates by educational attainment, 1999-2009



Source: Eurostat, LFS.

24. The roles of trade and offshoring in these aggregate labour market developments is not entirely clear (Lurweg and Uhde, 2010; Geishecker, 2008, Bachmann and Braun, 2011). The declines in employment have been mostly attributed to a weak overall economic performance, even though offshoring has certainly contributed to firms' shedding of labour. For example, it has been shown that offshoring mainly affects low-skilled labour (see *e.g.* Geishecker, 2006; Geishecker and Görg, 2008; Winkler, 2009). However, trade, in particular exports, is a major driving force during economic upswings (OECD, 2008a). Below we look into employment by export-, import-, and offshoring-intensive industries.

Real Wages

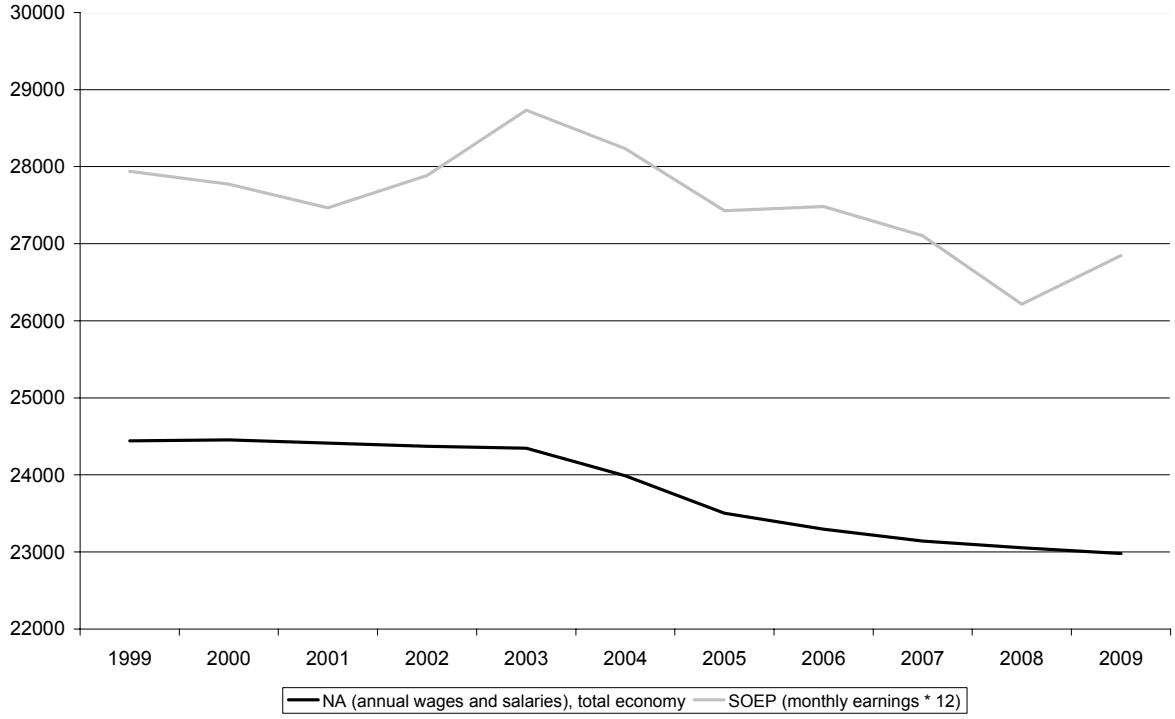
25. This subsection describes the development of real wages in Germany. We employ two different sources of wage data for this purpose. First, we calculate annual earnings using data from the National Accounts (gross wages, salaries and total employment). Data is available for all industries, except for 2009. Second, we use survey data from the German Socio-Economic Panel (SOEP). All series are in nominal terms and are deflated using the CPI provided by the German Statistical Office.

26. Real annual earnings are displayed in Figure 1.7. Even though the level of annual earnings calculated from the National Accounts is lower than in the SOEP, the development of real wages over time is similar.[12] The NA series indicates that real annual earnings stagnated between 1999 and 2003 and constantly declined thereafter. These observations are in line with other examinations of real wages in Germany (Brenke, 2009). While earnings in the SOEP increased relatively strongly between 2001 and

[12] The difference is likely to originate from differences in measuring wages (*i.e.* bonus payments, 13th salaries, overtime pay, etc.), differences in the sample of employed (full-time, part-time, etc.), and possibly also differences in the population concept (residents, foreigners working in Germany, etc.).

2003, real annual earnings also almost constantly declined thereafter. Interestingly, the SOEP data also indicate that annual earnings have risen in the aftermath of the financial crisis, whereas this does not show in the NA series.

Figure 1.7. Real annual earnings, 1999-2009, in Euros



Notes: from National Accounts (NA), and Socio-Economic Panel (SOEP); NA: Wages and salaries divided by total employment; SOEP: monthly earning multiplied by 12; all series deflated with CPI (German Statistical Office).

Trends by industry 1999-2009

Employment

27. We now look at employment trends within detailed industries. First, we look at aggregate industry trends at a 1-digit NACE level. Second, we identify the five industries with highest and lowest change in employment levels between 1999 and 2008.[13] Third, we identify the five industries with strongest and weakest employment growth. Finally, we report employment changes within export-, import-, and offshoring-intensive industries using the classification described in Section 2.1.

28. Table 1.6. shows employment growth rates by 1-digit industry. Real estate, renting, and business activities (industry K) has had the strongest employment growth in percentage terms (about 40%). It has also been the strongest in terms of net job creation, with more than 1.6 million net jobs created between 1999 and 2008. Employment in hotels and restaurants (H), and health and social work (N) grew by about 18% between 1999 and 2008. The strongest decline in employment (in percentage terms) has been in mining and quarrying (industry C), but in absolute terms, the employment decrease has been rather small (53,000 jobs). More important in terms of jobs lost has been the decline in the construction industry (F) and in manufacturing (D).

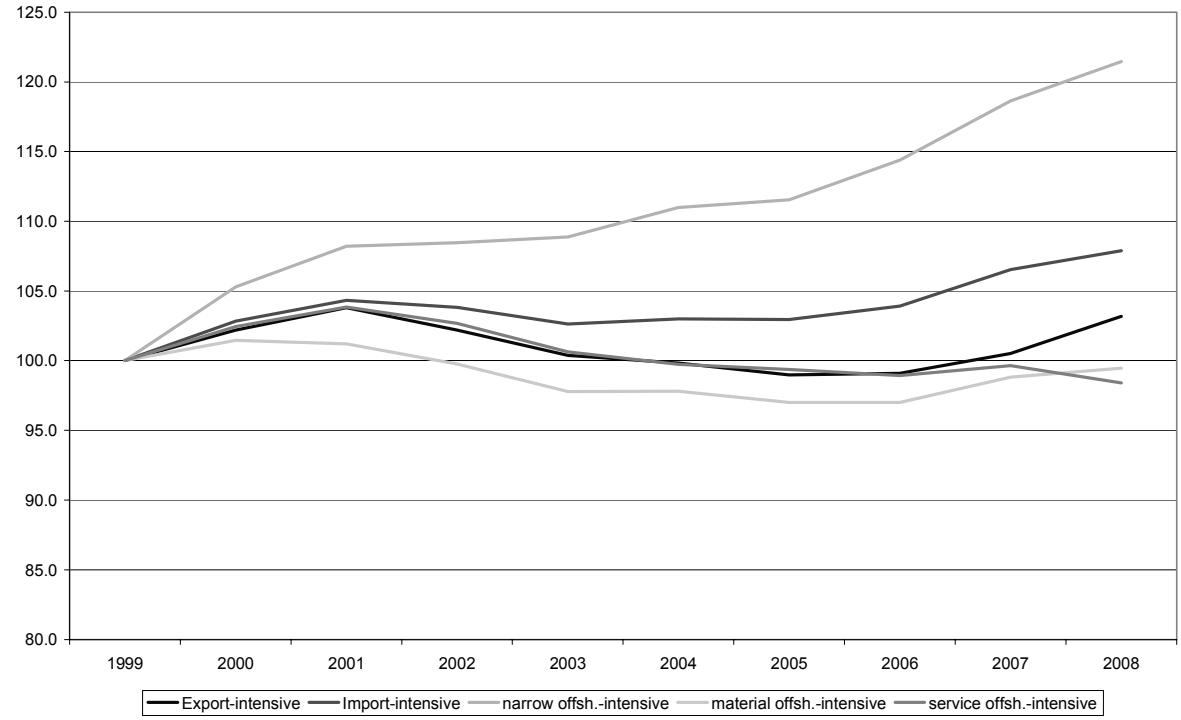
[13] Note that we compare to 2008 levels because the financial crisis of 2008 might have had unpredictable influences on employment trends at the industry level.

29. Looking at more detailed industries, Table 1.7 reports the five best and worst performers in terms of absolute job growth. Employment in "Other business services", comprising professional business services (*e.g.* accounting, consultancies), technical business services (*e.g.* architectural), advertising, and personnel services, increased by about 1.3 million employees. Health and social work is the second most important industry, which shows about 600,000 jobs more in 2009 than in 1999. The strongest decreases in employment occurred in construction, with more than 660,000 jobs lost. Also public administration and defence shrank strongly by more than 260,000 jobs.

30. In Table 1.8, we show the five best and worst performers in terms of employment growth rates. The oil and gas extraction industry has grown strongly by 75%. Business services (computer and related activities and other business services) have also grown strongly by 70% and 42%, respectively. The largest decreases occurred in the mining industries, and in textile and related industries.

31. Linking employment trends to trade, we now compare the development of employment between export-, import, and offshoring-intensive industries.[14] As to offshoring intensities, we distinguish between narrow offshoring, materials and services offshoring. Figure 1.8 shows employment trends over time for these five industry aggregates (1999=100). Industries intensive in narrow offshoring have shown the strongest growth in employment; an increase of more than 20% between 1999 and 2008. While overall employment declined between 2001 and 2004 (recall Figure 1.5), employment levels in industries intensive in narrow offshoring increased throughout. All other industry aggregates follow the overall trend of an employment decline starting in 2001. Employment only started to pick up again around 2005 in these industries. In particular, industries intensive in materials offshoring show shrinking employment levels almost throughout the entire period and only return to 1999 employment levels by 2008.

Figure 1.8. Employment trends in trade intensive sectors



Source: Eurostat, National Accounts

[14] A description of how we classify trade intensities is given in section 2.1 above. We classified the industries on the basis of trade data for 2007.

Employment by skill group

32. Table 1.9 displays the share of employed persons with a specific educational attainment in total employment (manufacturing and services) and separately by industry aggregates.[15] Looking at the overall figures, the table shows that the share of workers with no or only secondary education has declined from 16.2% to 11.3% between 1999 and 2009. The share of workers with vocational training has remained constant at around 62% throughout the period. The share of workers with tertiary education increased from 20.9% to 26.7%.

33. The rest of the table shows the shares of workers with different educational attainment in each of our five trade-intensity industry aggregates. The employment share of workers with no or just secondary education in all five industry aggregates is similar to their share in the overall economy. The share of workers with vocational training in trade-intensive industries is low compared to their share in overall employment (except in industries intensive in materials offshoring). In contrast, workers with tertiary education make up a relatively large share in trade-intensive industries. In export-intensive industries, and in industries intensive in narrow and services offshoring, their share is clearly above their average share in the overall economy. This is in line with the conventional wisdom that offshoring of materials and services increases demand for skilled labour (Geishecker, 2006, Winkler, 2009).[16]

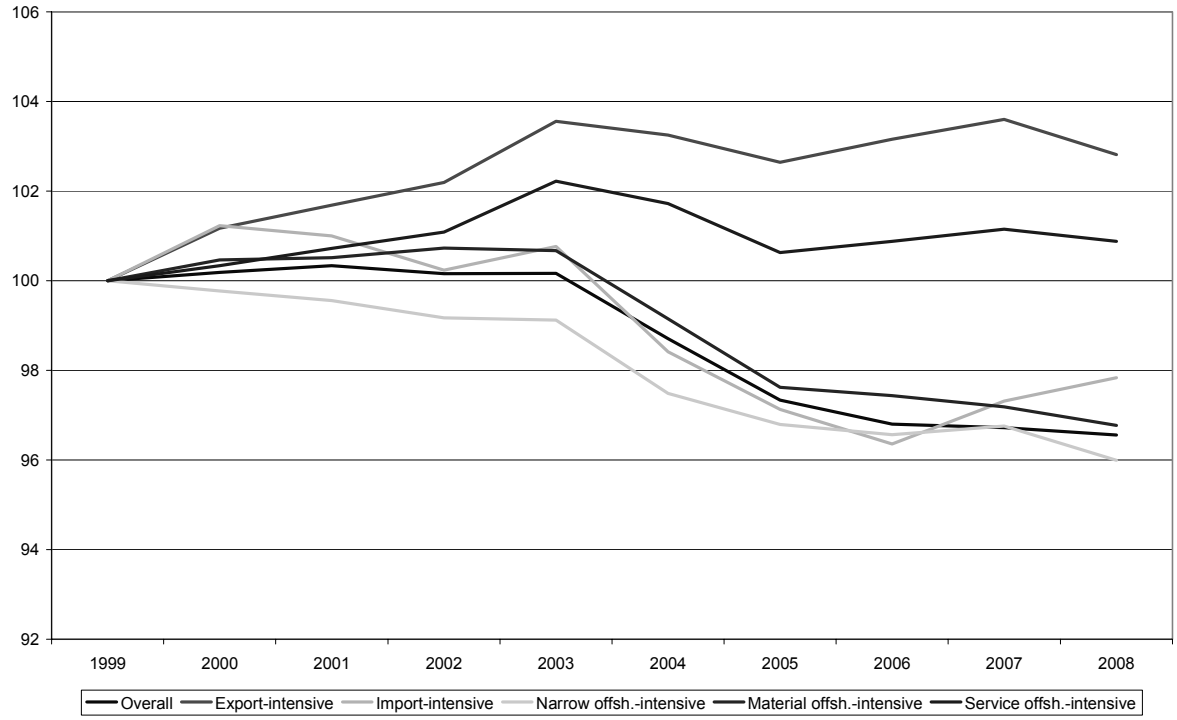
Real wages

34. The evolution of real annual earnings between 1999 and 2008 for the overall economy (except agriculture and public services) and by trade-intensity industry aggregates is shown in Figure 1.9. In import-intensive industries and in industries intensive in narrow and materials offshoring, real wages have closely followed the overall trend of declining wages since 2003 (recall Figure 2.7). In contrast, wages in the export-intensive sectors increased more rapidly until 2003 and more or less stagnated thereafter. Similarly, real wages in industries intensive in services offshoring increased relatively strongly until 2003, and declined only slightly thereafter.

[15] Given limitations for data from official statistical sources, we rely on employment figures from the SOEP in this section.

[16] Note, however, that in industries intensive in broadly defined materials offshoring, the share of skilled workers is below average.

Figure 1.9. Evolution of real annual wages 1999-2008 overall and by industry aggregates (1999=100)



Note: Overall refers to manufacturing and private services (*i.e.* excluding agriculture and public services).
Source: Eurostat, LFS; own calculations.

35. Table 1.10 shows the five best- and worst performing 2-digit industries in terms of growth in real earnings. Manufacture of communication equipment, transport equipment, coke, petroleum, nuclear fuels, and tobacco, and air transport industries had the strongest increase in real annual earnings. The strongest real earnings decline has occurred in education, recreational and sporting activities, mining, forestry, and extraction industries. Table 1.11 shows the best- and worst performing industries in terms of earnings growth in percentages. The industry with the strongest increase was activities auxiliary to financial intermediation.

1.3. Linking trade and labour markets: Econometric evidence

36. The analysis of aggregates in the preceding section allows us to say something about correlations between trade and labour market outcomes. Yet, labour market effects may strongly depend on individual level characteristics, such as education, age, tenure, etc. In order to be able to abstract from such confounding effects we now turn to an econometric analysis, where we use individual-level data combined with industry-level data on trade.[17] We look at two possible labour market outcomes, namely, individuals' wages and individuals' probability of moving into unemployment. The analysis is based on SOEP data for male and female full-time employees, aged 18 to 64, who are employed in manufacturing (NACE 15-36) or services industries (NACE 40-74), combined with industry-level data on trade variables (described in Section 2.1) for the period from 1999 to 2007.

[17] This approach has recently been employed by other researchers, see Geishecker and Görg (2008) and Lurweg and Uhde (2010) for Germany or Liu and Trefler (2008) for the US.

1.3.1. Wage effects

37. To investigate the relationship between trade and individuals' wages we estimate variants of the following Mincerian wage regression:[18]

$$(1) \quad \ln WAGE_{ijt} = \alpha + \beta X_{it} + \gamma TRADE_{jt} + d_j + d_t + d_i + v_{it}$$

where *WAGE* is the real monthly gross wage for individual *i* in industry *j* in year *t*. As explanatory variables we include a vector of individual-specific characteristics (including marital status, tenure, work experience, education, size and ownership of the firm where the individual works, and a dummy for individuals living in East Germany).[19] Dummies for industry *j*, time *t* and individual *i* control for unobserved effects at these levels. We also include industry-specific time trends, in order to control for technical change that is specific to an industry. The main variable of interest is the vector TRADE, which includes various measures of trade exposure of the industry. Specifically, these are the export share (exports over total output) and import share (imports over total output) of the industry, as well as the offshoring measures (narrow, materials, services) as described in Section 2. We also alternatively use an openness measure defined as exports plus imports over industry output.

38. The baseline results using data for individuals employed in manufacturing or services industries are presented in Table 1.12. Given the potential endogeneity of the trade variables (cf. Geishecker and Görg, 2008), we estimate all wage models using instrumental variables (IV) techniques.[20] Note, firstly, that the coefficients on our control variables are largely as expected: wages increase with firm size, work experience, tenure, education and status as married individuals.[21]

39. As regards the trade variables, a mixed picture emerges. Firstly, the export share of an industry is not statistically significantly correlated with individual-level wages.[22] This may, at first sight, be seen as out of line with evidence suggesting that exporting *firms* pay higher wages than non-exporters (*e.g.*, Schank *et al.*, 2007 for Germany). However, it has to be stressed that here we are concerned with individuals, not firms, and these individuals may work in firms that export or those that do not. We do not have information on exporting at the firm-, but only at the industry-level. Also, German exports are strongly influenced by wage moderation during the period under investigation (Felbermayr *et al.*, 2010), and even though we use an IV approach, perhaps we are not able to control for this endogeneity issue fully. Imports, materials offshoring and general openness are all negatively correlated with individual wage levels. The coefficient on services offshoring is positive, but not statistically significant.

40. Of course, the regression results hide substantial heterogeneity in our sample. Firstly, we pool manufacturing and services industries. Secondly, traditional trade theory would predict that trade effects

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[18] This approach is similar to Geishecker and Görg (2008) and Liu and Trefler (2008).

[19] A definition of the explanatory variables and some summary statistics are in the appendix.

[20] Excluded instruments are the first and second difference in the respective trade variable. The diagnostic tests, which are not reported here to save space, suggest that the exogenous instruments are both relevant (based on first stage F test) and valid (based on Hansen J statistic for overidentification restrictions). Note that results do not change importantly if we include more than one trade variable jointly in the model. We, therefore, prefer the more parsimonious models reported here.

[21] The coefficients on education and tenure are statistically insignificant. This may be due to our estimation procedure which controls for time invariant individual specific effects. Education and tenure vary only little over time, so they may not be able to be estimated with precision.

[22] This is in line with Lurweg and Uhde (2009) who also use SOEP data and find that workers in "high volume trade" industries do not experience wage gains.

should be different for workers with different skills. This is what we turn to investigating now. We run regressions of equation (1) for the subsamples of manufacturing and services industries, respectively. Within the broad sector, we also distinguish between export-intensive and non-export intensive industries. Furthermore, we allow for different effects of trade on individuals with different education levels, by including interactions of the trade variable with three education categories.

41. We report the regression results in Table 1.13. We estimate variants of equation (1), similar to Table 1.12. However, in order to save space we do not report all the regression results in a large number of tables. Rather, we collect the coefficients on the trade interactions from the various regression models and report these in the table.

42. To summarize the results, we can, firstly, see that there is little evidence that export activity in an industry is statistically significantly associated with individual-level wages. Secondly, total imports have a negative effect on individual-level wages only in export intensive manufacturing industries. These industries are in many cases also those that have high import penetration, as seen in section 2.1. Hence, export intensive industries may see a large degree of international competition, which may lead to higher pressure on wages than in other industries. We find no statistical evidence that offshoring of materials is associated with individual level wages.[23]

43. By contrast, services offshoring is positively associated with wages for low- and medium-skilled workers in export-intensive manufacturing industries, while there is a negative correlation for medium-skilled workers in non-export intensive industries. This suggests that in export-intensive manufacturing industries, the offshoring of services is complementary to low- and medium-skilled activities in the industry. By contrast, in other manufacturing industries, services offshoring may substitute for medium-skilled work, such as, for example, back-office activities, such as accounting.

44. Overall, however, our estimates give the impression that trade in its various facets is only to a low degree responsible for wage developments at the individual level.[24] Or, to cite Liu and Trefler (2008), there may be "much ado about nothing". This may perhaps not come at a surprise as Germany is generally regarded as being fairly inflexible in terms of wage setting, which is done by large unions at the sectoral level. In countries with rigid wage setting institutions, trade may perhaps have larger effects on employment than wages, as argued by Krugman (1995). We turn to investigating this in the next section.

1.3.2. Employment effects

45. In this section we look at the link between an individual's probability of losing her job and trade. To do so, we estimate the probability of job loss conditional on individual and industry characteristics:

$$\Pr(\text{job loss})_{ijt} = \alpha X_{it} + \lambda \, \text{TRADE}_{jt} + d_j + d_t + d_i + e_{it} \qquad (2)$$

where *job loss* is defined as a dummy variable equal to one if an individual *i* moves from full-time employment in period *t-1* into unemployment in period *t,* and zero otherwise. The explanatory variables are

[23] This is different to Geishecker and Görg (2008) who find positive effects for high skilled workers and negative for low skilled workers. However, even though there effects are statistically significant, they are also small. While Geishecker and Görg also combine SOEP data with industry level trade data, they investigate a different time period (1991 to 2000) and a different measure of offshoring which can only indirectly capture trade in intermediates, while we can observe it directly from the input-output tables. This may explain some of the differences in results. See also Winkler and Milberg (2009).

[24] A similar conclusion is drawn by Lurweg and Uhde (2009) and Geishecker and Görg (2008).

identical to those in equation (1). Given the binary nature of the dependent variable the model is estimated using fixed effects logit techniques.[25]

46. The baseline results for the full sample are presented in Table 1.14.[26] The estimates suggest that the probability of switching into unemployment is positively correlated with the export share – in other words, individuals in industries with high export shares are more likely to lose their jobs. This may be against the common expectation.

47. However, splitting the sample into export-intensive and not export-intensive sectors sheds further light on this (Table 1.15.). It is only in the latter sectors that we find a positive relationship. Workers in industries that are not very export-oriented become more likely to lose their jobs with increasing export exposure of the industry. This may be because these are industries that do not belong to the most internationally competitive and, therefore, are likely to lose out to foreign competition as they increase their exposure to the export market. Note that we do not find any statistically significant coefficients for any of the other trade-related variables.

48. Table 1.15 allows for further heterogeneity in the effects by industry and educational attainment of the individual. Here, a number of other noteworthy results emerge. Firstly, the positive relationship between exports and job loss in non-export intensive sectors affects both low- and high-skilled workers. There is no evidence, however, that this also affects workers with medium-skill levels.

49. We can now also document some important differences between manufacturing and services sectors.[27] In the services sector, we find strong evidence of positive correlations between export exposure and becoming unemployed. All three different skill groups are equally affected. We also find that the offshoring of material inputs in the services industry is strongly negatively correlated with moving into unemployment, again affecting all skill groups equally. Here, the results suggest that a one percentage point increase in material offshoring reduces the risk of becoming unemployed by about 60 percent.[28] By contrast, the offshoring of services in the services industry is associated with increases in the risk of becoming unemployed, and this effect is stronger for high-skilled than for low- or medium-skilled workers. These two results taken together are consistent with the idea that the offshoring of non-core activities, such as materials, allows services firms to focus on their core activity and increase productivity (as in Amiti and Wei, 2009 and Görg *et al.*, 2008), thereby improving employment prospects. By contrast, offshoring of services activities substitutes for domestic labour, in particular of high-skilled workers.

50. For manufacturing industries, the story is different. There is only weak evidence that exporting and importing are positively related with the probability of becoming unemployed, although these estimates are barely or never statistically significant. The only stronger effect is observed for materials

[25] This approach is similar to Geishecker (2008) and Bachmann and Braun (2011) who, however, focus only on the link between offshoring and labour market transitions at the individual level. Lurweg and Uhde (2009) also have a similar analysis but use very different definitions of the trade variables. They do not distinguish between exports and imports, and also do not consider offshoring. Also, they do not control for individual fixed effects.

[26] Since we include individual-level fixed effects, the estimation only utilizes observations for individuals that switch from employment to unemployment. This allows us to examine the specific question of what determines switches into unemployment, rather than a comparison of individuals who lose their job with those that do not.

[27] Due to data limitations we do not split the sample between export-intensive and other industries in the logit estimations.

[28] This result is in line with Bachmann and Braun (2011) who also find that outsourcing of materials increases employment stability in services industries.

offshoring, where we find that offshoring of this type reduces the risk of becoming unemployed, but only for medium-skilled workers.

51. Overall, the results suggest for manufacturing industries that trade does not seem to have any strong effects on unemployment probabilities (similar to the wage effects). However, for services industries we do find some stronger effects. Here, in particular, offshoring has two types of effects: the offshoring of non-core material inputs reduces the risk of unemployment, while offshoring of core services activities increases this risk. Also, exporting of final goods is positively associated with the probability of becoming unemployed. This may suggest that German services firms are finding it difficult to compete internationally with other services exporters that may be better placed in world markets, such as the world's top services exporters US or UK.

1.4. The impact of labour market policies

1.4.1. Overview

52. One important macroeconomic explanation for Germany's export success is without doubt the labour market reforms implemented in the early 2000s, and here in particular the policy of wage moderation. While wage restraint was not one of the aims of the labour market reforms per se, it appeared as an important and very welcome side-effect (Meier, 2009). As we show in Figure 1.9, reported earlier, real wages fell since 2003. This came after periods of much higher wage growth in the 1980s and 1990s (Boysen-Hogrefe and Groll, 2010). Wage restraint, implying relative low growth of real wages, made German exports more competitive as it effectively lead to a real depreciation vis-à-vis other Euro member countries (*e.g.*, Felbermayr *et al.*, 2010).

53. More recently, the limiting factors to German export growth have been the topic of debate. Here, in particular, much of the focus is on skill shortages. The *Institut der deutschen Wirtschaft* (Institute of the German Economy, IW (2008)) calculates that in 2008 there was a gap of about 140,000 skilled positions in engineering and technical jobs. In other words, these were jobs that could not be filled with suitably qualified candidates. This, of course, implies substantial losses to the German economy, which are calculated by IW (2008) to be around 28.5 billion euro during the period mid-2007 to mid-2008.

54. The notion of skill shortages is not uniformly accepted, however. Brenke (2010), for example, argues that there is no convincing evidence of skill shortages in the German economy since there is no accepted method of determining such shortages. If there were shortages in some aspects of labour supply, then wages should rise considerably, which is not what one sees in the data. Still, the question of skill shortages and whether or not a potential shortage should be alleviated by immigration are important topics on the current public policy agenda.

55. Another important development in labour market policy in Germany is the recent strong increase in temporary work arrangements. This was one aspect of labour market reforms implemented in the early 2000s with the aim of making employment contracts more flexible. As this is an aspect of labour market changes that, to the best of our knowledge, has not received much attention, we focus on this aspect in this section.

56. Labour markets are considered dual when workers are segregated into two groups: one group with permanent contracts, high protection through Employment Protection Legislation (EPL), and hence sheltered from many risks; and another group with temporary contracts, low protection through EPL, and hence exposed to all the risks of the market. Several OECD countries, including Germany, Spain and Italy reformed their EPL between the late 1980s and the early 2000s, easing legislation for workers with

temporary contracts, but leaving legislation for workers with permanent contracts mostly unchanged (Boeri and Garibaldi, 2007). As a consequence, dual labour markets were created in these economies.

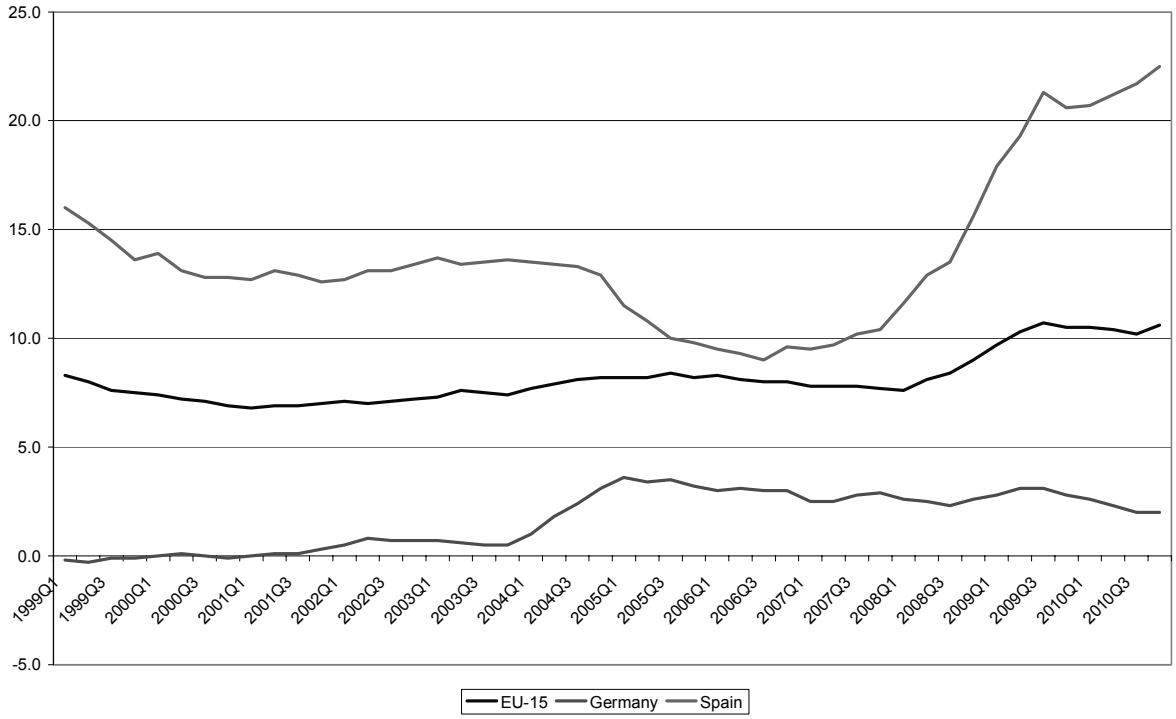
57. In Table 1.16, we compare the prevalence of temporary contracts in Germany and several other European countries. Looking at total German employment, the share of temporary contracts increased slightly from 13% in 1999 to 14.5% in 2009. This share is comparable to those in other countries, *e.g.* France, Italy and Netherlands. Spain exhibits an exceptionally high share of temporary contracts with figures ranging from 25% to 34%. However, looking at younger workers (up to 24 years old), the table shows that Spain is no longer particularly exceptional: in fact, among the young, the share of workers with temporary contracts in 2009 is higher in Germany than in all other countries (57%; up from 53% in 1999). Among workers between 15 and 19 years old, the share is even higher: 79% hold temporary contracts in Germany in 2009.[29]

58. While easing EPL on temporary contracts has led to increased job creation and employment growth when the economy is in good shape, several authors have discussed the problems created by dual labour markets when a recession hits the economy (see *e.g.* Dolado *et al.*, 2002). Due to a large wedge between firing costs for permanent and temporary workers, firms are hesitant to transform temporary contracts into permanent ones. In a recession with many jobs being shed, this can result in high levels of unemployment among groups with a high prevalence of temporary contracts (cf. Blanchard and Landier, 2002; Cahuc and Postel-Vinay, 2002; Boeri and Garibaldi, 2007).

59. In Figure 1.10, we plot the difference between the *youth* unemployment rate and the total unemployment rate for Germany, Spain, and the European Union average. It shows that, in a country such as Spain, with many young workers holding temporary contracts, youth unemployment was indeed shooting up during the economic crisis in 2008. Interestingly, such developments did not occur in Germany, even though the prevalence of temporary contracts among young workers was comparable to that of Spain. Note however, that Germany's labour market performed exceptionally well during the crisis (see Boysen-Hogrefe and Groll, 2010), so that a comparison of Germany and Spain is difficult. Nevertheless, it seems that labour market dualism is not creating the same problems in Germany as in other economies, even though the extent of segmentation is extremely high.

[29] Note however, that this number might be strongly influenced by the particularities of the German apprenticeship system, where young workers are already employed in firms, but only on a temporary basis for the duration of their training.

Figure 1.10. Differences between youth unemployment rate and total unemployment (quarterly, seasonally adjusted, in %)



Source: Eurostat, LFS.

60. As a first attempt to link the dualism to international trade, we summarize the prevalence of temporary contracts by our trade intensity industry aggregates (Table 1.17). The analysis is based on survey data from the SOEP. Looking first at the entire workforce (16-64 years old; panel A), the data confirm the positive trend in the share of temporary contracts in all industries, as reported above. The same holds for the sample of younger workers (panel B). Looking inside the industry aggregates does not confirm the impression of a steady increase in the prevalence of temporary contracts. Rather, the increase seems to be concentrated in the years since 2007 (with the industries intensive in offshoring materials being an exception). Again, this holds for both the entire workforce and younger workers.

61. In general, the table shows that trade-intensive industries have a lower share of temporary workers than the economy average. Yet, individual characteristics also play a role in explaining whether or not an individual has a temporary contract. A way of controlling for individual characteristics is to run individual-level probit regressions of holding a temporary contract on each indicator for trade intensity.[30] Using the entire age distribution, this exercise conveys that working in an export-intensive industry, or in an industry intensive in materials offshoring is associated with a higher probability of holding a temporary contract. Working in an industry intensive in narrow offshoring is associated with a lower probability, while there is no statistically significant relationship between being on a temporary contract and working in an import-intensive or service offshoring industry.[31]

62. We now look into the implications of such temporary work arrangements on labour market outcomes. In particular, we will investigate whether the impact of trade differs between workers on

[30] These results are not reported here to save space.

[31] For the sample of young workers, all trade-related variables are statistically insignificant.

temporary and permanent contracts. To answer these questions, we again need to turn to econometric estimation, which allows us to control for other important individual characteristics that also affect labour market outcomes.

1.4.2. Econometric estimation

63. As in the previous section, we estimate the effects of trade and temporary contracts on wages in an instrumental variables framework. The estimated model is identical to the previous one, except that we add a dummy for holding a temporary contract and the interaction of this dummy with the trade intensities. The base line regression for the full sample is displayed in Table 1.18. For the separate manufacturing and services regressions, we only present a summary of the results in order to save space (Table 1.19).

64. Generally, workers holding a temporary contract receive a lower real monthly wage than workers holding permanent contracts. This is in line with the empirical literature (*e.g.* Booth *et al.*, 2002, Hagen, 2002). In this article, however, we are mostly interested in whether trade affects the labour market outcomes of temporary and permanent workers differently.

65. Trade-intensive industries are facing global competition and are, consequently, under constant pressure to adjust unit labour costs and employment levels such that they can compete on global market. While, in principle, all workers in an industry are equally likely to be affected from these constraints, there are several reasons to believe that workers on temporary contracts are affected differently than workers on permanent contract. Workers on temporary contracts are the least protected workers on the labour markets. Accordingly, they might have a stronger propensity to lose their job due to international competition. Due to their weaker bargaining position they might also suffer from stronger wage reductions, in case employers adjust to globalisation pressure at the intensive margin.

66. The wage analysis shows that there is hardly any differential impact of trade between workers on temporary or permanent contracts at all. Looking at the full sample of manufacturing and services industries, only the interaction term of services outsourcing and temporary contracts is significant. While services offshoring and wages are unrelated for workers on permanent contracts, a 1% increase in the share of services outsourcing is associated with a wage increase of almost 4% for workers on temporary contracts.

67. Why is higher services offshoring associated with a higher wages for temporary workers? At least one explanation might be applicable, even though we cannot test it here. It could be that industries with strong services offshoring are characterised by labour churning among workers with temporary contracts. Newly hired workers may be able to negotiate a higher wage than permanent staff, particularly if they are also more skilled.

68. Looking at manufacturing industries only, the results show that the positive wage effect of services outsourcing on temporary workers only holds within export-intensive manufacturing industries. In manufacturing industries, which are not intensive in exports, service outsourcing has a small, negative impact on temporary workers (even though the coefficient is statistically insignificant).

69. Looking at services industries shows that rising exports, materials outsourcing, and services outsourcing are associated with higher wages for temporary workers (1%, 4%, and 4.3%, respectively), but not for permanent employees. Distinguishing between export-intensive and other industries does not provide new insights here.

70. In principle, it is not surprising that, except in services offshoring industries, the wage effects of trade do not differ between permanent and temporary workers. Limited contract duration may not necessarily be related to pay and the rigid German wage setting institutions may not allow strong

differences. Rather, we would expect to see differences at the extensive margin, *i.e.* in employment stability. Accordingly, we now investigate whether trade affects the probability of job loss differently for temporary and permanent workers. As above, we define job loss as the transition from full-time employment in period *t-1* into unemployment in period *t*.

71. Looking first at the full sample, comprising workers in both manufacturing and service industries, our regressions do not detect a significant difference in job loss probability between temporary and permanent workers (see Table1.20; Table 1.21 provides a summary of the relevant coefficients).

72. Yet, splitting up the sample between workers in export-intensive industries (as defined previously) and workers in other industries reveals large differences between these industries. As argued above, export-intensive industries are of particular importance for economic activity in Germany. Moreover, since they are also characterised by strong import shares, they are subject to a large degree of international competition and are, hence, likely to display stronger trade-related labour market effects. While there continue to be no significant differences between temporary and permanent workers in industries *not* intensive in exports, the results convey that in export-intensive industries the probability of job loss and the consequent transition into unemployment of temporary workers is positively associated with all trade measures, except services offshoring. Or, to put it differently, it appears that workers on permanent contracts are much better shielded from the forces of globalization than their colleagues holding temporary contracts; at least in export-intensive industries. In fact, temporary workers are up to twice more likely to become unemployed than permanent workers when trade intensity rises by one percentage point.

73. Looking at workers in manufacturing industries shows that temporary workers are 1.2 times as likely as permanent workers to become unemployed when the share of narrow outsourcing in their industry rises by 1%. In service industries we do not find any significant differences between temporary and permanent workers.[32]

74. Wrapping up, our results suggest that, in terms of job loss probability, workers on temporary contracts are more exposed to international competition than their colleagues holding permanent contracts, given that trade integration of the industry they are working in is sufficiently strong. For temporary workers, the chance of losing their jobs as trade intensity increases is significantly higher than for permanent workers.

75. On the one hand, temporary contracts allow employers to flexibly react to changing market conditions. On the other hand, temporary contracts imply a significant insecurity for workers, which is strengthened by increasing globalisation. Hence, the two trends of increasing labour market dualism and rising trade integration seem to be forming a dangerous mix, which is worth keeping in mind when policy-makers attempt to further soften employment protection legislation.

1.5. Conclusions and policy implications

76. The German economy is characterized by a high degree of foreign exposure through exports and imports. This paper considers the link between trade and labour market outcomes in Germany. To that end we combine individual-level data from the German Socio Economic Panel for the period 1999 to 2007 with industry-level data on various aspects of trade – exports, imports and offshoring. We consider their effects on wages and the probability of moving into unemployment.

77. Our econometric analysis suggests that there is little impact of trade-related variables on individual-level wages, neither positive nor negative. Hence, once controlling for characteristics of the

[32] Note that, due to data limitations, we do not split the sample between export-intensive and other industries.

individual (such as education, tenure, work experience, etc.) the extent of exposure of an industry to international competition does not seem to matter much for wages. This is in line with literature for Germany and other countries. Lurweg and Uhde (2009) look at the openness of an industry (not distinguishing exporting, importing or offshoring as we do) and its relationship with wages, and find only small, if any, effects. More recently, a growing literature looks at wage effects of offshoring of material and services inputs, largely concluding that any effects, if they are present, are low (*e.g.*, Geishecker and Görg, 2008 for Germany, Geishecker and Görg, 2009 for the UK, Liu and Trefler, 2008 for the US). For an economy like Germany this may not be too surprising, as the wage setting is rather rigid and one may, therefore, expect adjustments to be through the extensive margin, *i.e.*, employment levels.

78. We have, therefore, analysed this aspect in our paper. We find some important differences between manufacturing and services sectors, in particular with regard to exporting and offshoring. As regards exports, we find that exporting of final goods in the services industry is positively associated with the probability of becoming unemployed, and this effect is similar for all skill groups. By contrast, we do not find any strong evidence for such an effect for exporting in manufacturing industries. One possible explanation is that German services firms are finding it difficult to compete internationally with other services exporters that may be better placed in world markets, such as the world's top services exporters US or UK. If this was the case, policy makers should be aware of this and think about ways of making German services more competitive on world markets. This seems an important issue for further research.

79. In the services sector, we find that offshoring of material inputs reduces an individual's probability of moving into unemployment. This seems to affect all skill groups equally. More specifically, the results of our estimation suggest that a percentage point increase in material offshoring reduces the risk of becoming unemployed by about 60%.[33] Material offshoring in manufacturing industries also reduces the risk of unemployment, but the effect is much lower. It is statistically significant only for medium skilled workers, where we find that a one percentage point increase in material offshoring implies a reduction in the probability of moving into unemployment by about 30%. These findings are in line with Bachmann and Braun (2011) for Germany, who also find that outsourcing of materials increases job stability in particular in services industries. They suggest that firms are able to benefit from productivity increases due to offshoring, which then translate into better employment opportunities for workers in the offshoring firms (cf. Görg *et al.*, 2008, Amiti and Wei, 2009).

80. However, in the services industry, the probability of becoming unemployed increases with the extent of services offshoring, and this effect is stronger for high-skilled workers. We do not find this effect for manufacturing industries. This suggests that in services industries, offshoring of services activities substitutes for domestic labour, in particular of high skilled workers.[34] In terms of policy implications, this suggests that there may be substantial heterogeneity depending on the type of activity that is offshored abroad. This needs to be considered when judging the potential benefits or otherwise of offshoring for the German economy.

81. We also consider some of the labour market policies implemented in Germany in the last decade. We focus our analysis on the increasing use of temporary contracts, as this has not attracted as much attention as some of the other policies (*e.g.*, wage restraint, short time work). While our analysis shows that temporary workers earn on average less than permanent workers (controlling for individual-level

[33] This result is in line with Bachmann and Braun (2011) who also find that outsourcing of materials increases employment stability in services industries.

[34] This is in line with recent examples cited by Grossman and Rossi-Hansberg (2008). They describe the offshoring from the US of reading x-rays, software development and even heart surgery to India. These are all high skilled intensive services activities.

characteristics), we also investigate whether trade has any differential impact on temporary and permanent workers.

82. As regards the latter question, we find little evidence for this in the wage regressions. One striking finding is, though, that services offshoring is associated with higher wages only for temporary but not for permanent workers. One explanation may be that industries with high services offshoring are also those with high staff turnover, where temporary workers may be able to negotiate higher wages because of their flexibility. However, this clearly needs further research to understand the mechanism that is at work.

83. Looking at unemployment probabilities, we find that an increase in trade intensities is associated with a higher unemployment risk for workers on temporary contracts, in industries that are highly integrated internationally. Given the strong trend in Germany towards dual labour markets with permanent and temporary employees, and increasing levels of globalization through trade and offshoring, this latter result may suggest a trend towards decreasing employment security for temporary workers. This is an important finding from a policy perspective, given the debate as to whether globalization and employment insecurity are linked (Rodrik, 1997, Scheve and Slaughter, 2004). While a full answer to this issue would clearly need further research, these findings should be taken into account when policy-makers plan to further soften Employment Protection Legislation.

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ANNEX

A1. Calculation of outsourcing measures (imported intermediate inputs)

This definition of outsourcing measures follows the initial work by Feenstra and Hanson (1999) and work for Germany by Geishecker (2006). International Outsourcing is measured as the value of an industry's imported intermediate inputs from industries abroad as a share of the domestic industry's output. We can observe the amount of inputs that are imported for each industry from input-output tables for Germany. This enables us to observe the share of imports from an industry abroad that is used by the domestic industry in a given period (denoted *k* in the equation below).

Formally, outsourcing in domestic industry *j* in year *t* is defined as

$$OUT_{jt} = \sum IMP_{kt} / Y_{jt}$$

where *IMP* are imported intermediates in domestic industry j from foreign industry *k*, and *Y* is industry output.

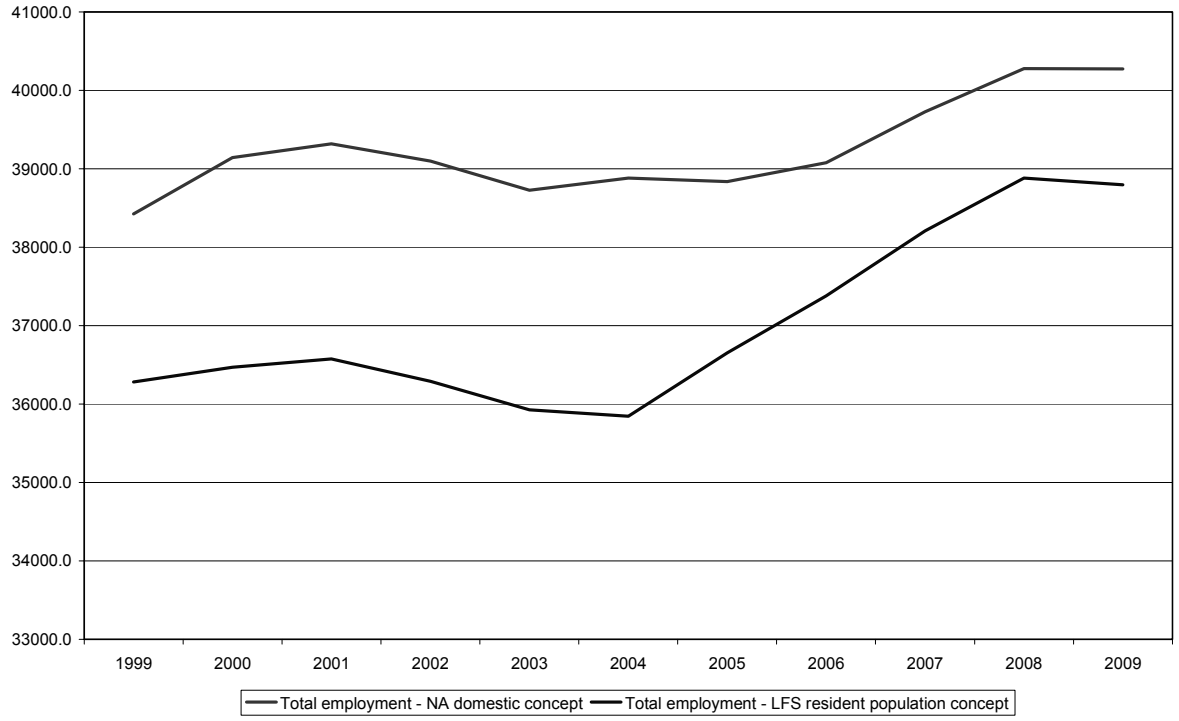
Based on this formula we calculate three different measures:

1. Narrow offshoring: domestic industry j = foreign industry k
2. Other materials offshoring:
    a. For manufacturing industries: k is defined as all manufacturing industries excluding j
    b. For services industries: k is defined as all manufacturing industries
3. Other services offshoring:
    a. For manufacturing industries: k is defined as all services industries
    b. For services industries: k is defined as all services industries excluding j

Data come from annual German Input output tables from 1999 to 2007.[35]

[35] www-ec.destatis.de/csp/shop/sfg/bpm.html.cms.cBroker.cls?cmspath=struktur,sfgsuchergebnis.csp&pagenr=2

A2. Total employment – comparison LFS and National Accounts



Source: Eurostat, based on LFS and National Accounts.

A3. Data, variable definitions and summary statistics for econometric analysis

The econometric analysis is based on the German Socio-Economic Panel (SOEP), waves 1999 to 2009. We use all samples for the analysis. Yearly industry-level information about trade and offshoring is merged with the SOEP on basis of industry classification provided in the SOEP (NACE 1.1). Variables are defined as follows.

Variable	SOEP variable and modifications
Log real monthly gross wage	Gross monthly income (LABGRO$) deflated by CPI (German Statistical Office). Imputed incomes are *not* used.
Job loss	Dummy for job loss is set to 1 in period *t* if person is unemployed in *t* (LFS$) and was working full time in *t-1* (EMPLST$). For unemployed persons, no industry information is provided in period *t*. We replace the missing value in *t* by the values in *t-1*.
Married	Dummy = 1 if person is married ($FAMSTD)
Tenure	Number of years with employer ($ERWZEIT)
Public ownership	Dummy = 1 if employer is public service (OEFFD$)
Firm size	Firm size categories (ALLBET$): 1. less than 20 employees (omitted category) 2. greater/equal 20 and less than 200 employees 3. greater/equal 200 and less than 2000 employees 4. greater/equal 2000 employees
Education	Highest educational level obtained (ISCED$): 1. unqualified labour, up to secondary education (ISCED 1 & 2) 2. skilled labour, apprenticeship, vocational education (ISCED 3 & 4) 3. high-skilled labour, tertiary education (ISCED 5 & 6)
Experience	Years of work experience; one year of full-time work (EXPFT$) counts as 1 year, one year of part-time work (EXPPT$) counts as 0.5 year.
East Germany	Dummy for Eastern federal state (BULA$)
Industry production	Taken from input-output table provided by German Statistical Office (destatis)

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Variable	Observations	Mean	St. Dev.
Real gross monthly wage	132150	2415.80	2155.947
Dummy: Job loss	192477	0.011	
Dummy: Married	192477	0.638	
Tenure	133421	10.119	9.795
Dummy: Public ownership	128639	1.748	
Firm size (cat. 1 to 4)	127899	2.425	1.194
Dummy: primary/sec. education	192477	0.156	
Dummy: vocational education	192477	0.524	
Dummy: tertiary education	192477	0.265	
Work experience	186431	15.623	12.171
Dummy: Temporary contract	113774	0.144	
Dummy: Eastern fed. state	192477	0.240	
Industry production	102502	150445	78664.1

TABLES

Table 1.1. Export and import intensities in Germany, 1999 and 2007, by manufacturing industry, in percent of output

Industry	Import intensity	Import intensity	Export intensity	Export intensity
	1999	2007	1999	2007
15: Food products and beverages	18.983	21.579	13.162	19.125
16: Tobacco products	15.186	27.038	27.790	**51.994**
17: Textiles	47.211	**50.056**	36.847	**42.648**
18: Wearing apparel; dressing and dyeing of fur	62.183	**68.419**	22.580	35.377
19: Leather, luggage, handbags, saddlery, harness, and footwear	65.991	**69.182**	23.643	37.436
20: Wood and wood products, except furniture	20.103	19.359	10.925	22.672
21: Pulp, paper, and paper products	28.131	**31.741**	28.212	36.686
22: Publishing, printing, and reproduction of recorded media	8.754	11.310	11.762	25.047
23: Coke, refined petroleum products, and nuclear fuel	32.350	**30.350**	13.094	22.483
24: Chemicals, chemical products and man-made fibres	25.502	**32.973**	33.834	**42.317**
25: Rubber and plastic products	23.011	27.206	28.292	**39.552**
26: Other non-metallic mineral products	16.567	18.818	15.708	25.810
27: Basic metals	27.253	**33.444**	25.933	31.225
28: Fabricated metal products, except machinery and equipment	13.736	16.599	18.127	25.544
29: Machinery and equipment n.e.c.	19.180	21.416	42.001	**49.146**
30: Office machinery and computers	72.179	**70.650**	31.107	**49.201**
31: Electrical machinery and apparatus n.e.c.	21.053	26.131	27.727	**37.845**
32: Radio, television and communication equipment and apparatus	45.984	**49.068**	40.978	**40.048**
33: Medical, precision and optical instruments, watches and clocks	28.777	**31.886**	39.830	**51.691**
34: Motor vehicles, trailers and semi-trailers	20.533	20.048	39.382	**44.544**
35: Other transport equipment	47.511	**47.619**	51.157	**49.579**
36: Furniture; manufacturing n.e.c.	29.793	**38.004**	21.102	35.981

Note: bold print indicates export or import intensive industries, respectively

Table 1.2. Export and import intensities in Germany, 1999 and 2007, by services industry, in percent or output

Industry	Import intensity	Import intensity	Export intensity	Export intensity
	1999	2007	1999	2007
[40] Electricity, Gas, Steam And Hot Water Supply	1.25	6.58	1.12	**9.03**
[41] Collection, Purification And Distribution Of Water	0.00	0.00	0.00	0.00
[45] Construction	1.46	1.55	0.03	0.07
[50] Sale, Maint, Repair Motor Vehicles; Retail Car Gas	0.00	0.00	5.04	7.29
[51] Wholesale Trade, Commission Trade, Ex. Moto Vehicles	1.99	2.35	17.93	**27.30**
[52] Retail, Ex. Motor vehicles, Motorcycles; Repair	0.08	0.07	0.08	0.09
[55] Hotels And Restaurants	9.12	**8.15**	4.52	6.47
[60] Land Transport; Transport Via Pipelines	10.96	**12.34**	7.69	7.31
[61] Water Transport	10.01	**16.92**	68.95	**72.27**
[62] Air Transport	17.28	**12.34**	23.63	**23.46**
[63] Supporting, Aux. Transport Activities; Trave agencies	7.39	**10.95**	6.95	**10.73**
[64] Post And Telecommunications	7.41	**8.25**	2.67	4.15
[65] Financial Intermediation, Ex. Insurance, Pensio Funding	2.36	3.75	7.40	4.97
[66] Insurance And Pension Funding, Ex. Compulsor SocSec	3.72	3.53	4.62	6.17
[67] Activities Auxiliary To Financial Intermediation	21.06	**19.39**	3.73	6.94
[70] Real Estate, Property Activities	1.49	2.36	0.19	0.29
[71] Renting Of Machinery, Equip Wo. Oper., Pers,HH Goods	0.00	0.00	0.00	0.00
[72] Computer And Related Activities	8.38	**12.74**	8.00	**17.97**
[73] Research And Development	18.67	**18.80**	18.93	**26.59**
[74] Other Business Activities	4.29	5.00	4.37	7.38

Note: bold print indicates export or import intensive industries, respectively.

Table 1.3. Offshoring intensities in Germany, 1999 and 2007, by manufacturing industry, in percent of output

Industry	Services offshoring	Services offshoring	Materials offshoring	Materials offshoring
	1999	2007	1999	2007
15: Food products and beverages	0.261	0.373	2.644	3.963
16: Tobacco products	0.975	1.505	1.788	0.351
17: Textiles	0.199	0.237	5.141	4.366
18: Wearing apparel; dressing and dyeing of fur	0.126	0.121	4.630	5.935
19: Leather, luggage, handbags, saddlery, harness, and footwear	0.059	0.062	8.183	7.885
20: Wood and wood products, except furniture	0.727	0.524	3.949	3.581
21: Pulp, paper, and paper products	0.413	0.658	6.039	7.659
22: Publishing, printing, and reproduction of recorded media	0.547	0.965	0.154	1.227
23: Coke, refined petroleum products, and nuclear fuel	0.405	0.219	4.462	1.835
24: Chemicals, chemical products and man-made fibres	1.192	1.901	7.908	7.996
25: Rubber and plastic products	0.509	0.993	0.829	1.447
26: Other non-metallic mineral products	1.276	1.781	1.790	2.186
27: Basic metals	0.369	0.534	7.068	10.950
28: Fabricated metal products, except machinery and equipment	0.445	0.705	1.371	1.949
29: Machinery and equipment n.e.c.	0.398	0.681	4.946	5.998
30: Office machinery and computers	1.137	0.762	1.316	7.353
31: Electrical machinery and apparatus n.e.c.	0.392	0.633	5.086	5.031
32: Radio, television and communication equipment and apparatus	0.286	0.605	3.307	12.984
33: Medical, precision and optical instruments, watches and clocks	0.394	0.630	2.545	3.752
34: Motor vehicles, trailers and semi-trailers	0.294	0.803	5.968	7.666
35: Other transport equipment	0.272	0.254	11.346	8.035
36: Furniture; manufacturing n.e.c.	0.143	0.344	5.081	6.204

Table 1.4. Offshoring intensities in Germany, 1999 and 2007, by services industry, in percent of output

Industry	Services offshoring	Services offshoring	Materials offshoring	Materials offshoring
	1999	2007	1999	2007
[40] Electricity, Gas, Steam And Hot Water Supply	0.082	5.273	1.972	1.894
[41] Collection, Purification And Distribution Of Water	0.000	0.000	1.979	2.099
[45] Construction	0.251	0.278	5.431	6.395
[50] Sale, Maint, Repair Motor Vehicles; Retail Car Gas	0.000	0.000	4.319	3.988
[51] Wholesale Trade, Commission Trade, Ex. Motor Vehicles	1.996	1.328	0.565	0.486
[52] Retail, Ex. Motor vehicles, Motorcycles; Repair	0.000	0.000	1.215	1.513
[55] Hotels And Restaurants	0.000	0.046	6.594	4.945
[60] Land Transport; Transport Via Pipelines	0.998	1.114	1.283	1.379
[61] Water Transport	0.000	0.000	1.243	1.801
[62] Air Transport	0.005	0.003	12.284	20.863
[63] Supporting, Aux. Transport Activities; Travel agencies	0.363	0.232	0.401	0.470
[64] Post And Telecommunications	4.900	6.802	0.656	1.007
[65] Financial Intermediation, Ex. Insurance, Pension Funding	0.846	0.333	0.145	0.203
[66] Insurance And Pension Funding, Ex. Compulsory SocSec	0.002	0.000	0.261	0.252
[67] Activities Auxiliary To Financial Intermediation	1.077	5.685	0.023	0.125
[70] Real Estate, Property Activities	0.515	2.367	0.080	0.056
[71] Renting Of Machinery, Equip Wo. Oper., Pers,HH Goods	0.000	0.000	0.073	0.067
[72] Computer And Related Activities	3.947	2.879	1.002	1.172
[73] Research And Development	1.044	0.831	1.713	2.408
[74] Other Business Activities	2.697	2.637	0.775	0.475

Table 1.5. Total employment by educational attainment (in thousands of workers)

	educational attainment		
	primary	secondary	tertiary
levels			
1999	6163	19722	8550
2000	5856	19685	8775
2001	5790	20362	8729
2002	5550	20954	8293
2003	5328	20047	8812
2004	4994	19604	9049
2005	5771	20965	9398
2006	5927	21629	9273
2007	5722	22403	9484
2008	5511	22672	9957
2009	5373	22289	10387
growth rates			
1999-2009	-12.8%	13%	21.5%

Source: Eurostat, LFS, authors' calculations; 23 November 2010.

Table 1.6. Employment growth by industry 1999-2008 (one-digit NACE)

		1999-2008	
NACE	Description	in thous.	in %
A	Agriculture, hunting and forestry	-86.0	-9.14%
C	Mining and quarrying	-53	-39.55%
D	Manufacturing	-375	-4.66%
E	Electricity, gas and water supply	-37	-11.64%
F	Construction	-666	-23.29%
G	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	26	0.44%
H	Hotels and restaurants	289	18.61%
I	Transport, storage and communication	141	6.77%
J	Financial intermediation	-80	-6.35%
K	Real estate, renting and business activities	1661	39.83%
L	Public administration and defence; compulsory social security	-265	-9.13%
M	Education	282	13.33%
N	Health and social work	646	18.06%
O	Other community, social and personal service activities	297	15.81%
P	Activities of households	72	11.34%

Source: Eurostat, National Accounts

Table 1.7. Industries with strongest and weakest absolute job growth between 1999 and 2008 (in thousands of workers, two-digit NACE)

Five industries with strongest job creation 1999-2008	
74 Other business activities	1349
85 Health and social work	646
55 Hotels and restaurants	289
80 Education	282
72 Computer and related activities	244
Five industries with weakest job creation 1999-2008	
65 Financial intermediation, except insurance and pension funding	-90
51 Wholesale trade and commission trade, except of motor vehicles and motorcycles	-99
22 Publishing, printing and reproduction of recorded media	-130
75 Public administration and defence; compulsory social security	-265
45 Construction	-666

Source: Eurostat, National Accounts

Table 1.8. Industries with highest and lowest employment growth rates between 1999 and 2008 (in %, two-digit NACE)

Five industries with highest employment growth 1999-2008		
11	Extraction of crude petroleum and natural gas; related service activities	75.00%
72	Computer and related activities	70.52%
37	Recycling	68.75%
74	Other business activities	42.54%
62	Air transport	36.73%
Five industries with lowest employment growth 1999-2008		
19	Manufacture of leather and leather products	-26.47%
17	Manufacture of textiles	-32.90%
5	Mining and quarrying	-39.55%
18	Manufacture of wearing apparel; dressing; dyeing of fur	-44.00%
10	Mining of coal and lignite; extraction of peat	-55.21%

Source: Eurostat, National Accounts

Table 1.9. Share of workers by educational attainment and industry aggregates (in %)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
A. No or secondary education											
Overall	16.2	15.1	14.3	14.9	13.7	14.0	13.0	11.8	12.4	11.4	11.3
Export-int.	15.0	13.4	13.1	12.8	10.9	11.8	11.2	10.1	8.7	8.6	9.2
Import-int.	18.3	16.4	15.6	18.2	16.7	17.9	17.5	16.1	16.8	14.5	12.8
Narrow offsh.-int.	16.8	13.7	12.6	13.3	12.1	12.5	12.3	11.2	11.5	11.6	11.1
Material offsh.-int.	17.8	16.3	15.6	16.7	15.6	15.6	14.8	13.7	15.5	13.7	12.9
Service offsh-int.	16.1	13.5	13.4	14.0	12.0	11.7	11.4	10.7	11.2	11.2	10.6
B. Vocational education											
Overall	62.9	62.2	62.3	61.9	62.0	62.0	62.4	62.8	62.7	63.4	62.0
Export-int.	58.0	56.7	56.8	57.0	57.6	58.6	58.5	58.8	60.8	60.9	54.8
Import-int.	59.6	58.1	59.0	56.8	57.3	57.3	56.9	58.8	58.5	60.6	60.1
Narrow offsh.-int.	52.5	53.2	53.3	52.4	50.8	52.8	51.3	53.1	51.2	50.3	50.5
Material offsh.-int.	64.2	62.7	62.6	62.3	63.0	63.2	63.3	65.1	63.8	65.2	65.1
Service offsh-int.	60.2	57.1	56.9	57.2	56.6	59.1	57.3	58.3	57.9	58.0	56.8
C. Tertiary education											
Overall	20.9	22.8	23.5	23.1	24.3	24.0	24.7	25.3	24.9	25.2	26.7
Export-int.	27.0	29.9	30.0	30.2	31.5	29.5	30.3	31.1	30.4	30.5	36.0
Import-int.	22.1	25.5	25.4	25.0	26.0	24.8	25.6	25.0	24.8	25.0	27.1
Narrow offsh.-int.	30.7	33.1	34.1	34.3	37.1	34.7	36.4	35.7	37.3	38.1	38.4
Material offsh.-int.	18.0	21.0	21.8	21.0	21.5	21.2	21.9	21.2	20.7	21.1	22.1
Service offsh-int.	23.7	29.4	29.7	28.9	31.4	29.2	31.3	31.0	30.9	30.8	32.6

Note: Cells show percentage of workers with specific educational attainment in respective industry, *e.g.* percentage of workers with tertiary education in export-intensive industries.
Source: SOEP.

Table 1.10. Industries with strongest and weakest real annual wage change between 1999 and 2008 (in levels, two-digit NACE)

A. Five industries with strongest real wage increase (levels) 1999-2008		
32	Manufacture of radio, television and communication equipment and apparatus	6544.1
35	Manufacture of other transport equipment	5103.6
23	Manufacture of coke, refined petroleum products and nuclear fuel	4849.0
62	Air transport	4808.1
16	Manufacture of tobacco products	4530.9
B. Five industries with weakest real wage increase (levels) 1999-2008		
92	Recreational, cultural and sporting activities	-4459.4
80	Education	-4502.3
10	Mining of coal and lignite; extraction of peat	-4914.3
2	Forestry, logging and related service activities	-5782.3
11	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying	-10974.0

Source: Eurostat, National Accounts.

Table 1.11. Industries with strongest and weakest real annual wage change between 1999 and 2008 (in %, two-digit NACE)

A. Five industries with strongest real wage increase (%) 1999-2008		
67	Activities auxiliary to financial intermediation	26.34%
32	Manufacture of radio, television and communication equipment and apparatus	16.40%
18	Manufacture of wearing apparel; dressing; dyeing of fur	14.03%
35	Manufacture of other transport equipment	11.91%
16	Manufacture of tobacco products	9.94%
B. Five industries with weakest real wage increase (%) 1999-2008		
80	Education	-14.73%
4	Fishing	-14.86%
11	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying	-18.18%
92	Recreational, cultural and sporting activities	-21.28%
2	Forestry, logging and related service activities	-27.72%

Source: Eurostat, National Accounts.

Table 1.12. Baseline regression results (manufacturing and services industries)

	(1)	(2)	(3)	(4)	(5)	(6)
Export share	-0.0102					
	(-1.44)					
Import share		-0.0724				
		(-2.67)***				
Narrow offshoring			-0.0271			
			(-0.89)			
Material offshoring				-0.0997		
				(-2.62)***		
Services offshoring					0.0192	
					(1.15)	
Openness						-0.0199
						(-2.27)**
Married	0.0218	0.0180	0.0217	0.0211	0.0228	0.0201
	(2.15)**	(1.73)*	(2.14)**	(2.07)**	(2.24)**	(1.96)**
Tenure	0.0000357	0.000142	0.0000699	-0.0000509	0.0000521	0.0000429
	(0.04)	(0.15)	(0.08)	(-0.06)	(0.06)	(0.05)
Public ownership	-0.00335	-0.00320	-0.00376	-0.00472	-0.00443	-0.00273
	(-0.30)	(-0.28)	(-0.34)	(-0.42)	(-0.40)	(-0.24)
Firm size 2	0.0309	0.0326	0.0313	0.0323	0.0312	0.0309
	(3.05)***	(3.19)***	(3.09)***	(3.17)***	(3.08)***	(3.04)***
Firm size 3	0.0260	0.0302	0.0266	0.0272	0.0262	0.0267
	(2.07)**	(2.37)**	(2.13)**	(2.16)**	(2.09)**	(2.12)**
Firm size 4	0.0231	0.0261	0.0229	0.0238	0.0225	0.0245
	(1.62)	(1.80)*	(1.61)	(1.67)*	(1.58)	(1.70)*
Education medium	0.0336	0.0345	0.0309	0.0256	0.0307	0.0368
	(0.30)	(0.31)	(0.27)	(0.23)	(0.27)	(0.33)
Education high	0.117	0.121	0.117	0.114	0.116	0.119
	(1.08)	(1.12)	(1.08)	(1.05)	(1.07)	(1.10)
Experience	0.0827	0.0832	0.0829	0.0833	0.0835	0.0823
	(5.56)***	(5.59)***	(5.59)***	(5.60)***	(5.63)***	(5.51)***
Experience squared	-0.000544	-0.000546	-0.000546	-0.000549	-0.000547	-0.000543
	(-12.81)***	(-12.69)***	(-12.89)***	(-12.87)***	(-12.90)***	(-12.71)***
East Germany	0.0100	0.0214	0.0108	0.00989	0.0102	0.0131
	(0.27)	(0.57)	(0.29)	(0.27)	(0.28)	(0.35)
N individuals	6059	6059	6059	6059	6059	6059
N	27466	27466	27466	27466	27466	27466

Notes: IV estimations, Endogenous: trade shares, Instruments: First and second difference of trade shares, t-statistics of robust standard errors in parentheses; all models include year dummies, industry dummies, and industry-specific time trends; *** significance at 1%, ** significance at 5%, * significance at 10%.

Table 1.13. Estimates by sector and education

	(1) All manu-facturing	(2) Export intensive manf.	(3) Non-export intensive manf.	(4) All services	(5) Export intensive serv.	(6) Non-export intensive serv.
Model 1						
edu1Xexpsh	-0.0246	0.0359	-0.0312	0.0103	0.0537	0.0186
	(-1.63)	(0.71)	(-1.05)	(1.60)	(0.39)	(1.05)
edu2Xexpsh	-0.0298	-0.0593	-0.0238	0.00377	0.119	0.00628
	(-1.86)*	(-1.17)	(-0.81)	(0.68)	(1.63)	(0.78)
edu3Xexpsh	-0.0293	-0.0418	-0.0373	0.000878	0.0536	-0.00153
	(-1.78)*	(-1.13)	(-1.32)	(0.14)	(0.56)	(-0.14)
Model 2						
edu1Ximpsh	-0.0390	-0.00373	-0.0542	-0.0241	0.0506	-0.0229
	(-1.83)*	(-0.15)	(-1.30)	(-0.72)	(1.13)	(-0.54)
edu2Ximpsh	-0.0463	-0.0438	-0.0593	-0.0376	-0.0173	-0.0319
	(-2.06)**	(-1.88)*	(-1.39)	(-1.10)	(-0.35)	(-0.74)
edu3Ximpsh	-0.0431	-0.0372	-0.0633	-0.0581	-0.0105	-0.0646
	(-1.97)**	(-1.65)*	(-1.57)	(-1.58)	(-0.32)	(-1.25)
Model 3						
edu1Xnarrowsh	0.00128	0.0912	0.0172	0.0633	0.0346	0.0519
	(0.04)	(1.25)	(0.34)	(1.16)	(0.10)	(0.94)
edu2Xnarrowsh	-0.00396	-0.00520	0.00959	-0.0126	-0.142	-0.00595
	(-0.12)	(-0.08)	(0.19)	(-0.26)	(-0.54)	(-0.12)
edu3Xnarrowsh	-0.00161	0.00937	-0.00269	-0.0593	-0.196	-0.0681
	(-0.05)	(0.14)	(-0.05)	(-1.16)	(-1.14)	(-1.25)
Model 4						
edu1Xmatsh	-0.0247	0.158	-0.00788	-0.0378	2.211	-0.0546
	(-0.98)	(1.09)	(-0.22)	(-0.38)	(0.84)	(-0.30)
edu2Xmatsh	-0.0439	-0.129	-0.0118	-0.113	-0.0791	-0.141
	(-1.52)	(-1.06)	(-0.32)	(-1.14)	(-0.87)	(-0.75)
edu3Xmatsh	-0.0243	0.00108	-0.0120	-0.133	-0.302	-0.161
	(-0.86)	(0.01)	(-0.32)	(-1.26)	(-0.93)	(-0.82)
Model 5						
edu1Xsersh	0.335	2.561	-0.700	0.0447	0.228	0.0301
	(1.09)	(2.32)**	(-1.38)	(1.88)*	(0.97)	(1.24)
edu2Xsersh	0.169	1.315	-1.003	-0.00286	0.0175	-0.00896
	(0.53)	(1.69)*	(-1.76)*	(-0.18)	(0.29)	(-0.53)
edu3Xsersh	0.147	1.302	-0.878	-0.0164	0.0101	-0.0296
	(0.45)	(1.44)	(-1.58)	(-1.00)	(0.08)	(-1.79)*
Model 6						
edu1Xopen	-0.0219	0.0124	-0.0231	0.00522	0.0411	0.00686
	(-1.96)**	(0.54)	(-1.24)	(0.63)	(0.50)	(0.58)
edu2Xopen	-0.0263	-0.0401	-0.0241	-0.00113	0.0791	0.00122
	(-2.18)**	(-1.65)*	(-1.25)	(-0.15)	(1.72)*	(0.13)
edu3Xopen	-0.0252	-0.0318	-0.0291	-0.00625	-0.0108	-0.0111
	(-2.09)**	(-1.55)	(-1.54)	(-0.74)	(-0.10)	(-0.89)

Notes: IV estimations, robust standard errors in parentheses. Models include all covariates as in Table 1.12.; these are not reported here to save space.

Table 1.14. Job loss estimations: baseline regression results (manufacturing and services industries)

	(1)	(2)	(3)	(4)	(5)	(6)
Export share	1.099					
	(2.44)**					
Import share		1.059				
		(0.82)				
Narrow offshoring			1.101			
			(0.55)			
Material offshoring				0.948		
				(-0.48)		
Services offshoring					1.387	
					(1.55)	
Openness						1.071
						(2.26)**
Married	0.854	0.850	0.847	0.847	0.854	0.855
	(-0.66)	(-0.68)	(-0.69)	(-0.69)	(-0.65)	(-0.65)
Tenure	1.166	1.164	1.164	1.164	1.166	1.166
	(8.90)***	(8.88)***	(8.88)***	(8.88)***	(8.89)***	(8.90)***
Public ownership	1.691	1.668	1.672	1.676	1.688	1.677
	(1.02)	(0.99)	(1.00)	(1.00)	(1.01)	(1.00)
Firm size 2	1.011	1.009	1.007	1.003	0.996	1.013
	(0.06)	(0.05)	(0.04)	(0.02)	(-0.02)	(0.07)
Firm size 3	0.991	1.004	1.008	0.991	1.007	0.999
	(-0.04)	(0.02)	(0.03)	(-0.03)	(0.03)	(-0.00)
Firm size 4	0.932	0.948	0.949	0.941	0.934	0.942
	(-0.21)	(-0.16)	(-0.16)	(-0.18)	(-0.21)	(-0.18)
Education medium	1.719	1.751	1.735	1.703	1.776	1.754
	(0.61)	(0.64)	(0.63)	(0.61)	(0.66)	(0.64)
Education high	1.494	1.526	1.497	1.471	1.528	1.537
	(0.30)	(0.31)	(0.30)	(0.29)	(0.31)	(0.32)
Experience	1.511	1.512	1.507	1.503	1.502	1.516
	(3.41)***	(3.43)***	(3.40)***	(3.37)***	(3.37)***	(3.44)***
Experience squared	1.008	1.008	1.008	1.008	1.008	1.008
	(5.04)***	(4.98)***	(5.01)***	(5.00)***	(5.02)***	(5.00)***
East Germany	1.000	1.000	1.000	1.000	1.000	1.000
	(0.07)	(0.32)	(0.38)	(0.61)	(0.60)	(-0.02)
N	5524	5524	5524	5524	5524	5524

Notes: Fixed effects logit estimation, displayed coefficients are odds ratios, t-statistics in parentheses; all models include year dummies, and industry dummies; *** significance at 1%, ** significance at 5%, * significance at 10%.

Table 1.15. Job loss estimates by sector and education

	(1)	(2)	(3)	(4)	(5)
	All	All Export intensive	All non-export intensive	Manufacturing	Services
Model 1					
edu1Xexpsh	1.075	0.845	1.103	1.162	1.195
	(2.09)**	(-1.06)	(2.17)**	(1.68)*	(2.19)**
edu2Xexpsh	1.046	1.197	1.067	1.094	1.170
	(1.41)	(1.45)	(1.57)	(1.11)	(2.17)**
edu3Xexpsh	1.098	0.987	1.124	1.089	1.245
	(2.64)***	(-0.09)	(2.44)**	(0.96)	(2.57)**
Model 2					
edu1Ximpsh	1.045	0.827	1.052	1.192	1.194
	(0.85)	(-0.85)	(0.84)	(1.33)	(1.15)
edu2Ximpsh	1.010	0.848	1.030	1.217	0.939
	(0.19)	(-0.91)	(0.53)	(1.56)	(-0.49)
edu3Ximpsh	1.067	0.913	1.071	1.270	0.983
	(1.25)	(-0.45)	(1.13)	(1.76)*	(-0.13)
Model 3					
edu1Xnarrowsh	1.079	0.614	1.060	0.732	0.840
	(0.47)	(-0.71)	(0.30)	(-0.96)	(-0.22)
edu2Xnarrowsh	1.056	0.956	1.127	0.938	1.557
	(0.38)	(-0.08)	(0.75)	(-0.22)	(1.59)
edu3Xnarrowsh	1.234	0.686	1.208	0.998	1.573
	(1.29)	(-0.57)	(0.90)	(-0.00)	(1.30)
Model 4					
edu1Xmatsh	0.984	0.916	0.951	1.032	0.431
	(-0.15)	(-0.19)	(-0.39)	(0.14)	(-2.10)**
edu2Xmatsh	0.923	0.986	0.873	0.687	0.442
	(-0.78)	(-0.03)	(-1.16)	(-2.07)**	(-2.24)**
edu3Xmatsh	1.044	1.006	0.966	0.701	0.406
	(0.38)	(0.01)	(-0.25)	(-1.32)	(-2.30)**
Model 5					
edu1Xsersh	1.332	2.484	1.348	0.101	1.523
	(1.13)	(1.05)	(1.00)	(-1.07)	(0.97)
edu2Xsersh	1.487	3.697	1.480	0.160	1.970
	(1.99)**	(1.20)	(1.70)*	(-0.92)	(2.65)***
edu3Xsersh	1.223	2.143	1.316	0.527	2.143
	(0.84)	(1.02)	(0.89)	(-0.29)	(2.37)**
Model 6					
edu1Xopen	1.042	0.890	1.048	1.124	1.173
	(1.78)*	(-0.81)	(1.70)*	(1.75)*	(2.33)**
edu2Xopen	1.024	1.069	1.032	1.119	1.099
	(1.08)	(0.58)	(1.24)	(1.77)*	(1.63)
edu3Xopen	1.054	0.960	1.057	1.125	1.137
	(2.22)**	(-0.29)	(1.97)**	(1.68)*	(2.00)**

Notes: Fixed effects logit estimation, displayed coefficients are odds ratios, t-statistics in parentheses; *** significance at 1%, ** significance at 5%, * significance at 10%. Models include all covariates as in Table 1.14, these are not reported here to save space.

Table 1.16. Temporary workers as a percentage of the total number of employees (by age and countries)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
A. 15-64 years old											
Germany	13.1	12.8	12.4	12.0	12.2	12.5	14.2	14.5	14.6	14.7	14.5
EU	13.3	13.6	13.5	13.2	13.1	13.5	14.5	15.0	14.5	14.0	13.4
Denmark	10.1	10.2	9.4	8.9	9.5	9.8	9.8	8.9	8.6	8.3	8.9
Spain	32.8	32.4	32.1	32.1	31.8	32.1	33.4	34.1	31.7	29.3	25.5
France	13.9	15.4	14.9	14.1	13.4	13.0	14.1	14.1	14.4	14.1	13.5
Italy	9.8	10.1	9.6	9.9	9.5	11.9	12.3	13.1	13.2	13.3	12.5
Netherlands	11.9	13.8	14.3	14.2	14.4	14.4	15.4	16.4	17.9	17.9	18.0
B. 15-24 years old											
Germany	53.1	52.4	52.1	51.4	53.0	55.5	58.0	57.6	57.5	56.6	57.2
EU	39.2	39.4	39.0	38.2	38.1	39.1	41.2	41.9	41.1	40.0	40.2
Denmark	29.7	29.8	26.9	25.0	27.3	26.9	26.9	22.4	22.2	23.2	23.6
Spain	70.3	68.9	66.6	65.1	63.9	64.8	66.5	66.1	62.8	59.4	55.9
France	54.4	55.0	52.2	48.5	47.4	47.8	50.7	50.8	52.5	51.5	51.2
Italy	26.2	26.2	23.3	27.3	25.5	34.4	37.0	40.9	42.3	43.3	44.4
Netherlands	33.3	35.3	36.5	36.4	37.2	37.9	41.7	43.5	45.1	45.2	46.5
C. 15-19 years old											
Germany	82.9	81.3	79.9	80.2	82.0	84.0	83.3	80.6	79.8	77.5	78.8
EU	52.1	52.4	51.5	50.9	50.9	50.9	53.8	54.5	55.3	54.0	55.5
Denmark	27.2	26.4	25.4	23.0	27.8	23.4	26.4	21.0	20.2	23.4	22.6
Spain	86.7	85.4	83.4	80.7	80.6	82.2	80.0	82.1	79.8	77.2	73.6
France	81.7	82.8	79.6	78.0	73.7	78.0	81.5	82.4	82.4	80.9	82.5
Italy	32.9	35.2	28.3	37.1	36.1	43.2	43.4	49.8	50.9	55.5	58.8
Netherlands	43.4	45.3	43.7	44.9	46.3	44.5	49.6	51.3	53.1	53.8	54.9

Source: Eurostat, LFS.

Table 1.17. Temporary workers as a percentage of the total number of employees (by age groups and industry aggregate)

		export-intensive	import-intensive	narrow-intensive	materials-intensive	service-intensive
			A. 16-64 yrs old			
1999	13.7%	10.2%	10.9%	9.9%	11.8%	9.5%
2000	13.8%	11.5%	12.6%	11.0%	14.4%	9.6%
2001	13.7%	10.2%	10.6%	9.8%	12.5%	7.7%
2002	13.8%	10.1%	10.0%	9.9%	13.6%	9.2%
2003	14.0%	9.0%	10.1%	8.7%	11.4%	7.7%
2004	14.8%	9.4%	11.5%	10.8%	14.3%	8.4%
2005	14.2%	8.2%	9.3%	9.1%	13.7%	7.7%
2006	15.1%	9.6%	9.9%	11.4%	13.5%	9.5%
2007	15.6%	12.4%	16.6%	13.5%	15.7%	11.0%
2008	15.9%	12.7%	15.4%	14.5%	14.8%	11.5%
2009	15.6%	14.0%	14.8%	13.1%	13.6%	12.4%
Average	14.6%	10.7%	12.0%	11.1%	13.6%	9.5%
			B. 16-25 yrs old			
1999	51.0%	53.0%	52.7%	50.0%	49.1%	41.4%
2000	52.7%	52.1%	44.2%	46.0%	51.7%	46.1%
2001	55.8%	53.4%	42.6%	48.0%	50.3%	48.2%
2002	58.2%	58.8%	47.0%	48.8%	56.3%	54.7%
2003	57.9%	59.9%	48.3%	44.4%	54.8%	51.7%
2004	59.1%	49.0%	48.5%	48.6%	59.5%	49.8%
2005	61.1%	45.8%	48.9%	48.6%	57.8%	44.9%
2006	62.5%	65.1%	58.0%	67.4%	54.7%	64.4%
2007	59.6%	61.8%	72.1%	62.6%	59.9%	60.5%
2008	58.3%	54.9%	62.6%	63.1%	54.7%	54.1%
2009	61.6%	70.4%	69.8%	58.7%	57.7%	66.5%
Average	58.0%	56.7%	54.1%	53.3%	55.1%	52.9%

Source: SOEP, weighted using cross-section weights.

Table 1.18. Temporary contracts and wages: baseline regression results (manufacturing and services industries)

	(1)	(2)	(3)	(4)	(5)	(6)
Export share	-0.00203					
	(-0.35)					
Temp. contract*export share	0.00134					
	(1.28)					
Import share		-0.0253				
		(-1.26)				
Temp. contract*import share		0.00141				
		(0.95)				
Narrow offshoring			0.0174			
			(0.68)			
Temp. contract*narrow offsh.			-0.0000565			
			(-0.01)			
Material offshoring				-0.0267		
				(-0.91)		
Temp. contract*material offsh.				0.00522		
				(1.45)		
Services offshoring					0.00652	
					(0.37)	
Temp. contract*services offsh.					0.0377	
					(3.08)***	
Openness						-0.00613
						(-0.89)
Temp. contract*openness						0.000770
						(1.18)
Temp. contract	-0.0816	-0.0770	-0.0568	-0.0873	-0.116	-0.0817
	(-3.74)***	(-3.42)***	(-3.02)***	(-3.68)***	(-5.05)***	(-3.53)***
Married	0.0258	0.0246	0.0266	0.0255	0.0271	0.0252
	(3.20)***	(3.01)***	(3.30)***	(3.16)***	(3.36)***	(3.11)***
Tenure	0.000127	0.000125	0.000114	0.000114	0.0000737	0.000117
	(0.16)	(0.15)	(0.14)	(0.14)	(0.09)	(0.14)
Public ownership	-0.0116	-0.0112	-0.0114	-0.0122	-0.0110	-0.0113
	(-1.17)	(-1.12)	(-1.15)	(-1.23)	(-1.09)	(-1.14)
Firm size 2	0.0367	0.0374	0.0366	0.0372	0.0367	0.0367
	(4.06)***	(4.12)***	(4.05)***	(4.11)***	(4.06)***	(4.06)***
Firm size 3	0.0376	0.0392	0.0372	0.0382	0.0368	0.0379
	(3.42)***	(3.53)***	(3.38)***	(3.46)***	(3.34)***	(3.44)***
Firm size 4	0.0415	0.0427	0.0413	0.0420	0.0403	0.0419
	(3.38)***	(3.46)***	(3.37)***	(3.42)***	(3.28)***	(3.41)***
Education medium	0.176	0.178	0.173	0.173	0.168	0.178
	(1.85)*	(1.86)*	(1.80)*	(1.80)*	(1.75)*	(1.88)*
Education high	0.277	0.279	0.274	0.276	0.271	0.279
	(2.97)***	(2.98)***	(2.90)***	(2.92)***	(2.87)***	(2.99)***
Experience	0.0317	0.0315	0.0325	0.0318	0.0314	0.0311
	(2.21)**	(2.21)**	(2.27)**	(2.23)**	(2.18)**	(2.16)**
Experience squared	-0.000460	-0.000460	-0.000459	-0.000462	-0.000458	-0.000459
	(-11.90)***	(-11.89)***	(-11.89)***	(-11.96)***	(-11.87)***	(-11.86)***
N individuals	4970	4970	4970	4970	4970	4970
N	22119	22119	22119	22119	22119	22119
Cragg-Donald F stat. (first stage)	239.7	54.95	198.7	123.4	646.7	105.9
Hansen J stat. (p-value)	0.691	0.0997	0.0999	0.463	0.0590	0.344

Notes: IV estimations, Endogenous: trade shares, interaction trade shares/temp. contract, Instruments: First and second difference of trade shares and interactions, t-statistics of robust standard errors in parentheses; all models include year dummies, industry dummies, and industry-specific time trends; *** significance at 1%, ** significance at 5%, * significance at 10%.

Table 1.19. Wage regression by sector

	Manufacturing			Services		
	All	Export intensive	Non-export intensive	All	Export intensive	Non-export intensive
Model 1						
Export share	0.00284	-0.00273	0.00947	0.00182	0.0259	0.00859
	(0.18)	(-0.09)	(0.37)	(0.4)	(0.35)	(1.44)
Temp. contract*export share	0.000724	0.0785	-0.00144	0.00808	0.0355	0.0464
	(0.18)	(0.55)	(-0.18)	(2.01)**	(0.25)	(3.25)***
Model 2						
Import share	-0.00467	-0.0370	0.0291	-0.00377	-0.00191	0.0435
	(-0.20)	(-1.35)	(0.82)	(-0.13)	(-0.05)	(1.07)
Temp. contract*import share	0.00142	0.00308	0.00126	0.00929	0.0156	0.0160
	(0.48)	(0.49)	(0.35)	(0.9)	(1.84)*	(1.04)
Model 3						
Narrow offshoring	0.0395	0.0569	0.0620	0.0189	-0.165	0.0432
	(1.26)	(1.01)	(1.24)	(0.49)	(-0.92)	(1.19)
Temp. contract*narrow offsh.	-0.00408	-0.00424	0.00177	0.00979	0.0374	0.0151
	(-0.35)	(-0.09)	(0.14)	(0.58)	(0.46)	(0.88)
Model 4						
Material offshoring	0.00618	0.0173	0.0163	-0.00344	-0.117	0.347
	(0.23)	(0.31)	(0.47)	(-0.03)	(-1.42)	(1.18)
Temp. contract*material offsh.	-0.00143	0.0824	-0.0130	0.0398	0.190	0.0424
	(-0.08)	(0.58)	(-0.56)	(3.06)***	(1.28)	(2.37)**
Model 5						
Services offshoring	0.0476	0.514	-1.025	-0.00858	-0.0306	-0.0145
	(0.15)	(0.64)	(-1.91)*	(-0.49)	(-0.63)	(-0.76)
Temp. contract*services offsh.	0.0196	0.386	-0.0324	0.0425	0.137	0.0579
	(0.35)	(1.95)*	(-0.51)	(2.75)***	(1.33)	(2.55)**
Model 6						
Openness	-0.00097	-0.0177	0.0109	0.00117	-0.000862	0.0125
	(-0.08)	(-0.87)	(0.64)	(0.18)	(-0.02)	(1.58)
Temp. contract*openness	0.000800	0.0103	0.000318	0.00544	0.0329	0.0171
	(0.33)	(0.68)	(0.10)	(1.60)	(1.59)	(2.23)**

Notes: IV estimations, Endogenous: trade shares, interaction trade shares/temp. contract, Instruments: First and second difference of trade shares and interactions, t-statistics of robust standard errors in parentheses; *** significance at 1%, ** significance at 5%, * significance at 10%. Models include all covariates as in Table 1.18, these are not reported here to save space.

Table 1.20. Temporary contracts and job loss: baseline regression results (manufacturing and services industries)

	(1)	(2)	(3)	(4)	(5)	(6)
Export share	1.074					
	(1.73)*					
Temp. contract*export share	1.002					
	(0.15)					
Import share		0.995				
		(-0.07)				
Temp. contract*import share		1.013				
		(0.82)				
Narrow offshoring			1.095			
			(0.48)			
Temp. contract*narrow offsh.			1.045			
			(0.65)			
Material offshoring				0.910		
				(-0.79)		
Temp. contract*material offsh.				1.016		
				(0.40)		
Services offshoring					1.394	
					(1.38)	
Temp. contract*services offsh.					0.979	
					(-0.16)	
Openness						1.046
						(1.36)
Temp. contract*openness						1.003
						(0.46)
Temp. contract	1.025	0.902	0.948	0.937	1.082	0.963
	(0.09)	(-0.38)	(-0.21)	(-0.21)	(0.27)	(-0.14)
Married	0.992	0.991	0.984	0.986	0.993	0.995
	(-0.03)	(-0.03)	(-0.06)	(-0.05)	(-0.03)	(-0.02)
Tenure	1.175	1.175	1.174	1.174	1.175	1.175
	(8.13)***	(8.17)***	(8.17)***	(8.14)***	(8.11)***	(8.14)***
Public ownership	1.426	1.367	1.404	1.373	1.412	1.397
	(0.65)	(0.57)	(0.62)	(0.58)	(0.63)	(0.61)
Firm size 2	1.022	1.020	1.017	1.013	1.000	1.025
	(0.11)	(0.10)	(0.09)	(0.07)	(-0.00)	(0.13)
Firm size 3	1.028	1.028	1.036	1.023	1.041	1.034
	(0.10)	(0.09)	(0.12)	(0.08)	(0.14)	(0.11)
Firm size 4	1.009	1.004	1.006	1.010	1.004	1.017
	(0.02)	(0.01)	(0.02)	(0.03)	(0.01)	(0.04)
Education medium	1.615	1.578	1.623	1.567	1.657	1.624
	(0.55)	(0.52)	(0.56)	(0.52)	(0.58)	(0.55)
Education high	9.803	9.468	9.759	9.417	10.05	9.981
	(1.27)	(1.28)	(1.29)	(1.28)	(1.31)	(1.29)
Experience	1.553	1.551	1.551	1.543	1.544	1.558
	(3.27)***	(3.26)***	(3.27)***	(3.22)***	(3.23)***	(3.30)***
Experience squared	1.008	1.008	1.008	1.008	1.008	1.008
	(4.25)***	(4.25)***	(4.26)***	(4.25)***	(4.27)***	(4.23)***
Industry production	1.000	1.000	1.000	1.000	1.000	1.000
	(-0.09)	(0.21)	(0.12)	(0.44)	(0.39)	(-0.10)
N	4840	4840	4840	4840	4840	4840

Notes: Logit estimation, displayed coefficients are odds ratios, t-statistics in parentheses; all models include year dummies, and industry dummies; *** significance at 1%, ** significance at 5%, * significance at 10%.

Table 1.21. Job loss regression by sector

	Manufacturing and Services			Manu-facturing	Services
	All	Export intensive	Non-export intensive	All	All
Model 1					
Export share	1.074	1.056	1.109	1.104	1.230
	(1.73)*	(0.43)	(1.67)*	(1.27)	(2.71)***
Temp. contract*export share	1.002	1.326	1.012	1.027	1.009
	(0.15)	(3.91)***	(0.65)	(0.85)	(0.17)
Model 2					
Import share	0.995	0.779	1.035	1.235	0.961
	(-0.07)	(-1.31)	(0.34)	(1.65)*	(-0.27)
Temp. contract*import share	1.013	1.272	1.025	1.043	0.994
	(0.82)	(3.53)***	(1.19)	(1.12)	(-0.08)
Model 3					
Narrow offshoring	1.095	0.896	1.120	0.988	1.841
	(0.48)	(-0.20)	(0.50)	(-0.04)	(1.45)
Temp. contract*narrow offsh.	1.045	2.177	1.173	1.204	1.037
	(0.65)	(2.52)**	(1.56)	(1.69)*	(0.18)
Model 4					
Material offshoring	0.910	0.996	0.801	0.747	0.501
	(-0.79)	(-0.01)	(-1.60)	(-1.64)	(-1.65)*
Temp. contract*material offsh.	1.016	1.349	1.052	1.158	1.030
	(0.40)	(2.19)**	(0.95)	(1.31)	(0.25)
Model 5					
Services offshoring	1.394	4.147	1.370	0.497	2.145
	(1.38)	(1.77)*	(1.03)	(-0.35)	(2.35)**
Temp. contract*services offsh.	0.979	0.138	0.959	0.493	1.103
	(-0.16)	(-2.87)***	(-0.28)	(-0.55)	(0.47)
Model 6					
Openness	1.046	0.971	1.062	1.126	1.149
	(1.36)	(-0.27)	(1.35)	(1.87)*	(2.14)**
Temp. contract*openness	1.003	1.149	1.009	1.020	0.998
	(0.46)	(3.56)***	(0.92)	(1.09)	(-0.05)

Notes: Logit estimation, displayed coefficients are odds ratios, t-statistics in parentheses; *** significance at 1%, ** significance at 5%, * significance at 10%. Models include all covariates as in Table 1.20, these are not reported here to save space.

PAPER 2.

TRADE AND EMPLOYMENT IN ITALY

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Abstract*

This paper addresses the relationship between trade, employment and wages in Italy from the perspective of the specific features of its international specialisation pattern. It focuses on several key questions: To what extent has international economic integration, including trade and international outsourcing, changed the structure of the Italian economy? To what extent has exposure to foreign competition helped Italian firms to restructure and upgrade their production, so as to increase the skill intensity of their activities? What are the effects of these processes on employment and wages?

The paper opens with a short review of the relevant literature and a description of recent developments in the trade specialisation pattern of the Italian economy, including its linkages with the structure of employment. This is followed by the main original contribution of the paper consisting of an econometric study structured around two parts. The first part presents an estimate of the employment effects of trade and off-shoring in the Italian manufacturing industry based on a panel of 15 sectors for the period from 1999 to 2008. The second part addresses the relationship between trade and wages using a rich micro-level panel of individual workers for the period from 1997 to 2003. In light of the results, the paper then considers the main policies adopted in Italy to facilitate the adjustment of employment and wages to external shocks, including short-term effects of trade liberalisation.

The Italian case appears to confirm that international economic integration, while generating important static and dynamic benefits, requires a flexible and efficient social security system, able to assist workers displaced by external competition or other kinds of structural change. In view of shortcomings in the existing system, a comprehensive social security reform, inspired by principles of universal access, medium-term financial equilibrium, and a proper design of individual incentives, may be necessary to better help workers displaced by international integration.

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Executive Summary

This paper analyses the relationship between the increasing international integration of the Italian economy and its economic performance, with particular reference to employment and wages.

The starting point of the paper is a survey of the empirical literature on the role of trade for employment and wages in Italy, which refers mostly to the manufacturing industry in the 1990s. The evidence tends to underline the positive role played by net exports in sustaining labour demand, particularly in the traditional sectors in which the Italian industry is more specialised. A skill-upgrading process is visible in the structure of employment and wages, and most studies tend to explain the process more with technical progress than with international competition.

The paper continues by presenting recent trends of the Italian economy in the context of its main structural features. Before the global crisis, notwithstanding the sluggishness of production and the decline of export market shares, employment had continued to grow in Italy and the unemployment rate had significantly fallen. This was partly the result of regulatory reforms, which facilitated the absorption of a rising labour supply, including a growing fraction of immigrant workers. However, the Italian economy has remained fragile, due to its longstanding structural problems, and the impact of the crisis has been harsher than in other developed countries, making the current recovery slower and uncertain.

Although rising substantially in the last decades, the degree of international openness of the Italian economy is still lower than in other European countries of similar size. Its growth is curbed, among other factors, by the increasing weight of the services sector, which is structurally less open than the manufacturing industry.

Following a common pattern among developed countries, the GDP and employment shares of the manufacturing industry have declined in the last decades, in a context of rising international integration. Manufacturing trade balance has remained in surplus, sustaining the growth of employment, but its net labour content has become smaller over time.

Driven also by demographic factors, a strong trend of skill upgrading has affected the structure of employment, particularly in the manufacturing industry. The relative demand for unskilled labour has fallen in all sectors, increasing wage gaps between different occupations.

These changes might be partly interrelated with a recent evolution in the international specialisation pattern of the Italian manufacturing industry. Under the increasing competitive pressure exerted by developing countries, traditional comparative advantages in low-technology consumption sectors have substantially weakened, and were replaced by a more intense specialisation in industrial machinery and other sectors producing intermediate and investment goods. Industries more exposed to competition from developing countries, both on the domestic and on export markets, have undergone the sharpest falls in employment.

This structural transformation is not only the unavoidable implication of changes in the 'international division of labour' between developing and developed countries, but also the result of market strategies carried out by Italian firms, and particularly by the most competitive medium-sized enterprises that are emerging from the selection process elicited by international competition. However, these changes have not been strong enough so far to overcome the structural problems limiting the growth of the Italian economy, and in particular the 'dynamic inefficiency' of its specialisation pattern, concentrated in products characterised by a lower income elasticity of demand. This calls into question the ability of the Italian economic system to generate sufficient product innovation, which in turn depends on the quality of its human- and knowledge capital. A related problem concerns the services sector, where an increase in openness and competition would be necessary to generate the high-skilled jobs that could sustain the growth prospects of the Italian economy.

In order to offer a more precise assessment of the employment and wage effects of international integration on the Italian manufacturing industry, the paper presents two econometric exercises. The first

one confirms that, after controlling for the effects of output growth and technical progress on labour demand, trade specialisation has played a positive role in sustaining the growth of employment in the last decade, offsetting the negative impact of the competitive pressure from developing countries and of production off-shoring by Italian firms.

The second group of estimates, based on a large panel of data on workers characteristics, gives similar results for wages. After controlling for a set of individual worker characteristics (age, gender and occupation) as well as for firm size and labour productivity, we find again that the competitive pressure from developing countries exerts a negative impact on wage growth, which may, however, be more than offset by the export specialisation of the region in which workers are located. Nevertheless, both of these trade-related variables (competition from developing countries and export specialisation) tend to increase wage gaps between white-collar and blue-collar workers (who are likely to have lower skill levels than white collar workers).

The Italian case, therefore, seems to confirm that international economic integration, while generating important static and dynamic benefits, requires a flexible and efficient social security system, able to assist workers displaced by external competition as well as by any other kind of structural change.

The last section of the paper addresses the issue of labour policies in Italy from the perspective of their role in supporting trade adjustment. The current social security system looks unduly complex, iniquitous and ineffective. Most of the non-standard-contract workers, who have been impacted more severely by trade competition and by the global crisis, are not covered by any form of assistance. The large informal economy existing in Italy is not able to solve this problem. Rather, its presence and the interconnections between legal and illegal activities threaten the financial sustainability of labour policies and obscure the growth and progress prospects of the Italian society.

Only a comprehensive reform of the social security system, inspired by principles of universal access, medium-term financial equilibrium, and a proper design of individual incentives, may help workers displaced by international integration, without jeopardising the substantial economic and social benefits associated with trade.

TRADE AND EMPLOYMENT IN ITALY

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2.1. Introduction

84. The global economic crisis hit the Italian economy more severely than other developed countries, due to long-standing structural problems limiting its efficiency and growth. The fall of gross domestic product (GDP) has been greater than in the rest of the OECD, and its recovery appears slower, even in comparison with the other members of the euro area. The resulting employment loss was initially milder than in the OECD average, but only in terms of number of persons. Total hours worked recorded a sharp decline, reflecting the need of firms to reduce labour input in response to the collapse of demand. Even if the official unemployment rate is still below the OECD average, this is mostly the result of a very large proportion of discouraged workers in the labour force. The employment rate, which had risen substantially before the crisis, remains considerably lower than in other developed countries.

85. The growth of the Italian economy has been lagging behind the rest of the euro area in the last decade, as a result of a marked slowdown of productivity. The current account balance has gradually worsened, revealing problems of export performance more than a surge in imports. Italy's share of world exports has declined from 5% to 3% in the last two decades, responding only marginally to real exchange rate fluctuations. A substantial part of this fall is a reflection of the great success achieved by China and other emerging countries. However, Italian exports have been growing more slowly even in comparison to the average of the euro area, raising serious concerns about the competitiveness of exporting firms and their ability to adapt to the new features of international competition. Measured in terms of export propensity and import penetration, the international openness of the Italian economy has fallen drastically in the last few years, and is now the lowest in the European Union, well below openness levels of other countries of similar size, such as France and the United Kingdom.

86. Yet, exposure to international competition has played a positive role in the Italian economy, promoting a process of restructuring and firm selection. As a result, a large group of medium-sized enterprises, which seem able to successfully compete in foreign markets, has emerged as a dynamic force in the Italian economy. In comparison with their industry average, these firms are more productive, more innovative and employ relatively more skilled labour. In many cases, they have emerged from the population of small enterprises operating in local production systems (*distretti industriali* or industrial districts), which have characterised Italian economic development in the last decades.

87. At the onset of the global crisis, aggregate data on productivity and exports were starting to show the positive signs of this restructuring process. So far, the available evidence seems to suggest that the crisis has been particularly unfortunate from this perspective, harming more severely the firms that were more dependent on foreign sales.

88. This confirms the importance of better understanding of the relationship between the particular features of Italy's international specialisation pattern and its growth and employment performance. It is often argued that the Italian economy is more exposed than other developed countries to the competition of low-wage exporters, due to its specialisation in traditional manufacturing sectors. It can be shown that this is only partly due to problems of price competitiveness, since many Italian firms have successfully upgraded their production to higher quality market segments, where non-price factors are more important. The main reason for the weak performance of Italian exports is the 'dynamic inefficiency' of their specialisation pattern, *i.e.* their concentration in products characterised by a relatively slow growth of

world demand. To a certain extent, this reflects the limited ability of Italian firms to invest in product innovation, which would be necessary to increase the income-elasticity of their exports. In turn, this innovation gap can be related to the fact that Italian firms tend to employ less skilled labour than their competitors in other developed countries.

89. This paper will address the relationship between trade, employment and wages in Italy from the perspective of the specific features of its international specialisation pattern. To what extent has international economic integration, including trade and international outsourcing, changed the structure of the Italian economy? To what extent has exposure to foreign competition helped Italian firms to restructure and upgrade their production, so as to increase the skill intensity of their activities? What are the effects of these processes on employment and wages?

90. Following a short review of the relevant literature, the paper will turn to comment on the main developments in trade, employment and wages in Italy over the last decade. Then, Section 3 will illustrate the trade specialisation pattern of the Italian economy and discuss its linkages with the structure of employment. The main original contribution of the paper consists of an econometric study structured around two parts. First, Section 4 will present an estimate of the employment effects of trade and off-shoring in the Italian manufacturing industry, based on a panel of 15 sectors for the period from 1999 to 2008. Second, Section 5 will address the relationship between trade and wages, using a rich micro-level panel of individual workers for the period from 1997 to 2003.

91. The main policies adopted in Italy to facilitate the adjustment of employment and wages to external shocks, including short-term effects of trade liberalisation, will be reviewed in section 6, which will also consider the role of the informal economy and its relationship with trade exposure. The analysis will focus on how the Italian social security system has responded to the recent global economic crisis and what the prospects for its reform are. In particular, the analysis will consider means for improving its effectiveness in addressing trade-related adjustment problems. The final section will summarize the main insights and policy implications of the paper.

2.2. Trade, employment and wages in the Italian economy: an overview

2.2.1. Literature review

92. International economic integration, in all its aspects, exerts a growing influence on employment and wages, by changing the incentives faced by households and firms, the productive structure of the economy, and the macro-economic context. In the short run, trade liberalisation may improve real wages by reducing the price of imports and sustain employment by creating new export opportunities (Dee *et al.*, 2011). In the long run, the opening of international markets improves the allocation of resources and stimulates their accumulation. In particular, the selection effect elicited by trade liberalisation policies results in higher productivity, allowing for higher real wages and lower unemployment rates (Felbermayr *et al.*, 2009).

93. However, the adaptation of economic systems to changes in international competition entails distributive effects, which may prove difficult to manage, particularly in the short run. One example is the simultaneous increase of skilled workers' wage premia and employment shares, which is well documented in developed countries. The underlying increase in the relative demand for skilled labour has often been explained as the combined result of international competition and technological change, even if some studies focus also on the role of labour market institutions and individual characteristics of workers. Recent surveys of this literature include Hoekman and Winters (2005), Chusseau *et al.* (2008), OECD *et al.* (2010).

94. The available empirical evidence on the role of trade for employment and wages in Italy refers mostly to the manufacturing industry. The evidence tends to underline the positive role played by net exports in sustaining labour demand, particularly in the traditional sectors in which the Italian industry is more specialised. A skill-upgrading process is visible in the structure of employment and wages, and most studies tend to explain the process more with technical progress than with international competition.

95. Using input-output tables, De Nardis and Malgarini (1996) confirm the dominant role of technical change in driving the evolution of productivity and employment, and show that net exports sustained Italian manufacturing employment in the period from 1982 to 1988. Similar results have been reached by De Nardis and Paternò (1997) for the period from 1980 to 1995, by comparing the labour content of net exports with the counterfactual assumptions of no trade and of an unchanged trade balance with respect to 1980. Econometric estimates carried out by Faini *et al.* (1999) for the period from 1951 to 1995 confirm that the role of trade for employment and wages, although less important than that of technical progress, has been positive, thanks to the Italian economy's specialisation in labour intensive sectors. On the other hand, Bella and Quintieri (2000) find a minor negative effect of import competition on employment in the period from 1975 to 1989.

96. The above studies address only the effect of trade on total employment, without distinguishing between skilled and unskilled labour. Quintieri and Rosati (1995) show that skill upgrading in the manufacturing industry was predominantly a within-industry process in the 1980s, interpreting this fact as evidence of the dominant role of technical progress, as opposed to trade, in raising the relative demand of skilled labour. Somewhat different results have been obtained by Brenton and Pinna (2001), who confirm that in the 1980-90s technical progress was more important than trade in explaining skill upgrading in low-skill industries, but identify a substantial effect of import competition, and particularly of foreign outsourcing, in lowering the demand for unskilled labour in high-skill sectors. The relatively better performance of traditional sectors might be traced back to specific competitive advantages of Italian industrial districts, related to agglomeration economies. Helg and Tajoli (2005) confirm that in Italy, unlike in Germany, international outsourcing affected positively the relative demand for skilled labour over the 1990s.[36]

97. The increasing availability of micro-economic statistics, and particularly of linked-employee-employer data, allows for a better understanding of the functioning of the economic system and its structural changes. In particular, information about the number of workers hired and dismissed at firm level can be used to assess the process of job reallocation between less and more productive firms (Davis *et al.*, 1996). According to research based on a large business survey of the manufacturing industry conducted by the Bank of Italy, no significant changes have occurred in the size of this process since the recession of the early 1990s (Bugamelli *et al.*, 2010). The rates of job creation and destruction have remained quite stable, resulting in a steady increase in employment year after year. The restructuring process elicited by the introduction of the euro has occurred more at the intra-industry level than across different sectors. The share of blue-collar occupations in manufacturing employment has fallen as a result of vertical specialisation in high-skill stages of the production process. The process has been particularly intense in low-tech industries, which are more affected by the end of competitive devaluations. The reduction in the employment share of blue-collar workers has been accompanied by an increase in its variance across firms, confirming the intensity of intra-industry restructuring.

98. Other studies based on micro-data broadly confirm the main insights drawn from the empirical evidence at the industry level. In particular, skill-biased technical change is identified as the most important factor explaining the increase in relative employment of skilled workers in the manufacturing industry.[37] In a study on the mechanical industry, Manasse *et al.* (2004) show that within-firm changes are the most important factor behind the increase in the wage premium and employment share of skilled workers,[38] whereas trade has offset this trend by reducing the relative demand for skilled labour. Exposure to international competition has played an important role, as shown by the fact that skill upgrading has been more pronounced in exporting firms. However, in accordance with the structural features of the

[36] See also Lo Turco and Parteka (2009).

[37] See also Casavola *et al.* (1996), Piva and Vivarelli (2002, 2004), and Bratti and Matteucci (2004). Piva *et al.* (2005) show that organizational change has been more important than technical progress in raising the relative demand for skilled labour.

[38] Actually, the aggregate share of non-manual workers has remained virtually unchanged in the sample during the 1990s, but this is the result of an increase in the share of executives at the expense of clerks (Manasse *et al.* 2004).

Italian economy, demand has shifted towards less skill-intensive exporting firms. Manasse and Stanca (2006) obtain similar results on a large panel of Italian manufacturing firms for the period from 1989 to 1995. Between-firm demand shifts, which may be traced back to trade, have exerted a small positive effect on the relative demand for unskilled labour, dwarfed by within-firm skill-upgrading in both employment and worked hours caused by technical progress.

99. Falzoni *et al.* (2007) use detailed micro-data for the period from 1991 to 1998 to conclude that import competition was detrimental for wages of both skilled and unskilled workers, whereas exports played a positive role only for the latter, confirming that the specific features of Italy's specialisation pattern are essential to understand the impact of trade on wage gaps. Similar results have been obtained for the period from 1991 to 2002 by Matano and Naticchioni (2010), who distinguish between trade with developed and developing countries and conclude that the largest impact on wage and employment has come from trade with developed countries. They find that exports increase the demand for unskilled labour and imports play the opposite role due to the complementarities between imports of capital-intensive goods from developed countries and high-skill labour. For the period from 1995 to 2003 Antonietti and Antonioli (2011) find support for the skill-upgrading effect of foreign production, showing that it is mostly due to a fall of unskilled labour employment in firms shifting production activities abroad.[39]

2.2.2. International openness, structural change, employment and wages in the Italian economy

100. The performance of the Italian economy before the global crisis was characterised by an apparent paradox (Codogno, 2008). Notwithstanding the stagnation of GDP, which grew at an average rate of 1.2% between 2000 and 2007, lower than in the rest of the euro area, employment continued to expand by about 1% per year. A larger labour supply, boosted by an increase in the activity rate and sizeable migration inflows, was absorbed relatively easily by the economic system. The unemployment rate, which had climbed to an historically high level of 11.3% in the second half of the 1990s, dropped steadily in the following years, reaching 6.1% in 2007.

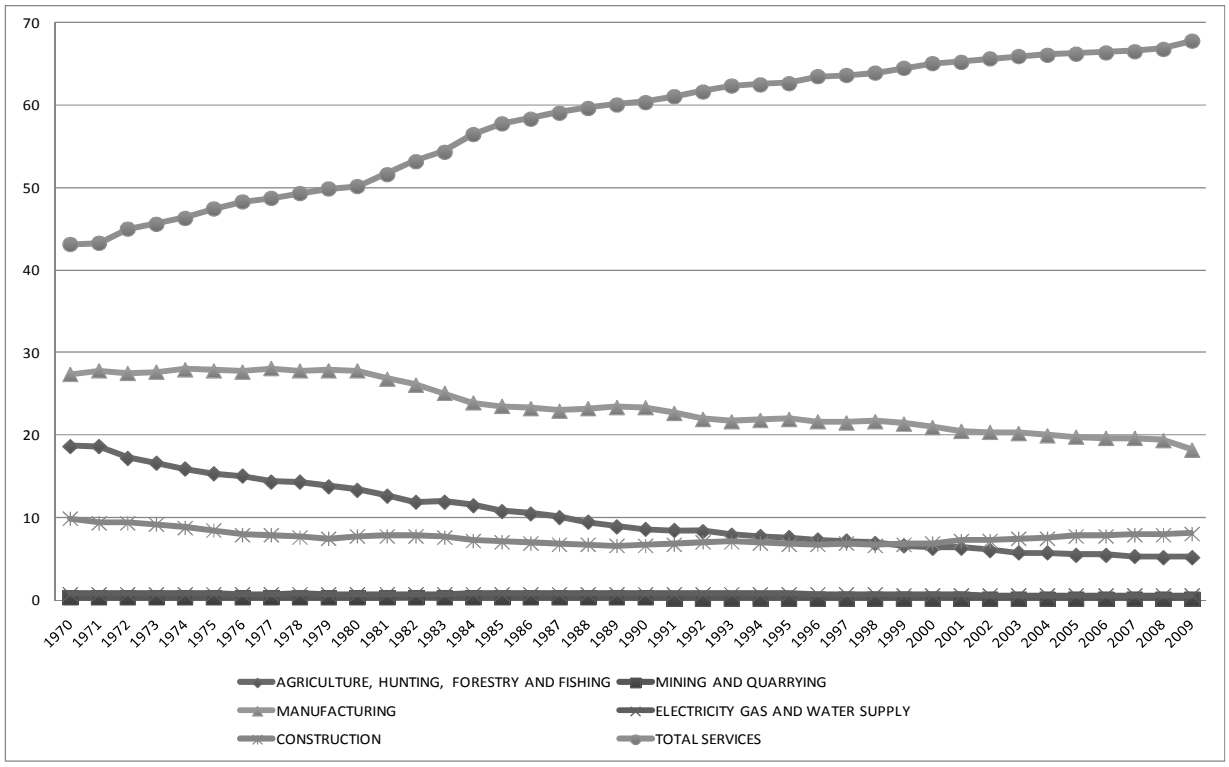
101. Changes in industrial relations in the early 1990s led to a period of moderation in wage dynamics, which resulted in a rise in the profit share of value-added until 2001. This trend has reversed in the last decade. Wage growth has remained weak, but anyway higher than that of productivity. The resulting increase in labour cost has eroded the profitability of firms and their international competitiveness.

102. The sluggishness of productivity, as mentioned in the introduction, is commonly considered as the most important factor explaining the weak growth performance of the Italian economy in the last decades. The resulting structural fragility of the productive system exacerbated the impact of the global crisis, whose consequences were more severe than in other developed economies. Its consequences on employment have soon also become evident, even if, as will be shown later in Section 6, the intense use of out-of-work wage supplementation schemes has curbed the growth of the official unemployment rate.

103. Following a common pattern among developed countries, the structure of the Italian economy has changed substantially over the last decades (Figure 1). Based on full-time equivalents, the share of services in total employment has risen from 43% to 68% between 1970 and 2009, at the expense of the manufacturing industry (from 27% to 18%), the primary sector (from 19% to 5%), and construction (from 10% to 8%). The process of tertiarisation was particularly rapid in the first half of the 1980s, but has continued almost unabatedly in the following decades and has been accelerated by the global crisis.

[39] In a previous draft of their paper, Antonietti and Antonioli (2007) show that firms outsourcing their production abroad tend to be less skill intensive than non-outsourcing firms, confirming the idea that shifting production abroad could represent the defensive strategy adopted by more vulnerable firms.

Figure 2.1. Employment by sector in Italy (full-time equivalents) - percentage shares

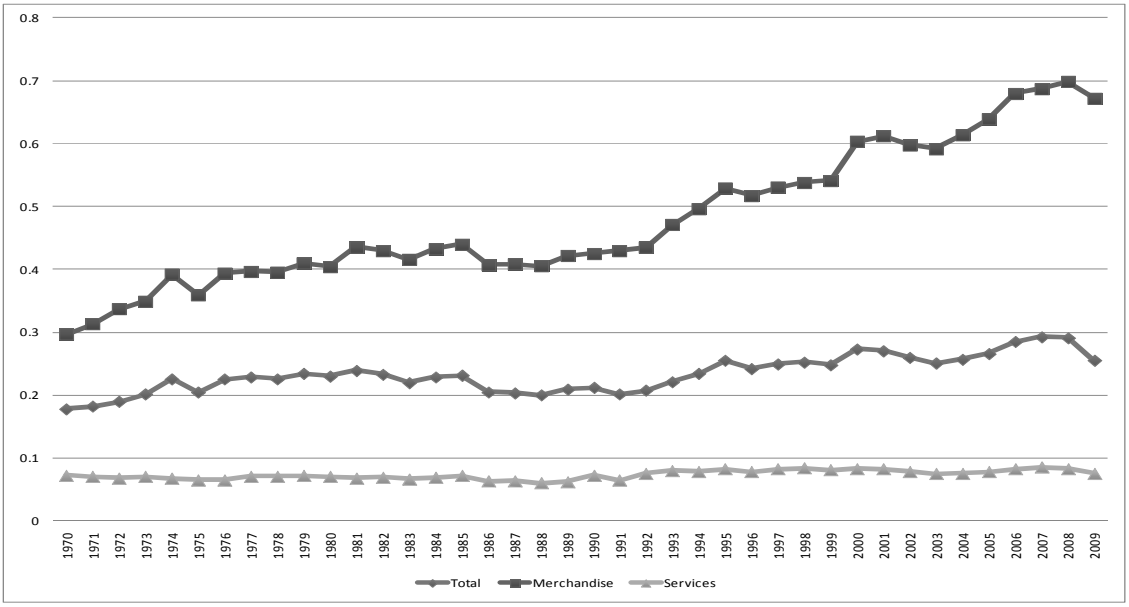


Source: OECD-STAN data.

104. The services sector is structurally less open to international competition than the manufacturing industry, because many services are intrinsically non-tradable and restrictive market-access policies create additional barriers. So, other things being equal, the tertiarisation of the economy dampens its international integration. Figure 2 shows clearly that the openness degree of the tertiary sector in Italy, measured by the ratio between total trade (exports + imports) and the value of gross output at current prices[40], is much lower than in the rest of the economy and has remained quite stable in the last four decades. On the other hand, trade openness has increased substantially in the merchandise sector, particularly since the early 1990s. Overall, the trade-to-output ratio has risen by 11 percentage points between 1970 and 2008, but its increase would have been much larger, if the tertiarisation of the economy had not generated a negative composition effect of 8 percentage points.

[40] This way of measuring international openness overcomes the well-known upward distortion of the trade-to-GDP ratio, due to the fact that GDP is measured in terms of value-added, whereas exports and imports are recorded in terms of gross value, including the value of intermediate inputs.

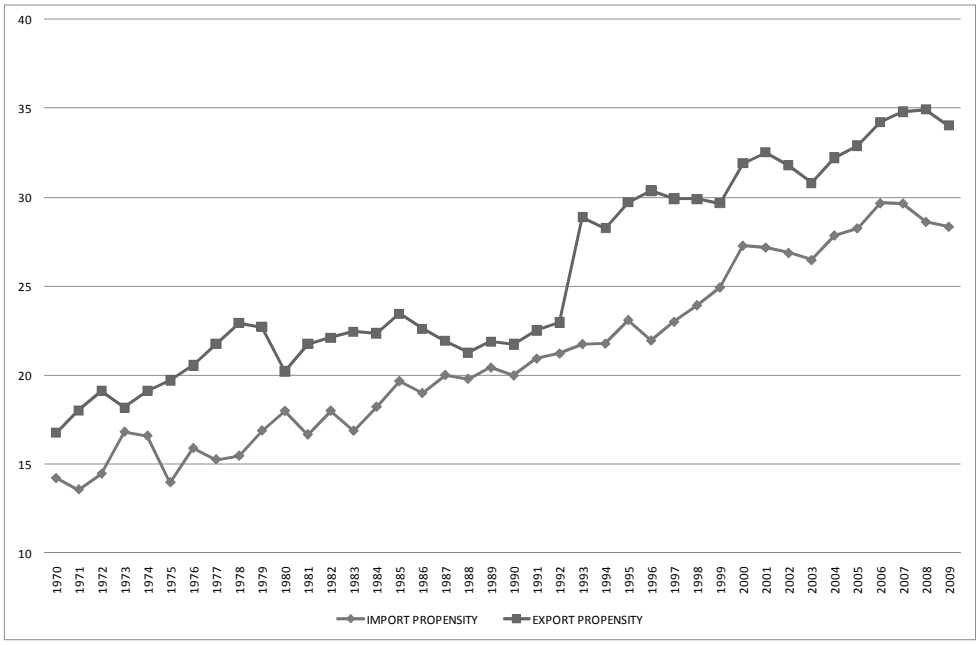
Figure 2.2. Degree of international openness of the Italian economy by sector
(Ratio between trade (exports + imports) and gross output at current prices)



Source: Based on Istat and OECD-STAN data.

105. The relative downsizing of the manufacturing industry has sometimes been related to import competition. Actually, import propensity, measured with respect to the value of gross output, has risen from 15% to 30% in the period from 1970 to 2009, even if it has undergone a slight backlash in the last few years (Figure 3). On the other hand, export propensity has grown even more, from 17% to 35%, underlining the interdependence between the two trade flows, further intensified by international production fragmentation. So, assuming that the increase in import penetration has translated into job destruction in the manufacturing industry, the corresponding increase in export propensity should have offset this loss by creating new employment opportunities.

Figure 2.3. Degree of international openness of the Italian manufacturing industry
(ratio of exports and imports to gross output at current prices)



Source: Based on OECD-STAN data.

106. The trade balance in the manufacturing industry has always been positive, but a downward trend was clearly visible in the 1980s (Figure 4). The currency crisis of 1992, combined with restrictive fiscal

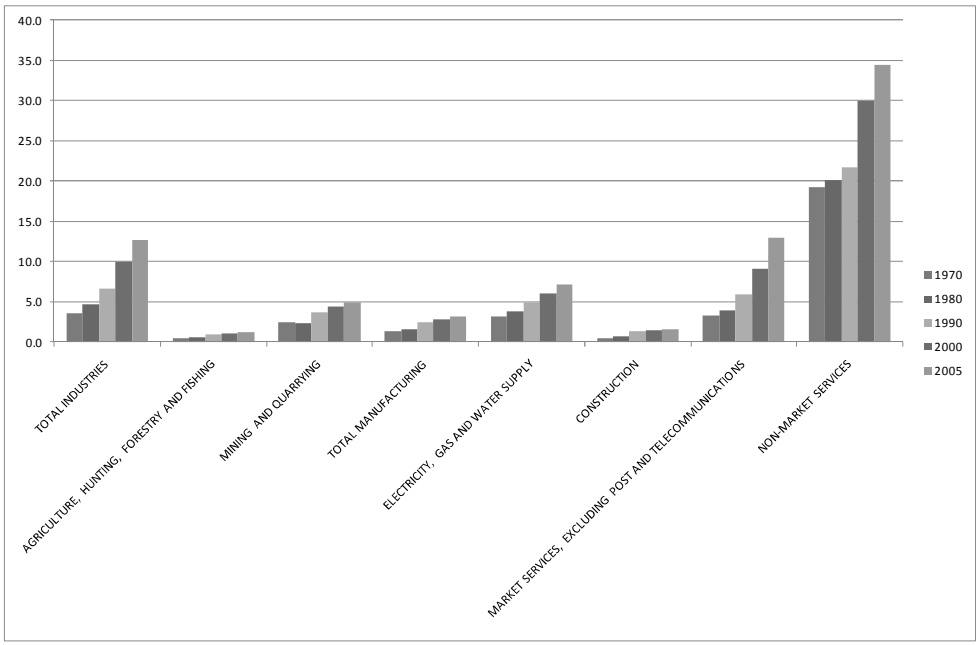
policies aimed at reducing public debt, translated into a sharp fall in domestic demand and imports, with beneficial effects on the trade balance until 1996. In the following years the downward trend has emerged again, mostly reflecting the problems of Italian exports in keeping pace with the growth of world demand. The modest recovery achieved in 2007-08 has already been cancelled by the effects of the global crisis. Recently released data for 2010 show that the normalised trade balance of the manufacturing industry has fallen back to 7%.So, other things being equal, a simple computation of the labour content of trade on the above data would lead us to conclude that the net effect of trade on manufacturing employment in Italy has been positive, even if its size has tended to shrink in the last fifteen years.

107. Turning to the structure of employment by occupation, a strong process of skill upgrading can be observed by looking at the share of hours worked by high-skilled persons engaged. These data are shown in Figure 5 for the main sectors of the Italian economy. It is clear that the process has accelerated since 1990 and has been particularly intense in the services sector, but is visible also in the manufacturing industry and in other sectors.

Figure 2.4. Normalised trade balance of the Italian manufacturing industry

Source: Based on OECD-STAN data.

Figure 2.5. Hours worked by high-skilled persons engaged as a percentage of total hours worked in Italy



Source: EU-KLEMS data base.

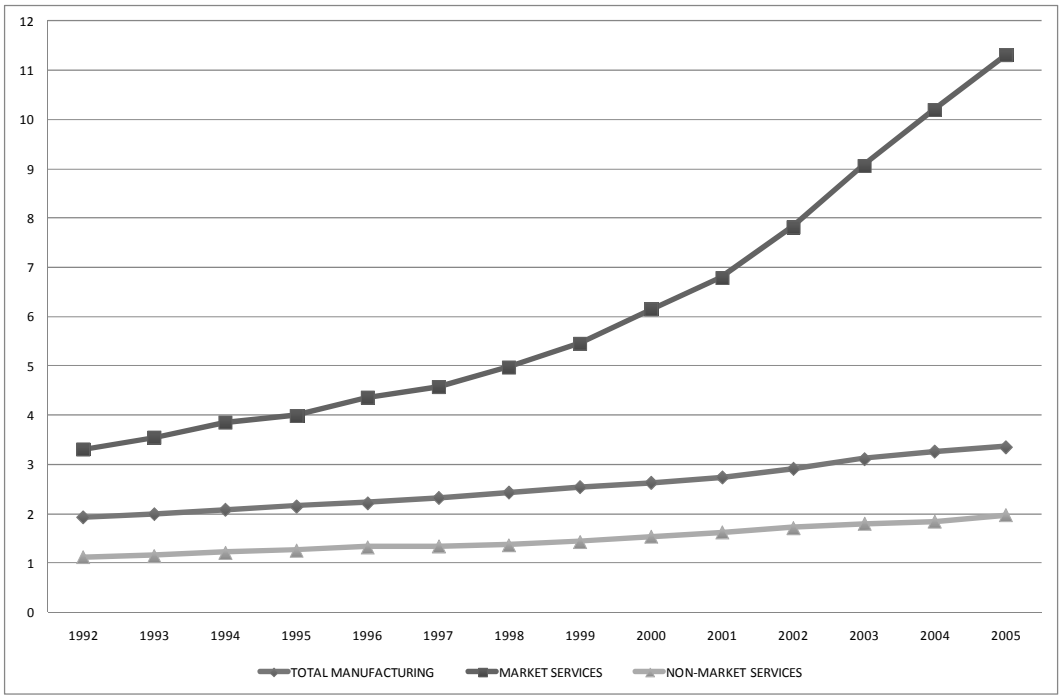
108. More recent data show, however, a partly different picture, revealing the impact of the global crisis on the occupational structure of employment (Table 2.1). The most qualified jobs, and particularly managers and technicians, have continued to expand their share of total employment until 2007, but have undergone a sharp contraction in the following three years. Nevertheless, the share of blue-collar occupations has continued to fall even during the crisis. The reshuffling of employment has favoured white-collar jobs and elementary occupations. Overall, these changes appear to be driven by sector-composition effects, confirming that the impact of the crisis has been more severe in the manufacturing industry, where the share of lower-skilled workers is larger.

109. The process of skill upgrading is clearly visible in the manufacturing industry, where the ratio between non-manual and manual employees rose on average by 17% between 2000 and 2007. Recent data confirm this trend. Considering only employees in the private sector,[41] the number of manual workers rose by 2.5% between 2006 and 2010, against an average growth rate of 4.5% for total employment. The crisis impacted manual workers more severely, with an employment loss of 7% between 2008 and 2010, than non-manual workers, whose total number rose by 1.5% in the same period.

110. Evidence of skill-upgrading emerges also in the dynamics of relative wages. The ratio between labour compensation and employment may be used to indirectly estimate the wage premium of high- to low-skilled workers. Figure 6 shows this indicator for the three largest sectors of the economy (*i.e.* total manufacturing, market services and non-market services) and suggests that wage inequality has risen substantially in the last two decades.

[41] These figures are based on INPS data on employees in the private sector, excluding agriculture and domestic workers.

Figure 2.6. Relative wages of high- to low-skilled workers in Italy
(Relative ratios between labour compensation and employment shares)



Source: Based on EU-KLEMS database.

111. This kind of data may be strongly affected by composition effects and does not allow for precise assessment of the dynamics of wages within each sector. More direct and recent data are available for the private sector, albeit only for a few years. Daily earnings of manual workers rose by 7% between 2006 and 2009, slightly less than the growth rate of earnings for the average of all occupations (8%).

112. Many different effects can explain the process of skill upgrading in employment and wages (Falzoni *et al.* 2007). Immigration tends to increase the wage premium of skilled workers because immigrants tend to be employed in low-skill occupations. The share of foreign workers over total employment, which had already grown from 2% to 4% over the 1990s, has continued to expand year after year, reaching 9% in 2010. Foreign workers' share of unskilled occupations was about 19% in 2010.

113. On the other hand, the increasing participation of women in the labour force may reduce wage gaps, because women have tended to be employed in low-wage jobs among skilled occupations and in high-wage jobs among blue-collar occupations. Actually women's share of total employment has continued to rise in the most recent years (from 39% to 40% between 2004 and 2010), but their share in manufacturing employment has fallen in the same period (from 29% to 27%), and the resulting effects on the wage gap are uncertain.

114. Another factor affecting the wage differential between skilled and unskilled workers is the age distribution of employees. Increasing shares of old workers result in higher wage premia for skilled workers. The ageing process of Italian employees has continued in the last few years, with the employment share of workers between 15 and 34 years falling from 34% to 27% between 2004 and 2010.

2.3. International specialisation and employment in Italy

115. The Italian economy is often characterised as a latecomer in economic development, with an intermediate position between developed and developing countries in terms of factor endowments and pattern of comparative advantages. Its international specialisation is concentrated in traditional sectors, which tend to be relatively more unskilled-labour-intensive than those in which Italy's main trading partners are specialised. This has led some observers to argue that the distributive effects of trade, as predicted by the Stolper-Samuelson model, could have been favourable to unskilled workers in the case of

Italy. However, this intermediate position was due to be challenged by recent developments in international economic integration. For instance trade liberalisation policies (the dismantling of the Multi-Fiber Agreement) affected traditional specialisation sectors of the Italian economy helping emerging countries to gain larger shares of world trade (Faini *et al.*, 1999).

116. In fact, recent changes in the Italian economy's trade specialisation pattern show clearly that its comparative advantage in traditional sectors producing consumer goods has weakened substantially, under the increasing competitive pressure of emerging countries. As a result, the Italian industry has further concentrated its specialisation in the mechanical industry and other "specialised-supplier" sectors, such as electrical machinery and apparatus. In the case of these sectors industrial districts of small- and medium-sized enterprises may still retain a significant lead and competition from emerging countries is less threatening than in traditional sectors.

117. Several indicators may be used for the analysis of trade specialisation patterns. In this paper, a net trade specialisation index (NTS) has been chosen, defined as follows:

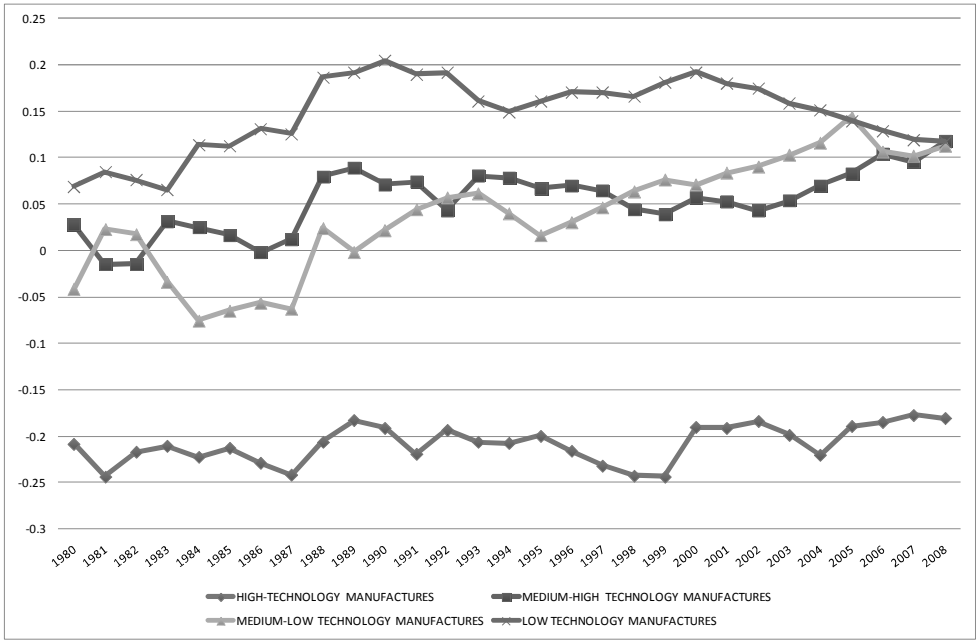
$$NTS_{i,s} = \frac{\left(\frac{X_{i,s}}{X_{i,q}} - \frac{M_{i,s}}{M_{i,q}}\right)}{\left(\frac{X_{i,s}}{X_{i,q}} + \frac{M_{i,s}}{M_{i,q}}\right)}$$

$$-1 \leq NTS_{ik} \leq 1$$

where X and M denote respectively exports and imports, i stands for the country, s for the sector and q for the sum of sectors.

118. This indicator, adapted from a measure of intra-industry trade specialisation proposed by Balassa and Bauwens (1988), has several advantages. First, unlike the well-known Balassa index of revealed comparative advantages (RCA), it is based on both exports and imports, giving a more comprehensive and theoretically well-founded measure of trade specialisation. Second, with respect to other net-trade indicators proposed in the literature (Lafay, 1992), it has a more straightforward interpretation as a measure of intensity of inter-industry specialisation as it does not depend on other variables, such as the size of the sector or its degree of openness (Iapadre, 2001).

Figure 2.7. Net trade specialisation indices of the Italian manufacturing industry



Source: Based on OECD-STAN data.

119. Figure 7 shows the trade specialisation pattern of the Italian manufacturing industry, classified in terms of technological intensity.[42] It is clear from the graph that the main qualitative features of Italy's specialisation pattern have remained unchanged since the early 1980s, and particularly the pronounced weakness in high-tech manufactures, which reflects the difficulty that large Italian firms face in gaining significant shares in international oligopolistic markets.

120. However, the comparative advantages and disadvantages of the Italian industry have changed over time. In particular, in the last decade, its specialisation in low-tech manufactures has been substantially eroded by the competitive pressure of emerging countries, whereas the comparative advantage in medium-technology sectors has strengthened. In other words, even from this relatively aggregate classification, a process of upgrading is clearly visible in the pattern of specialisation of the Italian economy. A more detailed picture of this evolution is given by Table 3.1, which displays the NTS index for 25 manufacturing industries.

121. Until the early 1990s, the sectors in which the Italian economy revealed the most intense specialisation were still traditional industries producing consumption goods, such as apparel, footwear and furniture. In the last two decades most of these sectors have undergone a sharp reduction of their comparative advantage, which has lowered significantly their ranking in the table. On the other hand, the machinery and equipment industry has emerged as the most important sector of specialisation, reinforcing an already strong position, partly based on the production of investment goods for traditional consumption industries. Specialisation indices have also improved in several sectors producing intermediate goods. Signs of change can be seen even in high-tech production. The amplification of comparative disadvantage in 'Office, accounting and computing machinery' has been offset by relatively better results in industries such as 'Medical, precision and optical instruments' and 'Aircraft and spacecraft'.

122. Most of these changes suggest the idea that the transformation of Italy's specialisation pattern is not only the passive result of the expansion of emerging countries, but is also partly driven by the process of international outsourcing carried out by many Italian firms in traditional sectors, which fosters exports of intermediate and investment goods within global production networks. However, this transformation raises concerns about the ability of medium-tech comparative advantage industries to absorb workers laid off by traditional labour-intensive sectors, nurturing the wide-spread fear that the process of tertiarisation observed in employment data might be more the result of a process of industrial decline, than a welfare-improving structural evolution of the Italian economy.

123. Considering data at industry level for the last decade, the idea that import competition has led to a fall in manufacturing employment does not find clear support. On aggregate, the number of full-time equivalent employees has remained virtually unchanged between 2000 and 2007 in the manufacturing industry (with a total increase of 25 thousand units, 0.6% of its initial level), whereas the import penetration rate[43] has risen from 28.6% to 31.3% in the same period. However, the data differ markedly across industries. Figure 8 shows the lack of a clear correlation between the annual growth rate of manufacturing employment and the average level of import penetration for 16 industries in the period from 2000 to 2007.

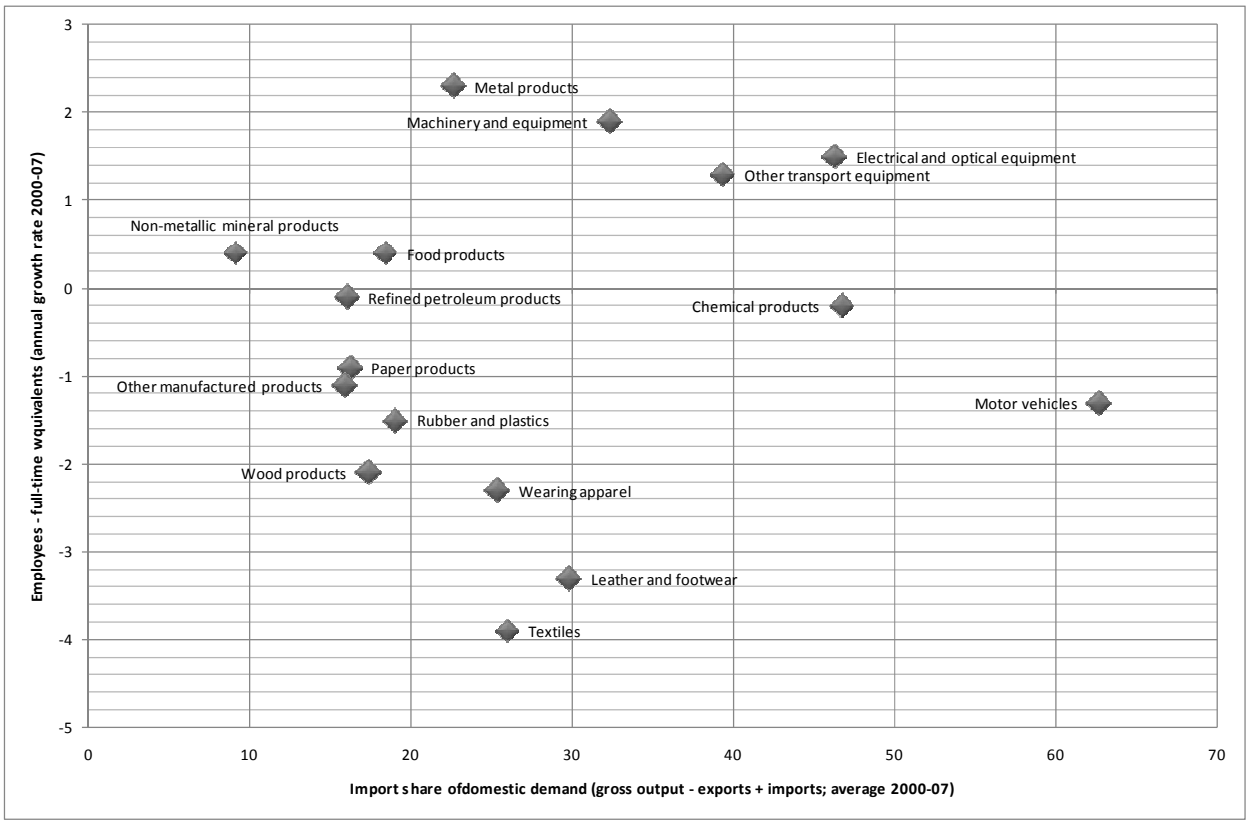
124. However, industries shown in Figure 8 tend to cluster into two groups, characterised by different structural features. The first group is made of scale-intensive and science-based industries, in which import penetration is sustained by the relatively large role of multinational corporations. Employment trends in this group appear relatively more favourable than in the second cluster, which includes mostly traditional sectors producing consumption and intermediate goods. Within each group, a negative

[42] The four classes of technological intensity are those available in the OECD-STAN database. See: http://www.oecd.org/dataoecd/5/30/40729523.pdf

[43] The import penetration rate is measured as the ratio between imports and domestic demand at current prices. Domestic demand is computed as apparent consumption (gross output – imports + exports).

correlation between employment growth and import penetration appears clearer, and interacts with other factors affecting structural change in the manufacturing industry.[44]

Figure 2.8. Import penetration and employment in the Italian manufacturing industry (2000-07)



Source: OECD-STAN database.

125. It has often been argued that the possible labour effects of trade stem mainly from the increasing penetration of developing countries' exports. From this standpoint, what matters is not only the domestic market, in which the share of imports from developing countries is still relatively low, but also foreign markets, where Italian firms compete directly or indirectly with manufactures produced in developing countries. Figure 9 shows clearly a negative correlation between employment growth in the Italian manufacturing industry and the average world export market share of developing countries.[45] In particular, textiles, clothing and leather are the three sectors in which employment has recorded the most severe losses, in the range between 2 and 4 percentage points per year.

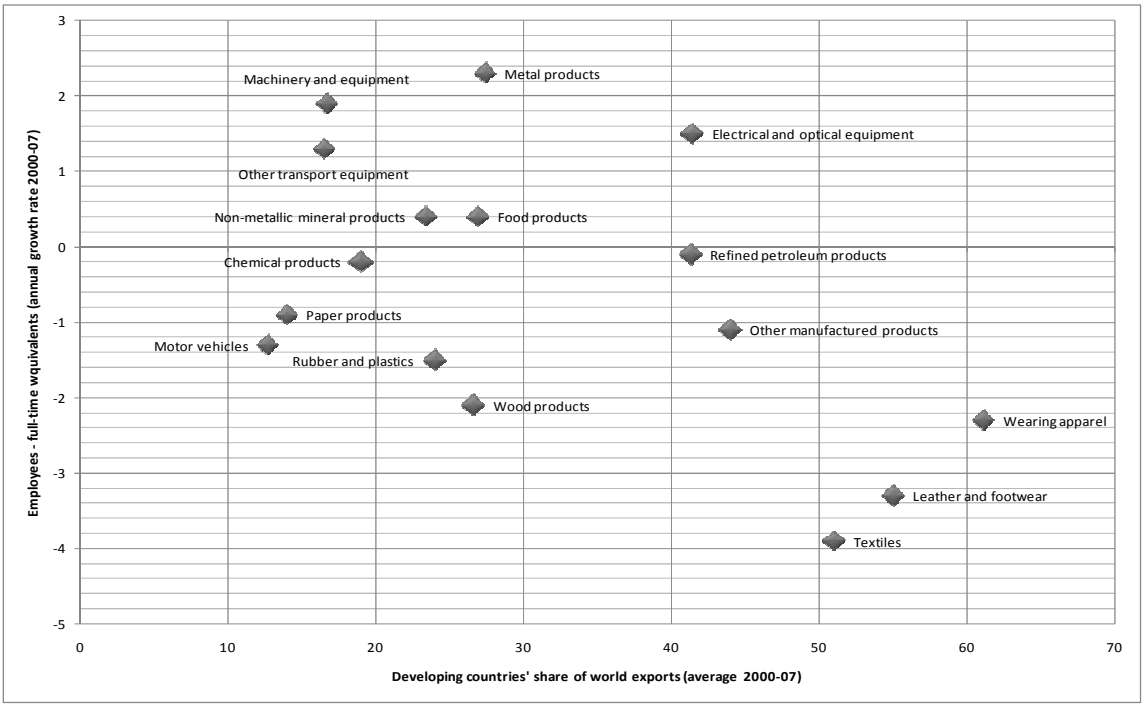
126. Of course, the fact that competition from emerging countries has created problems for traditional sectors in Italy should not be read as a sign of a harmful influence of trade on employment and wages at the economy-wide level. On the contrary, the downsizing of some industries might be seen as an adjustment of the economic system to the new features of international competition. As argued earlier, there are several reasons to believe that, to a certain extent, the lower specialisation in traditional sectors reflects the results of market strategies carried out by the most efficient Italian firms. First, many exporters have successfully tried to upgrade the quality of their production, targeting smaller but more remunerative market segments, where non-price competitiveness factors are more important. Second, a growing number of Italian firms has outsourced labour-intensive production tasks to foreign affiliates or independent partners in low-wage countries, concentrating domestic production in the most qualified segments of the

[44] There are also signs of a positive correlation between international openness and the increase in the employment share of skilled workers. Considering large firms, sectors in which this skill upgrading process was more pronounced tend to coincide with sectors characterised by the highest degree of international openness (trade-to-production ratio), with a linear correlation coefficient of 0.47 in the 2000-07 period.

[45] The linear correlation coefficient is - 0.52.

value-chain and reinforcing their competitiveness. Third, what emerges from the selection process elicited by international competition in traditional sectors is the most efficient and innovative group of firms. Even if their aggregate market share has shrunk, their competitive position appears more robust for the future.

Figure 2.9. Export market share of developing countries and employment in the Italian manufacturing industry (2000-07)



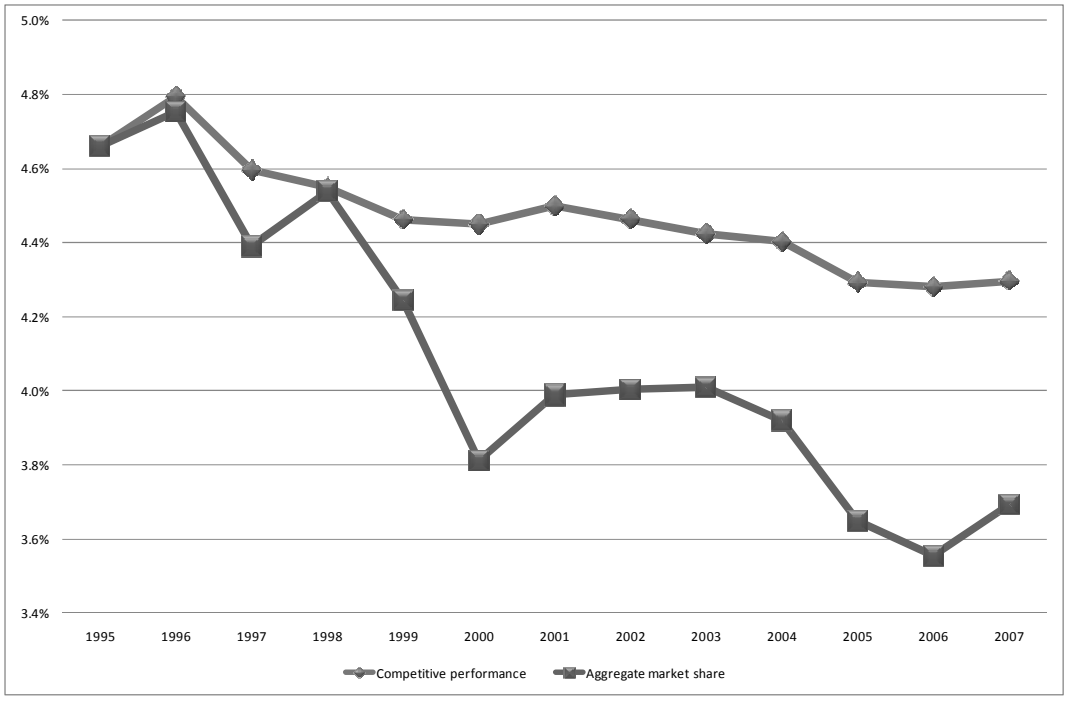
Source: OECD-STAN database and Istat-ICE. "Commercio estero e attività internazionali delle imprese", 2008 Yearbook.

127. However, particularly in the aftermath of the global crisis, what really matters is the ability of the Italian economic system to generate new employment opportunities in sectors other than those affected more intensely by the rise of emerging countries. This challenge concerns primarily the services sector, which needs to become more open to international competition in order to better exploit its potential. But this particular issue is relevant also for the manufacturing industry.

128. As argued earlier in the Introduction, the main reason for the long-lasting decline in the world market share of Italian exports, even in comparison with the rest of the euro area, lies in the dynamic inefficiency of their specialisation pattern, *i.e.* their concentration in products characterised by a relatively slow growth of world demand (Memedovic and Iapadre, 2010). Figure 10 presents the results of a very detailed 'constant-market-share analysis' (CMS) exercise, aimed at measuring the composition effects generated by this problem. The difference between the actual aggregate market share (in red) and the competitive performance at the level of individual markets for each product (in blue) measures the dynamic efficiency of specialisation. Net of this problem, the competitive performance of Italian exports would have been better than that of France and Germany between 1995 and 2007.

129. The correlation between the pattern of comparative advantage and the growth of world demand, which determines the dynamic efficiency of specialisation, may in turn be related to the income elasticity of exported products. In other words, the problems of Italian firms in export markets may be partly traced back to their inability to generate an adequate flow of product innovations, characterised by a high income-elasticity of demand. This calls into question, among other issues, the quality of human capital (Faini and Sapir, 2008), which entails the double challenge of raising the supply and the demand for high-skilled labour in the Italian economy.

Figure 2.10. Italy: CMS analysis of export performance (percentages at current prices)



Source: Drawn from Memedovic and Iapadre (2010) - based on BACI database.

2.4. Trade and employment in the Italian manufacturing industry: econometric evidence

130. This section presents the results of an econometric exercise aimed at estimating the effects of trade on employment in Italy in a panel of 15 sectors of the manufacturing industry[46] for the period from 1999 to 2008. Employment is measured by the number of hours worked by employees, as available in the OECD-STAN database, so as to take into account not only the number of employees but also changes in their working hours.

131. The trade variables used as regressors are different from the openness indicators prevailing in the literature surveyed in Section 2. As mentioned in Section 3, we prefer a measure of the competitive pressure exerted by developing countries, given by their share of world exports in each sector.[47] This choice allows us to focus the specification on the most challenging aspect of recent changes in the international economic scenario. The increasing share of world exports coming from developing countries may be considered as a variable measuring synthetically the effects of trade liberalisation policies, as well as of other important factors of international integration, such as the growth of foreign direct investment (FDI) and other forms of international production fragmentation.

132. Following the widely spread belief that the Italian industry's specialisation pattern is particularly vulnerable to the competition from lower-wage countries, we expect that a higher world export share of developing countries would negatively affect employment in Italy, other things being equal. On the other hand, employment growth is positively affected by the strength of a country's comparative advantage. Namely, high levels of specialisation according to its comparative advantage reveal that Italy may overcome the problems created by higher labour costs with non-price competitiveness factors.

[46] The sector of refined petroleum products has been excluded, because its data show an anomalous degree of variability over time, due to the effects of the large swings in oil prices.

[47] Export market shares are expressed at current prices. The necessary data has kindly been provided by the Italian National Institute of Foreign Trade (ICE) that maintains a data-base on world trade, combining UN COMTRADE with more up-to-date data provided by national statistical institutes through Global Trade Information Services (GTI). Tables on export market shares based on this data are regularly published in the ICE-Istat Yearbook on Foreign Trade and International Activities of Firms.

133. So, we include among the regressors the NTS index presented in Section 3, which measures revealed comparative advantages considering both exports and imports.[48] Of course, several other factors besides trade can affect employment. We have explicitly considered two of them.[49] The first is the growth rate of gross output at sector level, taking account of the impact of cyclical and sector variations in total demand (domestic and foreign) on employment.

134. The second factor is a measure of labour productivity, given by the ratio between value-added at constant prices and the number of employees (full-time equivalents). Its expected sign is negative, reflecting the combined effects of capital deepening, technical progress and business organisation improvements on the demand for labour.

135. So, our base econometric specification is as follows:

$$Log\ H_{s,t} = \alpha + \beta_1 * Log\ DCXS_{s,t} + \beta_2 * Log\ (NTS_{s,t} + 1) + \beta_3 * OG_{s,t} + \beta_4 * Log\ LP_{s,t} + \varepsilon_{s,t}$$

where H denotes hours worked by employees, $DCXS$ is the world export market share of developing countries, NTS the net trade specialisation index, as defined in Section 3,[50] OG is the growth rate of output, and LP denotes labour productivity, as defined above, with subscript s referring to 15 sectors of the Italian manufacturing industry and subscript t to years from 1999 to 2008.

136. Moreover, following Ebenstein *et al.* (2009), we consider separately the possible negative employment impact of production off-shoring by Italian manufacturing firms. We understand that this impact may be partly captured by our measure of competitive pressure from developing countries. However, there are two reasons to believe that off-shoring should be included separately in the regression. First, for any given degree of competitive pressure, a higher level of employment off-shoring by Italian firms reveals a more cogent need to shift labour-intensive activities abroad. Second, horizontal FDI into other developed countries is mostly motivated by the market-access advantages of a direct presence in the host economy. Inasmuch as this kind of FDI replaces exports, it may exert a negative impact on employment in Italy, regardless of the competitive pressure from developing countries. Our measure of off-shoring is given by the number of employees in foreign affiliates of Italian manufacturing firms, by sector ($FAE_{s,t}$).[51]

137. Furthermore, a dynamic specification for the three variables related to international integration has been considered in order to control for possible delays in the transmission of their effects on employment. These variables have been lagged by one year (see also Ebenstein *et al.*, 2009).

138. The results of our estimates are shown in Tables 4.1 and 4.2. All the variables show the expected sign and are statistically significant. As already suggested by the negative correlation shown in Figure 9, the competitive pressure from developing countries exerts an adverse effect on manufacturing employment in Italy. The elasticity is, however, relatively low. Moreover, after controlling for the effect of employment off-shoring, which is also negative and significant, the size and the significance of the *DCXS* variable are reduced.

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[48] As an alternative to the NTS index, we have also tried to include export propensity, measured as the ratio between exports and gross output at current prices, but the results have been statistically less significant.

[49] Other important factors should be considered, including immigration and demographic trends affecting the growth of the labour force, as well as changes in institutions, regulations and industrial relations. However, most of these factors are hardly measurable, and even when some indicators are available, they do not cover all relevant aspects and are not differentiated by sector. In an unreported econometric exercise, we have also included time dummy variables in the estimated equation, in order to capture the effects induced by these processes. The results are however not statistically significant.

[50] Since NTS ranges from – 1 to 1, it has been augmented by 1, so that its logarithm is defined over the entire range.

[51] This data is drawn from the Reprint database, maintained by ICE, and is also included in the OECD database on *Measuring Globalisation – Activities of Multinationals*.

139. This result should not be taken as evidence of an overall negative effect of trade on employment in Italy. Rather, the opposite appears to be true.

140. The net trade specialisation index shows a strong positive effect. Sectors in which the Italian manufacturing industry reveals the most intense comparative advantages tend to have a better employment performance. As shown in Section 3, these sectors are no longer limited to traditional low-tech industries producing consumption goods, which have undergone a sharp reduction of trade specialisation and employment in the last decade. Instead, they increasingly tend to concentrate in the medium-high-tech grouping, and particularly in the production of machinery and equipment.

2.5. Trade and wages in Italy: a micro-level analysis

141. As mentioned in Section 2, recent trends in the structure of wages in Italy are difficult to detect and explain. Sector data give contrasting signals depending on the source used and on the aggregation level of the analysis. This suggests the possibility that composition effects hide the underlying trends of disaggregated data. More importantly, wage levels are strongly influenced by the individual characteristics of workers (gender, age, instruction, and so on), so that their distribution within each sector is characterised by a high degree of variability, and any analysis conducted on sector averages fails to capture the most important sources of their variance. This explains why a growing literature is trying to use linked employer-employee micro-data to better understand the dynamics of wages and factors affecting it, including trade. Following this approach, we present here the results of a micro-econometric analysis aimed at assessing the effects of trade competition on the growth and structure of wages in the Italian manufacturing industry.

2.5.1. Presentation of the data

142. In the following analysis we merge data from two different sources. The first is a micro database that contains individual level information on workers in Italy for the period 1997-2003, while the second one includes data defined at the sector level, similar to those used in Section 4 to study trends in employment. Data for workers are drawn from an administrative database provided by INPS. It is a panel[52] employer-employee dataset, which contains for each worker individual information such as age, gender, occupation, workplace, date of beginning and end of the current contract (if any), worker status (part-time or full-time), real gross yearly wage, and the number of weeks worked. As for the firms, there is the plant location, the number of employees and the sector.[53] The units of analysis are dependent workers in the manufacturing industry, both part-time (converted into full-time equivalents) and full-time. Here we consider males and females, aged between 15 and 64 and employed in blue-collar and white-collar occupations. The final sample includes 74,334 workers with 309,437 observations.

143. We use data at sector level to define control and interest variables that will be included in the econometric specification. Two of them are the same variables used in Section 4, namely developing countries' (DCs) shares of world exports, and labour productivity.[54] However, we use here a different indicator of trade specialisation, which may be computed for each of the 20 Italian regions, so that our analysis can take the territorial dimension of specialisation also into account.[55] In particular, we build an index of regional export specialisation ($RXS_{r,s}$) defined for every year as:

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[52] The panel version was constructed considering only one observation per year for each worker. For those workers who have more than one observation per year we selected the longest contract in terms of weeks worked. We also eliminated the observations below (above) the 1st (99th) percentile of the wage distribution.

[53] The sector classification is based on ATECO, the Italian version of the European nomenclature, NACE. We consider here 17 manufacturing sectors.

[54] Labour productivity is defined here at sector level as the ratio between real value-added and the number of hours worked.

[55] Unlike the NTS index used in Section 4, the RXS index does not consider imports in the measurement of revealed comparative advantages. This choice is made necessary by the fact that the regional distribution of

$$RXS_{r,s} = \frac{\left(\frac{X_{r,s}}{X_{r,q}} - \frac{X_{b,s}}{X_{b,q}}\right)}{\left(\frac{X_{r,s}}{X_{r,q}} + \frac{X_{b,s}}{X_{b,q}}\right)}$$

$$-1 \leq RXS_{r,s} \leq 1$$

where *r* stands for the region, *b* for all other regions (Italy except for region r), *s* for the sector and *q* for the sum of sectors. This index varies between – 1 and 1 and its range is not affected by the size of the region or of the sector considered[56].

2.5.2. Econometric analysis

144. In order to assess the impact of trade competition on wages in the Italian manufacturing industry, we perform an individual-level random-effects estimate, where we regress each worker's wages on the DCs' share of world exports, our measure of export specialisation and a set of control variables. The econometric specification is as follows:

$$Log\ w_{i,t} = \alpha + \beta_1 * DGender_{i,t} + \beta_2 * Age_{i,t} + \beta_3 * AgeSq_{i,t} + \beta_4 * DBC_{i,t} + \beta_5 * Log\ Firmsize_{i,t} + \\ + \gamma_1 * Log\ DCXS_{s(i),t} + \gamma_2 * RXS_{r(i),s(i),t} + \gamma_3 * Log\ LP_{s(i),t} + \lambda_a + \delta_t + \varepsilon_{i,t}$$

where *i* refers to the individuals, *s* to sectors, *r* to regions, *a* to areas and *t* to time. The dependent variable in the regression is the (log) real gross weekly wage in euro.[57] The individual level control variables are $Age_{i,t}$, age squared ($AgeSq_{i,t}$), a female dummy ($DGender_{i,t}$) and a blue-collar dummy ($DBC_{i,t}$). *Log* $DCXS_{s(i),t}$ is the (log) developing countries' share of world exports, $RXS_{r(i),s(i),t}$ is the index of regional export specialisation, *Log* $LP_{s(i),t}$ is the (log) hourly labour productivity, while *Log* $Firmsize_{i,t}$ is the proxy for firm heterogeneity. Finally λ_a are dummies that control for area effects (five macro-areas in Italy: Northwest, Northeast, Centre, South and Islands), while δ_t are time dummies which control for the business cycle.

145. Table 5.1 shows the results. Column (1) refers to all workers. There is a statistically significant negative impact of the competitive pressure from developing countries on the wages of Italian workers. In particular, the estimated elasticity of wages with respect to *DCXS* is equal to -1.7%. At the same time, this negative effect may be offset by the export comparative advantages revealed by the worker's region. In other words, workers who are employed in areas of highly specialised economic activity tend to receive a higher remuneration. All our control variables have the expected sign. Wages show a concave curvature with respect to age. The female and blue-collar workers dummies negatively impact wages. The effect of labour productivity and firm size turns out to be positive and significant.

146. Our individual worker data also allow us to investigate the relationship between trade and wage inequality across different occupations. To this purpose we have obtained separate estimates for blue-collar and white-collar workers. Their results appear in columns (2) and (3) of Table 5.1. The negative wage impact resulting from the competitive pressure from developing countries turns out to be significantly higher for blue-collar- (with an estimated elasticity of -2.2%) than for white-collar workers (-1.1%), which suggests that trade competition increases the relative demand for skilled labour and widens the wage gap. Nonetheless, both categories of workers are harmed by the competition from developing countries. On the other hand, the impact of regional export specialisation is confirmed to be positive and significant for both occupation categories. Even from this perspective, however, trade seems to contribute

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imports is less significant than that of exports for the analysis of territorial specialisation. Trade intermediaries account for a large share of imports and their customers are often located outside the boundaries of their region.

[56] Our *RXS* index is an adaptation of the symmetric revealed comparative advantage index proposed by Dalum, Laursen and Villumsen (1998) in order to overcome the limitations of the traditional Balassa index.

[57] Wages have been deflated using the consumer price index for blue- and white-collar worker households (FOI). The base year is 2002. See: http://en.istat.it/prezzi/precon/

to widening of the wage gap. The estimated elasticity of wages with respect to regional specialisation is higher for white-collar (1.9%) than for blue-collar workers (1%).

147. To sum up, our initial analysis suggests that the increase of the DCs' share of world exports affects negatively wages in the Italian manufacturing industry and this impact is higher for blue-collar workers. However, it could be argued that these estimates do not consider two important issues. First, wage adjustments to changes in trade competition are not instantaneous. Second, as suggested in Ebenstein *et al.* (2009), within a given year, trade exposure and wages could be affected by simultaneous shocks, thus biasing previous estimates. In order to address these issues we perform the same estimates using lagged values for the variables of interest. In particular we regress the (log) real weekly wages on the 1-year lagged values of the (log) DCs' share of world exports, regional export specialisation index and hourly productivity variables. All the other variables remain the same. Table 5.2 shows the results of this estimation.

148. The wage effects of trade exposure appear even more clearly once taking into account a one-year adjustment lag. In fact, in comparison to our non-lagged estimates for all workers, the elasticity of wages with respect to DCs' shares of world exports increases in magnitude from -1.7% to -2%. Moreover, this increase concerns both blue-collar- and white-collar workers, even if the elasticity difference between the two categories remains the same (1.1%). As for the regional export specialisation index, results are similar between lagged and non-lagged estimates. However, its positive wage impact becomes higher in magnitude for white-collar workers (2.2%) and lower for blue-collar workers (0.8%), suggesting that the widening effect of trade on the wage gap is not simultaneous.

149. A further step in the analysis is to control for a possible interaction between the DCs' share of world export and the regional export specialisation variable. This is interesting since a positive interaction between the two variables would reinforce the conclusion that the negative impact on wages due to the competitive pressure from DCs can be reduced in those regions and sectors where the level of export specialisation is higher.

150. In order to perform such an analysis, we convert our *RXS* index into a categorical variable, to be interacted with the *DCXS* variable. Therefore, we split observations into two categories (low and high specialisation level) on the basis of the median of the (time average of) *RXS* in the database. Then, we repeat the regressions presented in Table 5.1, this time including the interaction term between DCs' share of world exports and a dummy indicating a high level of regional export specialisation. Results of this analysis are shown in Tables 5.3 and 5.4 for current and one-year lagged variables, respectively. As we can see, our two trade variables continue to be significant and with the expected sign. In addition, the coefficient of their interaction term is positive and significant. In particular, this interaction effect is equal to 0.8% (Column (1), Table 5.3) for all workers and, again, it is higher for white-collar (1.5%) than for blue-collar workers (0.5%). These results are also confirmed in Table 5.4, where interaction terms are again positive and significant, just slightly reduced in magnitude. So, our findings confirm the idea that in regions and sectors, where the level of export specialisation is higher, the negative impact of trade competition by DCs on wages is attenuated.

2.6. Labour policies and international integration

151. Overall, the econometric evidence presented in the previous sections suggests, in line with theoretical predictions and previous findings reported elsewhere, a positive role of trade specialisation on employment and wages in the Italian manufacturing industry. Simultaneously, our results confirm that increasing competition from developing countries may exert negative pressure on both variables. Moreover, production off-shoring by Italian firms seems to reduce manufacturing employment at the sector level. Even if these negative outcomes were considered as short-term problems that need to be tackled in order to reap larger benefits stemming from international economic integration, their social costs cannot be neglected. In fact, these costs may be calling into question the ability of the Italian social security system to assist workers displaced by international competition and facilitate their search for a new job. This section will address the issue of labour policies in Italy from the perspective of their role in supporting trade adjustment. After an overview of the main limitations of the Italian social security

system, we will discuss the problems created by a sizable informal economy, and will conclude by presenting elements of social security system reform, required to increase its ability to assist workers displaced by international competition.

2.6.1. Labour policies and trade adjustment in Italy

152. The Italian system of social protection lacks a specific instrument for "trade displaced workers".[58] It is a complex set of differentiated provisions, which has grown without a consistent design, and has not been significantly improved by the labour policy reforms carried out in the last two decades. It includes several forms of income protection for workers who are in the process of losing or have lost their jobs. Among the most important are the ordinary and special wage supplements (*Cassa integrazione guadagni*), regular and reduced unemployment benefits, mobility allowances for dismissed workers, and job-security agreements providing for a reduction in the working hours and pay of a company's employees in order to prevent collective dismissals.[59]

153. In comparison with other EU countries, the Italian social protection system is weaker and somewhat peculiar. In 2005, public expenditure for unemployment subsidies and active labour policies amounted to 0.6% of GDP against an EU-15 average of 1.5%. More importantly, several qualitative features of Italian labour market policies impair their ability to address social problems created by trade competition (Sestito, 2008).

154. From this perspective, the most important problem is the weak linkage between benefits associated with social protection and measures aiming at promoting the search for a new job. Labour policy reforms in Europe have tended to strengthen the conditions required to remain entitled to public assistance, whereas in Italy the administration of unemployment support has been gradually separated from the management of active labour policies. As a result, the benefit system provides workers with little direct incentive to look actively for a new job.

155. A second problem is the wide differentiation in the treatment of various categories of workers. For instance, workers in industrial enterprises with more than 15 employees are entitled to the full benefits of a series of temporary measures (wages supplementation benefits, mobility allowances), which, however, may be easily cumulated over time. Others receive weak and short-lived support. There are also many so-called non-standard workers, formally not recorded as employees, who are not entitled to any form of assistance. As a result, the system is both iniquitous and inefficient because its relatively most generous benefits accrue where they are less needed, that is to workers who were already enjoying the advantages of open-ended contracts in large firms, and discourage the inter-sector mobility of workers.

156. A third structural flaw of Italian labour policies is the recurrent habit to augment existing measures with additional provisions, which are presented as temporary derogations for special circumstances, but *de facto* tend to become permanent. The reason is that policy makers find it easier to refinance these existing provisions than to tackle a comprehensive reform of the system. This is a convoluted way to offset the budgetary limitations of the system, which increases its distortions and further impairs the financial linkage between contributions and benefits.

157. Lastly, it has been observed that the Italian social security system, regardless of its size, does not play the expected cycle-stabilising role. This is due to the fact that most of its instruments are targeted at offsetting periodic shortfalls of labour demand, such as those related to seasonal variations in production,

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[58] Italian authorities have however made use of the recently established European Globalisation Adjustment Fund (EGF). Italian requests amounted to 12.5% of total requests between 2007 and June 2010 (European Commission, 2010). Financed requests amount to about €35 million and are aimed at assisting about 6,000 textile workers in four Italian regions.

[59] A detailed description of the system (in Italian) may be found at: http://www.lavoro.gov.it/Lavoro/md/AreaLavoro/AmmortizzatoriSociali. Some information in English is available at: http://www.eurofound.europa.eu/eiro/studies/tn1004019s/it1004019q.htm

or give priority to long-term unemployment and industrial restructuring processes, more than to cyclical demand swings.

158. It might be argued that this problem is more relevant from a macro-economic perspective than for trade adjustment. Workers displaced by international competition tend to concentrate in a limited number of traditional manufacturing sectors, giving rise to long-term adjustment problems, which do not exhibit a cyclical pattern. However, trade represents also a powerful international transmission channel of cyclical instability, as shown clearly by the recent global crisis and the following recovery. So, a higher elasticity of social security expenditure with respect to the macro-economic cycle could be of help also to smooth the adjustment process in sectors more exposed to trade competition.

159. In fact the Italian system of wage supplements, notwithstanding its quantitative and qualitative limitations, has played a partial shock-cushioning role during the crisis. [60] The rise in the official unemployment rate (from 6.1% to 8.4% between 2007 and 2010) would have been much higher without this system, which has allowed many firms to reduce the labour input without firing workers. An indicator of labour underutilisation, including the work hours covered by wage supplementation payments as well as the number of discouraged workers, is estimated two percentage points higher than the official unemployment rate (Bank of Italy, 2011, p. 32). Moreover, the use of non-standard job contracts, made easier by labour policy reforms of the last two decades, has become relatively more important. In 2010 fixed-term and part-time jobs rose respectively by 1.4% and 5%, whereas the total number of employees fell by 1%.

160. The problem is that, as already mentioned, the Italian social security system does not cover the entire labour force. Non-standard employees do not enjoy the same level of wage support as full-time workers with open-ended contracts, and are not entitled to the same unemployment benefits (Berton *et al.*, 2009). So, the burden of the adjustment to macro-economic shocks, such as the recent crisis, as well as to structural changes induced by trade competition falls predominantly on the shoulders of the weakest part of the labour force.

2.6.2. Informal employment and social protection

161. As argued in the previous section, in addition to the partial protection granted to standard workers by the Italian social security system, non-standard labour contracts, notwithstanding their limitations, may be considered a second-tier cushion against adverse employment and wage shocks. The large shadow economy growing beside and interacting with regular productive activities seems to offer a further adjustment mechanism, by providing displaced workers with employment and/or income maintenance opportunities. On the other hand, the very existence of an informal economy distorts the functioning of market competition and jeopardises the sustainability of the social security system. More importantly, even if conceptually clear (Castells and Porter, 1989), the border between informal and illegal activities is spongy in the real economy, and their interconnection is one of the most important factors impairing growth and societal progress.

162. The size of the informal economy in Italy is notoriously large, well above the average of developed countries. According to Schneider (2005) estimates, the GDP share of the shadow economy in Italy rose steadily until 1997-98 and declined only marginally in the following years, down to 26.2% in 2002-03, to be compared with an OECD average of 16.4%t. More recent estimates (Schneider *et al.*, 2010) show that the size of the shadow economy has not changed significantly since 2001, fluctuating near 27% until 2007, to be compared with a weighted average of 13.4% for high-income OECD countries in 2005.

163. Official estimates of the informal economy, based on a different method, are regularly published by the Italian National Institute of Statistics (Istat). The most recent release (Istat, 2010) shows that the

[60] As a response to the crisis, the application of the wage supplementation scheme and mobility allowances was extended to enterprises previously excluded, such as industrial firms with fewer than 15 employees. However this extension was provided as a new temporary 'derogation' to existing rules and many non-standard employees continue to be excluded from the system.

employment share of the informal economy has been gradually growing from 11% to almost 14% in the 1980-90s.[61] A sharp fall of this indicator was recorded between 2001 and 2003, as a result of new regulations facilitating the legalisation of unrecorded contracts with immigrant workers. In the following years the upward trend has resumed, up to a level of 12.2% in 2009. The number of informal jobs remained substantially constant between 2007 and 2009, whereas the number of full-time equivalent labour units fell by more than 750 thousand (3.4%), which shows the inability of the informal economy to absorb workers displaced by the crisis.

164. These estimates reveal the limited effectiveness of the policies pursued so far in reducing the incentives to perform economic activities outside the legal system. This applies to measures aimed at repressing illegal practices as well as to programmes targeted at reducing the cost of going formal. The latter may produce some important short-term results, as shown by the legalisation of immigrant jobs in 2002-03, but fails to address the structural roots of the problem.

165. Tax and social contribution burdens as well as restrictive regulations on business activities and the poor quality of public administration are widely considered the most important factors explaining the size of the shadow economy. Informal employment agreements may be deemed necessary by firms to reduce their labour costs and tax base, as well as to circumvent complex and costly regulations. So, the incentives feeding informal employment are the same that explain tax avoidance and evasion. To a certain extent, their strength might be abated through a reduction of the fiscal burden on firms. However, given the current situation of public finance in Italy, this would be difficult to engineer since it would require a politically difficult increase of tax pressure on financial rents. In addition, a simplification and liberalisation of rules on business activities might be of further help. Although each of these measures may be desirable, none are individually able to structurally reduce the weight of the informal and illegal economy, unless public authorities can better enforce existing rules and sanction their violation (Bovi, 2005). Even worse, the use of tax and social contribution amnesties, which has been so frequent in Italy, undermines the credibility of any measure designed to increase the cost of violating laws. On the other hand, a purely repressive strategy would also fail to achieve its targets Instead, a comprehensive reform of public administration, involving a significant cost reduction and improvement of the quality of services, is needed. From the perspective of trade adjustment policies, downsizing the relative size of the informal economy remains essential to generate the resources needed to finance the social security system as well as to preserve a well-functioning competition market and reinforce the incentives for welfare-improving structural change.

2.6.3. The Italian social security system and international integration: prospects for reform

166. In the previous section we argued that the Italian social security system is iniquitous and inefficient, and that reliance on the informal economy not only may not offset these limitations, but may exacerbate problems. Now we will present some general principles that could guide a reform process in order to allow the system to address the trade-related adjustment issues more effectively.

167. A necessary premise is that there is no compelling argument for an additional instrument specifically targeting trade adjustment. International integration is a multi-faceted process and its effects on employment and wages are channelled not only through trade, but also through FDI and other forms of international production fragmentation as well as through migration. Furthermore, the wave of skill-biased technical and organisational innovation contributing to the widespread fall in the relative demand for unskilled labour may also be traced back to the intensification of international competition. So, it could be very difficult to identify trade-displaced workers within the entire set of job losers. Moreover, an additional trade adjustment assistance instrument would add to the already high complexity and diversification of the social security system and could potentially work as a catalyst to reinforce political pressures against trade liberalisation (Sestito, 2008).

[61] The sharp difference with respect to Schneider's estimates might be partly due to the fact that Istat method does not consider the grey area of informal agreements with officially recorded workers, for working hours and rewards going beyond contractual provisions.

168. Even though introducing a new tool may not be optimal, it does not imply that the current system should not be reformed. On the contrary, the problems created by international competition in certain sectors and regions in Italy are serious, as shown in the previous sections of this paper. There is, therefore, a clear need for improved labour policies.

169. The first priority is clearly the removal of existing discriminations and the establishment of a universal system of unemployment subsidies, covering standard and non-standard contracts. This will require a reduction of the benefits currently granted to the most protected sectors of the labour force. If implemented, it would, however, ensure that the most vulnerable workers, who are often severely harmed by external competition, receive the assistance they deserve. Of course, a universal system will not prevent any sector from building its own *additional* benefit scheme, but this will have to be completed paid for by firms wishing to use it.

170. Another important criterion is financial sustainability, based on a medium-run contributions-payments equilibrium. It will have to be applied at the aggregate level, but also individually, so that the duration and the size of the benefits are proportional to past contributions and subject to precise conditionality criteria. Access to the benefits should be possible only after reaching a minimum threshold of working hours, which is necessary not only for the financial sustainability of the system, but also to generate incentives to work.

171. Moreover, continued receipt of the benefits should be made conditional on serious efforts to search for a new job, which requires measures and resources to strengthen the control activities of public employment offices. Indeed, this is one of the most important aspects of any reform design. Instead of competing with private firms in employment-matching services, the public administration should concentrate its resources in monitoring the system and ensuring that the most vulnerable sections of the labour force are not excluded from the necessary assistance. In this context, any specific issue related to trade displacement could be taken duly into account by the public administration, while avoiding further fragmenting the system with an additional subsidy scheme.

2.7. Summary and conclusions

172. This paper has attempted to analyse to what extent the increasing international integration of the Italian economy has affected its economic performance, with particular reference to employment and wages. The main insights that have been drawn from the descriptive and econometric evidence presented in the previous sections may be summarised as follows.

173. Before the global crisis, notwithstanding the sluggishness of production and the decline of export market shares, employment had continued to grow in Italy and the unemployment rate had significantly fallen. This was partly the result of regulatory reforms, which facilitated the absorption of a rising labour supply, including a growing fraction of immigrant workers. However, the Italian economy has remained fragile, due to its longstanding structural problems, and the impact of the crisis has been harsher than in other developed countries, making the current recovery slower and uncertain.

174. Although rising substantially in the last decades, the degree of international openness of the Italian economy is still lower than in other European countries of similar size. Its growth is curbed, among other factors, by the increasing weight of the services sector, which is structurally less open than the manufacturing industry.

175. Following a common pattern among developed countries, the GDP and employment shares of the manufacturing industry have declined in the last decades, in a context of rising international integration. Manufacturing trade balance has remained in surplus, sustaining the growth of employment, but its net labour content has become smaller over time.

176. Driven also by demographic factors, a strong trend of skill upgrading has affected the structure of employment. The relative demand for unskilled labour has fallen in all sectors, increasing wage gaps between different occupations.

177. These changes might be partly interrelated with a recent evolution in the international specialisation pattern of the Italian manufacturing industry. Under the increasing competitive pressure exerted by developing countries, traditional comparative advantages in low-technology consumption sectors have substantially weakened, and were replaced by a more intense specialisation in industrial machinery and other sectors producing intermediate and investment goods. Industries more exposed to competition from developing countries have undergone the sharpest falls in employment.

178. This structural transformation is not only the unavoidable implication of changes in the 'international division of labour' between developing and developed countries, but also the result of market strategies carried out by Italian firms, and particularly by the most competitive medium-sized enterprises that are emerging from the selection process elicited by international competition. However, these changes have not been strong enough so far to overcome the structural problems limiting the growth of the Italian economy, and in particular the 'dynamic inefficiency' of its specialisation pattern, concentrated in products characterised by a lower income elasticity of demand. This calls into question the ability of the Italian economic system to generate sufficient product innovation, which in turn depends on the quality of its human- and knowledge capital. A related problem concerns the services sector, where an increase in openness and competition would be necessary to generate the high-skilled jobs that could sustain the growth prospects of the Italian economy.

179. A more precise assessment of the employment and wage effects of international integration on the Italian manufacturing industry has been offered by our econometric exercises. The first one has confirmed that trade specialisation has played a positive role in sustaining the growth of employment in the last decade, offsetting the negative impact of the competitive pressure from developing countries and of production off-shoring by Italian firms.

180. The second group of estimates, based on a large panel of data on workers characteristics, gives similar results for wages. After controlling for a set of individual worker characteristics, firm size and labour productivity, we find again that the competitive pressure from developing countries exerts a negative impact on wage growth, which may, however, be more than offset by the export specialisation of the region in which workers are located. Nevertheless, both of these trade-related variables (competition from developing countries and export specialisation) tend to increase wage gaps between white-collar and blue-collar workers.

181. The Italian case, therefore, seems to confirm that international economic integration, while generating important static and dynamic benefits, requires a flexible and efficient social security system, able to assist workers displaced by external competition as well as by any other kind of structural change.

182. The current system looks iniquitous and ineffective. Most of the non-standard-contract workers, who have been impacted more severely by trade competition and by the global crisis, are not covered by any form of assistance. The large informal economy existing in Italy is not able to solve this problem. Rather, its presence and the interconnections between legal and illegal activities threaten the financial sustainability of labour policies and obscure the growth and progress prospects of the Italian society.

183. Only a comprehensive reform of the social security system, inspired by principles of universal access, medium-term financial equilibrium, and a proper design of individual incentives, may help workers displaced by international integration, without jeopardising the substantial economic and social benefits associated with trade.

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TABLES

Table 2.1. Employment by occupation - percentage shares

Occupation		2004	2005	2006	2007	2008	2009	2010
managers, professionals and technicians		34,4	34,1	36,1	36,9	36,2	35,0	34,1
managers, professionals and technicians	legislators, senior officials and managers	4,7	4,6	5,0	4,9	4,7	4,3	4,0
	professionals	10,1	9,9	9,7	10,0	10,4	10,3	10,0
	technicians and associate professionals	19,6	19,6	21,4	21,9	21,1	20,4	20,1
white collar		27,0	27,1	26,3	26,2	26,8	27,5	28,1
white collar	clerks	11,3	11,4	10,6	10,3	10,8	11,0	11,4
	service workers and shop and market sales workers	15,7	15,7	15,7	15,9	16,1	16,5	16,7
blue collar and craft and related trades workers		28,2	28,2	27,5	27,1	26,9	26,8	26,4
blue collar and craft and related trades workers	skilled agricultural and fishery workers and craft and related trades workers	19,1	19,1	18,6	18,3	18,6	18,8	18,4
	plant and machine operators and assemblers	9,1	9,2	8,9	8,8	8,3	8,0	7,9
elementary occupations		9,2	9,4	9,0	8,8	9,1	9,7	10,3
armed forces		1,2	1,1	1,1	1,1	1,0	1,1	1,1
total		100,0	100,0	100,0	100,0	100,0	100,0	100,0

Source: Istat Labour Force Survey - Istat database

Table 2.2. Net trade specialisation indices of the Italian manufacturing industry

	1980-81	1990-91	2000-01	2007-08
FOOD PRODUCTS, BEVERAGES AND TOBACCO	-0,41	-0,31	-0,16	-0,10
TEXTILES	0,23	0,37	0,35	0,23
WEARING APPAREL, DRESSING AND DYING OF FUR	0,51	0,51	0,30	0,19
LEATHER, LEATHER PRODUCTS AND FOOTWEAR	0,69	0,62	0,38	0,29
WOOD AND PRODUCTS OF WOOD AND CORK	-0,58	-0,49	-0,40	-0,44
PULP, PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING	-0,26	-0,14	-0,15	-0,06
COKE, REFINED PETROLEUM PRODUCTS AND NUCLEAR FUEL	-0,12	-0,21	-0,01	0,29
CHEMICALS EXCLUDING PHARMACEUTICALS	-0,32	-0,34	-0,29	-0,24
PHARMACEUTICALS	-0,01	-0,25	0,00	-0,11
RUBBER AND PLASTICS PRODUCTS	0,25	0,25	0,25	0,26
OTHER NON-METALLIC MINERAL PRODUCTS	0,47	0,48	0,51	0,43
IRON AND STEEL	0,04	-0,04	-0,12	-0,08
NON-FERROUS METALS	-0,73	-0,63	-0,58	-0,42
FABRICATED METAL PRODUCTS, except machinery and equipment	0,43	0,44	0,42	0,43
MACHINERY AND EQUIPMENT, NEC	0,34	0,43	0,41	0,44
OFFICE, ACCOUNTING AND COMPUTING MACHINERY	-0,15	-0,13	-0,47	-0,65
ELECTRICAL MACHINERY AND APPARATUS, NEC	0,06	0,11	0,07	0,15
RADIO, TELEVISION AND COMMUNICATION EQUIPMENT	-0,37	-0,38	-0,25	-0,35
MEDICAL, PRECISION AND OPTICAL INSTRUMENTS	-0,33	-0,22	-0,16	-0,06
MOTOR VEHICLES, TRAILERS AND SEMI-TRAILERS	-0,19	-0,13	-0,19	-0,16
BUILDING AND REPAIRING OF SHIPS AND BOATS	0,30	0,04	0,44	0,37
AIRCRAFT AND SPACECRAFT	-0,17	0,03	-0,05	0,28
RAILROAD EQUIPMENT AND TRANSPORT EQUIPMENT NEC	0,50	0,26	0,16	0,17
MANUFACTURING NEC; RECYCLING	0,62	0,63	0,59	0,44

Source: Based on OECD-STAN data.

Table 2.3. Fixed Effects Estimations. Dependent Variable: Log of Hours Worked by Employees

DC World Export Share	-0.080**	-0.044*
	[0.038]	[0.087]
Net Trade Specialization Index	0.666***	0.609***
	[0.114]	[0.118]
Foreign affiliate employees		-0.036***
		[0.012]
Output Growth	0.284**	0.339**
	[0.117]	[0.107]
Labour productivity	-0.454***	-0.556***
	[0.110]	[0.106]
Constant	7.629***	8.221***
	[0.459]	[0.469]
N. Observations	150	150
R^2	0.43	0.45

Notes: ***, ** and * denote significance at 1%, 5% and 10%.
Robust standard errors in parenthesis.

Table 2.4. Fixed Effects Estimations. Dependent Variable: Log of Hours Worked by Employees

L. DC World Export Share	-0.056*	-0.033*
	[0.030]	[0.018]
L. Net Trade Specialization Index	0.600***	0.594***
	[0.118]	[0.120]
L. Foreign affiliate employees		-0.036***
		[0.012]
Output Growth	0.428***	0.525***
	[0.117]	[0.117]
Labour productivity	-0.516***	-0.612***
	[0.112]	[0.119]
Constant	7.908***	8.459***
	[0.457]	[0.516]
N. Observations	135	135
R^2	0.42	0.46

Notes Notes: ***, ** and * denote significance at 1%, 5% and 10%.
Robust standard errors in parenthesis.

Table 2.5. Random Effects Estimations. Dependent Variable: Log of Real Weekly Wage

	All workers	Blue Collars	White Collars
	(1)	(2)	(3)
LDC Export Share	-0.0173***	-0.0220***	-0.0106***
	[0.0015]	[0.0016]	[0.0035]
Specialization Index	0.0125***	0.0101***	0.0194***
	[0.0021]	[0.0022]	[0.0048]
Female Dummy	-0.2201***	-0.1922***	-0.2641***
	[0.0024]	[0.0025]	[0.0054]
Age	0.0234***	0.0217***	0.0490***
	[0.0005]	[0.0005]	[0.0012]
Age Squared	-0.0002***	-0.0002***	-0.0003***
	[0.0000]	[0.0000]	[0.0000]
Blue collar dummy	-0.2955***		
	[0.0024]		
Firm Size	0.0351***	0.0330***	0.0327***
	[0.0004]	[0.0004]	[0.0010]
Productivity	0.1696***	0.1757***	0.1246***
	[0.0042]	[0.0045]	[0.0087]
Constant	5.0889***	4.8093***	4.6949***
	[0.0181]	[0.0184]	[0.0381]
Area and Time dummies	yes	yes	yes
N. Observations	309,437	230,283	79,154
N. Individuals	74,334	56,758	19,622
R^2	0.51	0.36	0.42

Notes: ***, ** and * denote significance at 1%, 5% and 10% respectively.
Robust standard errors in parenthesis.

Table 2.6. Random Effects Estimations. Dependent Variable: Log of Real Weekly Wage

	All workers	Blue Collars	White Collars
	(1)	(2)	(3)
L.LDC Export Share	-0.0200***	-0.0248***	-0.0144***
	[0.0016]	[0.0017]	[0.0036]
L.Specialization Index	0.0122***	0.0081***	0.0225***
	[0.0023]	[0.0023]	[0.0051]
Female dummy	-0.2221***	-0.1933***	-0.2650***
	[0.0025]	[0.0026]	[0.0054]
Age	0.0232***	0.0214***	0.0492***
	[0.0006]	[0.0057]	[0.0014]
Age Squared	-0.0002***	-0.0002***	-0.0004***
	[0.0000]	[0.0000]	[0.0000]
Blue collar dummy	-0.3111***		
	[0.0025]		
Firm Size	0.0350***	0.0325***	0.0346***
	[0.0004]	[0.0004]	[0.0011]
L.Productivity	0.1719***	0.1774***	0.1274***
	[0.0046]	[0.0048]	[0.0093]
Constant	5.0938***	4.8022***	4.6951***
	[0.0197]	[0.0200]	[0.0412]
Area and Time dummies	yes	yes	yes
N. Observations	263,146	195,625	67,521
N. Individuals	70,327	53,352	18,633
R^2	0.51	0.36	0.42

Notes: ***, ** and * denote significance at 1%, 5% and 10% respectively. Robust standard errors in parenthesis.

Table 2.7. Random Effects Estimations. Dependent Variable: Log of Real Weekly Wage

	All workers	Blue Collars	White Collars
	(1)	(2)	(3)
LDC Export Share	-0.0209***	-0.0240***	-0.0192***
	[0.0018]	[0.0019]	[0.0041]
Specialization Index Dummy	0.0124***	0.0066*	0.0286***
	[0.0034]	[0.0035]	[0.0081]
DSpec*LDC Export Share	0.0075***	0.0046**	0.0154***
	[0.0020]	[0.0022]	[0.0047]
Female dummy	-0.2199***	-0.1919***	-0.2639***
	[0.0024]	[0.0025]	[0.0054]
Age	0.0234***	0.0217***	0.0491***
	[0.0005]	[0.0005]	[0.0012]
Age Squared	-0.0002***	-0.0002***	-0.0004***
	[0.0000]	[0.0000]	[0.0000]
Blue collar dummy	-0.2955***		
	[0.0024]		
Firm Size	0.0352***	0.0332***	0.0330***
	[0.0004]	[0.0004]	[0.0010]
Productivity	0.1694***	0.1753***	0.1252***
	[0.0043]	[0.0045]	[0.0087]
Constant	5.0793***	4.8060***	4.6636***
	[0.0182]	[0.0186]	[0.0386]
Area and Time dummies	yes	yes	yes
N. Observations	309,437	230,283	79,154
N. Individuals	74,334	56,758	19,622
R^2	0.51	0.36	0.42

Notes: ***, ** and * denote significance at 1%, 5% and 10% respectively. Robust standard errors in parenthesis

Table 2.8. Random Effects Estimations. Dependent Variable: Log of Real Weekly Wage

	All workers	Blue Collars	White Collars
	(1)	(2)	(3)
L.LDC Export Share	-0.0229***	-0.0266***	-0.0211***
	[0.0019]	[0.0020]	[0.0042]
L.Specialization Index Dummy	0.0124***	0.0077**	0.0250***
	[0.0036]	[0.0038]	[0.0087]
L.(DSpec*LDC Export Share)	0.0059***	0.0039*	0.0119**
	[0.0021]	[0.0023]	[0.0048]
Female dummy	-0.2220***	-0.1932***	-0.2649***
	[0.0025]	[0.0026]	[0.0054]
Age	0.0232***	0.0214***	0.0493***
	[0.0058]	[0.0006]	[0.0014]
Age^2	-0.0002***	-0.0002***	-0.0004***
	[0.0000]	[0.0000]	[0.0000]
Blue collar dummy	-0.3111***		
	[0.0025]		
Firm Size	0.0352***	0.0327***	0.0348***
	[0.0004]	[0.0004]	[0.0011]
L.Productivity	0.1718***	0.1773***	0.1276***
	[0.0046]	[0.0048]	[0.0093]
Constant	5.0876***	4.7990***	4.6799***
	[0.0199]	[0.0202]	[0.0418]
Area and Time dummies	yes	yes	yes
N. Observations	263,146	195,625	67,521
N. Individuals	70,327	53,352	18,633
R^2	0.51	0.36	0.42

Notes: ***, ** and * denote significance at 1%, 5% and 10% respectively. Robust standard errors in parenthesis

PAPER 3.

AGRICULTURAL TRADE AND EMPLOYMENT IN SOUTH AFRICA

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Abstract*

This report provides an overview of policy changes in South African agriculture over the past three decades, and of some of the associated impacts on output, trade patterns and employment. In agriculture, the story is one of widespread substitution of labour for capital. While the sector has shed more than a million jobs over the past four decades, the paper highlights its continuing role as an employment creator in rural areas, albeit mainly in low-wage occupations. As for its principal analytical contribution, this paper considers future trade liberalisation in the agricultural sector. Using two different economic models, we find a remarkably consistent pattern whereby agricultural trade liberalisation in the region is predicted to increase agricultural employment.

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Executive Summary

The linkages between agricultural trade and employment in South Africa have to be assessed against the background of the significant agricultural reform process over the last ten to twelve years as well as the legacy of the policies and resulting institutional framework inherited from the apartheid era. By the late 1970s the racial segregation of South African agriculture was complete, subsidization of commercial farming peaked and the productive base of the farming sector in the homelands ceased to provide any meaningful income opportunities to all but a handful of farmers. By the end of the 1990s, the deregulation of domestic agricultural markets as well as the liberalisation of trade was all but complete.

However, despite reformist policies such as land reform and institutional restructuring, the sector remained divided: on the one hand, commercial (largely white) farmers faming on privately owned land, and on the other hand, small-scale subsistence (exclusively black) farmers in the communal areas. There are fewer than 40,000 commercial farms overall. While fewer than 2,500 farmers produce more than half the total output, well over 1.2 million are subsistence farmers. The latter represent a wide range of farming systems, with a few commercial farmers and mostly homestead gardens. Where employment data for agriculture do exist, it is almost always for the commercial farmers only. This, combined with the poor quality of employment data, complicates analysis of the linkages between reform and employment in the sector. The principal policy dilemma in this case is that reforms designed to improve productivity in agriculture are at odds with the policy of trying to decrease rural unemployment and, thus, poverty.

Other reforms in the post-apartheid era have included the introduction of minimum wages and improved employment conditions for farm workers; the deregulation of the Control Boards that were responsible for interventions in the agricultural market; substantial liberalisation of international trade; and the withdrawal of a large proportion of the farmer support services provided to commercial and small-scale farmers alike. While these reforms took place after South Africa became a signatory to the Marrakech Agreement, the country unilaterally lowered most of its tariffs in agriculture to well below the bound rates of the Agreement on Agriculture. There are two consequences of the comprehensive shifts in policy that are important: the change in the agricultural production portfolio of the country and the shift in trade patterns.

Since 1965-67 animal production has generally maintained its relative share of total agricultural production (40%) and, given the nature of South Africa's agricultural resources with only some 17% of the available agricultural land suitable for cultivation, this is to be expected. However, the relative share of different kinds of animal products has shifted over this period, with the production and consumption of red meat stagnating and being replaced by the increasing production of poultry meat. Horticulture has increased its share of production by 10 percentage points to 27% at the expense of field crops (with historical highs of 49.5% in 1980 and historical lows of 24.1% in2005). This increased horticultural production is especially apparent in the case of fruit and wines that experienced exceptional growth.

It is the demand-pull from an increase in exports of horticultural products that is driving the relatively faster growth in their production. This, in turn, has influenced the agricultural trade balance of the country, although it is a striking feature of South African agricultural exports that there have been limited overall changes in its export portfolio and destination for several decades. Conversely, equally influential on the other side of the agricultural trade balance has been the dramatic increase in soybean-oil cake for poultry feed: from R195 million in 1996 through to R2.4 billion in 2010.

While the employment levels are notoriously difficult to enumerate, (given the presence of seasonal labour, etc.), the trend is unambiguous: agriculture has shed about a million workers over the past four decades. Employment on farms fell by 50% or 800,000 workers from 1968 to 2003 in the period prior to democratization and the significant agricultural reforms. Nevertheless, since 2003 almost another 200,000 employment opportunities have been lost in primary agriculture. There are some signs of improvement, but many of the newly created employment opportunities are limited to seasonal workers during harvest in the orchards and vineyards and, thus, remain volatile. One encouraging feature is that the hiring and firing patterns seem to be gender neutral.

Reviews of the linkages between trade liberalisation and poverty reduction in South Africa have attracted considerable attention over recent years. There are no conclusive answers except that liberalisation alone was not sufficient to reduce unemployment and poverty, especially not amongst the unskilled and rural poor. This is partly because the poor are largely disconnected from the formal sector, partly because economic and export growth has not created employment anyway and finally, because liberalisation is still seen as incomplete by some.

The recent initiative of South Africa's Trade Policy and Strategy Framework identifies the government's major national development goals as, *inter alia*, employment creation, economic growth, poverty reduction, industrial development and restructuring, and the promotion of high value-added exports. However, the key question about the impact of trade liberalisation on growth, employment and poverty is a complex and largely unanswered one. The *process* of trade liberalisation is well-documented and straightforward. The *extent* of liberalisation is equally well-documented, but not universally accepted. Most difficult to assess has been the *impact* of trade liberalisation in South Africa on trade, employment, prices and productivity, and this is especially true for assessing the impact of trade liberalisation on growth and poverty. Researchers have argued that the political economy questions surrounding the distortions created by the apartheid era are particularly important for the rural sector where production became increasingly capital- and skill-intensive following liberalisation (contrary to the initial expectations that there would be an increase in employment of the abundant low-skilled labour).

This paper uses two different computer models to assess the impact of liberalisation on employment in the agricultural sector. While they are different, with different underlying assumptions and structures, they both indicate a positive relationship between liberalisation and employment in the sector, in contrast to the empirical evidence over recent years. Perhaps the post-apartheid adjustment has largely taken place in the agricultural sector and, therefore, the past may not be an accurate indicator of the future in South African agriculture.

The GTAP model suggests increases in agricultural employment in the primary sector of around 1% and of 1.5% in the secondary sector. This is in response to general output price increases of around 0.5% in the agricultural sector. The PROVIDE model also gives an employment increase of 1.5%, based upon the latest numbers of persons employed in agriculture. Importantly this job increase is orientated towards females and the increase in non-white household income is double that of white household income.

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3.1. Introduction

184. South Africa represents an interesting yet frustrating case study of the relationship between trade and employment in the agricultural sector. It is an interesting case because there has been considerable liberalisation of agricultural trade since 1994, and frustrating because of the poor quality of employment data. This latter aspect is exacerbated by the dualistic nature of agricultural production, with fewer than 40,000 commercial farms (mostly white-owned, and where fewer than 2,500 farmers produce more than half the total output), and well over 1.2 million subsistence farmers. The latter are almost exclusively black, live in the former homeland areas, and represent a wide range of farming systems, with a few commercial farmers and mostly homestead gardens. Where employment data for agriculture do exist, it is almost always for the commercial farmers only.

185. Yet the relationship between trade and employment in agriculture is an important one, not least because agriculture has been earmarked to contribute a million of the 5 million jobs that the government has promised under its new economic initiatives. A better sense of the strength of this link will assist in deciding on priorities for the sector, especially if the relationship between trade, economic growth, employment and poverty alleviation can be investigated further.

186. To this end this report starts with an overview of policy implementation in South African agriculture over the past three decades, and of some of the consequences of the rather radical policy shifts that have taken place. The emphasis here is on the impact of the policy changes on output and trade patterns. This is followed by an overview of the available employment data for primary agriculture in South Africa. Here, the story is one of widespread substitution of labour for capital. While the sector has shed more than a million jobs over the past four decades, it continues in its unique position as an employment creator in rural areas, albeit mainly in low-wage occupations.

187. Sections 4 and 5 constitute the analytical part of the report. Here we start by examining the work that has been undertaken in South Africa looking at trade liberalisation and employment and poverty, and find that much of this work has concentrated upon the latter. The general conclusion is that trade liberalisation alone is not sufficient to reduce unemployment and poverty. We then employ two different economic models to assess future trade liberalisation in the agricultural sector and find a remarkably consistent pattern whereby agricultural trade liberalisation in the region is predicted to increase agricultural employment. Section 6 offers a summary.

3.2. Deregulation of South African agriculture

188. A short overview of the process of deregulation of South Africa's agricultural sector is necessary in order to better understand the patterns of trade in agricultural products that have resulted. This process of reform has been well-researched (see *e.g.* van Zyl *et al.,* 2001; Vink and Schirmer, 2002; Vink, 2003; Sandrey and Vink, 2006;), and regularly updated, inter alia in a recent OECD working paper (Sandrey and Vink, 2008) and World Bank publication (Kirsten *et al.*, 2009). What follows is a concise version, updated where possible.

189. The racial segregation of South African agriculture was complete by the 1970s: subsidization of commercial farming peaked and the productive base of the farming sector in the homelands ceased to

provide any meaningful income opportunities to all but a handful of farmers. In the period around 1980, however, farm policy started to change. Deregulation started outside the sector, with financial sector deregulation, which marked the beginning of a long period of devaluation of the currency and increased interest rates. The result was severe pressure on farm inputs (which have a relatively large import component) as well as credit. Furthermore, many controls over the movement of labour were lifted by the mid-1980s, setting in motion vast population movements to the towns and cities. Finally, considerable microeconomic deregulation took place, leading to a significant increase in activity in the informal economy, including the increase in informal marketing of farm products in the urban areas.

190. Within the sector, there were a wide range of policy shifts, which included a start in the tariffication of some trade protection for farm commodities; deregulation under the Marketing Act of 1968 and other legislation; a reduction in the implicit subsidy represented by income tax concessions to farmers; and a decrease in direct budgetary expenditure on agriculture.

191. Thus, the 1980s were marked by attempts to improve the efficiency and viability of the commercial farming sector and happened largely in the interest of fiscal sustainability within the existing institutional framework. This changed with the first democratic election of 1994. The most important policy initiatives taken since include: trade liberalisation, land reform, institutional restructuring in the public sector, the promulgation of the Marketing of Agricultural Products Act and the Water Act as well as labour market policy reforms. South Africa's trade regime for agriculture changed when the quantitative restrictions, specific duties and price controls, import and export permits and other regulations in place under the old Marketing Act were replaced by tariffs after South Africa became a signatory to the Marrakech Agreement. However, South Africa also unilaterally lowered most of its tariffs in agriculture to well below the bound rates of the Marrakech Agreement.

192. The three most important trade relations in the Southern African region include the Southern Africa Customs Union (SACU), which exhibits the deepest level of integration, the Southern African Development Community (SADC), and the South Africa-Zimbabwe bilateral agreement. Of the extra-regional influences, the Cotonou preferences[62] (and the on-going Economic Partnership Agreement negotiations) of the European Union (EU), the Africa Growth and Opportunity Act (AGOA) of the United States, and South Africa's separate bilateral Trade, Development and Cooperation Agreement (TDCA) with the EU are most influential.

193. The consequences of these comprehensive shifts in policy have been extensively reported (see Vink, 2003). Here we summarise this research, focusing on the change in the agricultural production portfolio and the shift in trade patterns.

3.2.1. Agricultural output and composition

194. South African agriculture is at times heavily influenced by weather occurrences (Figure 3.1.). As a resource-poor country, South Africa is especially plagued by droughts, though these are often localized. However, the current period (*i.e.* since the first fully democratic elections in 1994) is unusual, as there has not been a country-wide drought, in contrast to severe country-wide droughts in 1966, 1982-84 and 1992-93. The sector is also highly exposed to global markets: farmers receive no subsidies and trade at the borders has been substantially liberalized. Hence, a peak in the value of output is evident in 2002, when the Rand was at its weakest against the major international currencies.

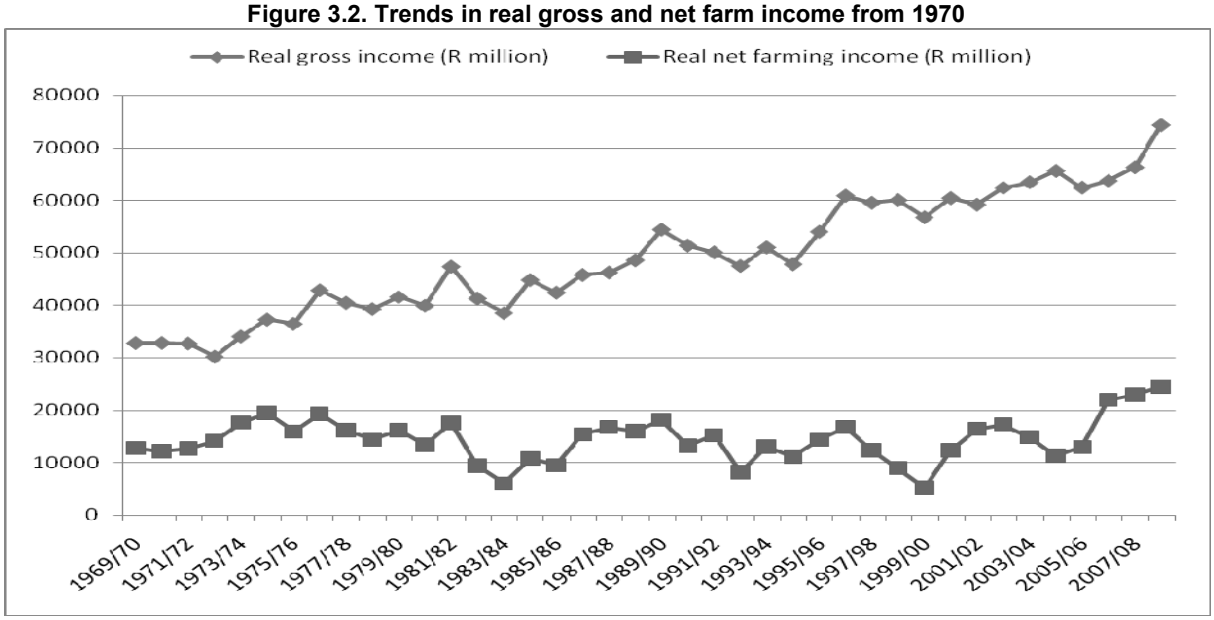
[62] South Africa is a contracting party of the Cotonou Agreement, but not all the provisions apply to the cooperation between South Africa and the EC (see Protocol 3 of the Cotonou Agreement). Further information can be obtained at the European Commission's EuropeAid website: http://ec.europa.eu/europeaid/where/acp/overview/cotonou-agreement/index_en.htm

Figure 3.1. The contribution of agriculture to GDP since 1911

Source: Adapted from DAFF, 2010. *Abstract of Agricultural Statistics*. Pretoria, National Department of Agriculture, Forestry and Fisheries

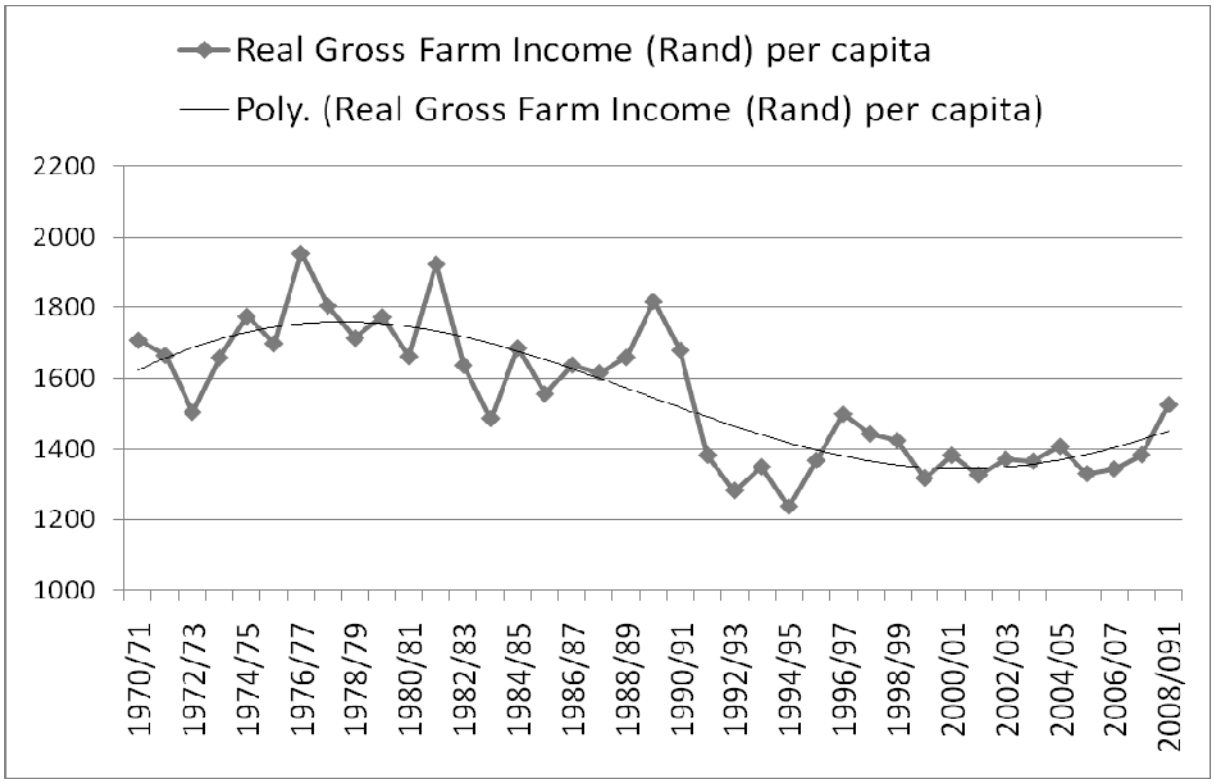
195. Figure 3.2. shows the trends in real gross and net farm income over the past four decades. Real gross farm income has increased from around R30 billion (with the year 2004-05 as the base year) in 1970 to over R70 billion in 2008-09. During that time, real net farm income (defined as gross farm income minus depreciation, salaries and wages, interest, and rent) has remained stagnant. The growth in real gross farm income took place during a period where the South African population increased from around 20 million (1970) to some 49 million people (2009). Figure 3.3. shows that the growth in production was not sufficient to keep pace with population growth until the middle of the 1990s. This coincides with the democratisation process, accompanied by trade liberalisation and internal market deregulation in agriculture.

Figure 3.2. Trends in real gross and net farm income from 1970



Note: Base year = 2004-05
Source: Adapted from DAFF, 2010. *Abstract of Agricultural Statistics.* Pretoria, National Department of Agriculture, Forestry and Fisheries.

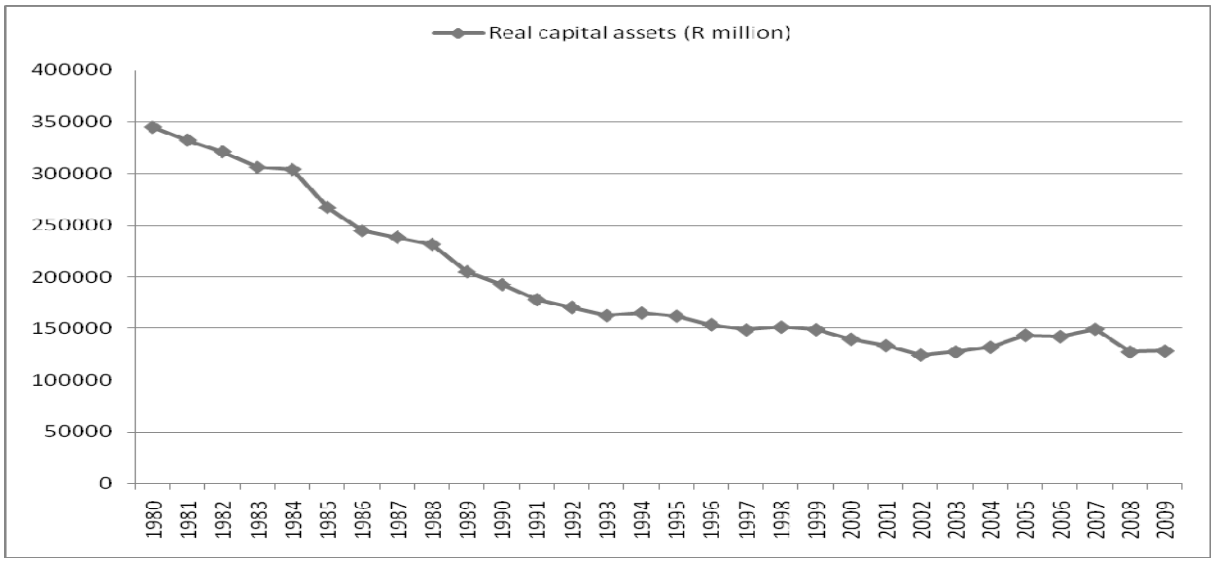
Figure 3.3. Real gross farm income per capita since 1970-71 (Rand)



Source: Adapted from DAFF, 2010. *Abstract of Agricultural Statistics*. Pretoria, National Department of Agriculture, Forestry and Fisheries.

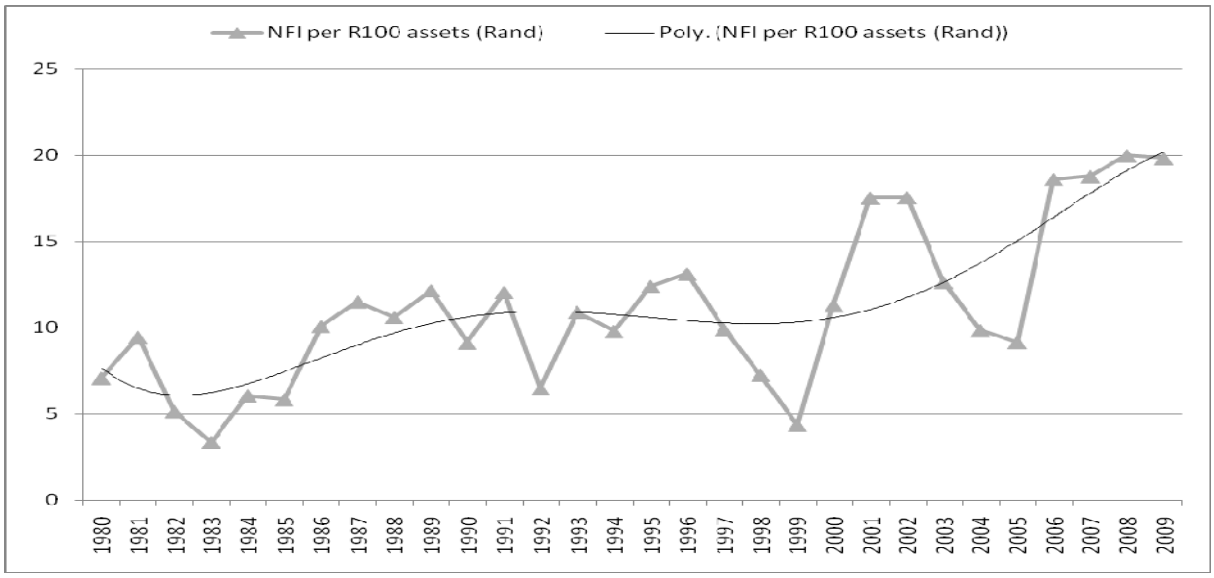
196. The stagnation in real net farm income should be seen in perspective: Figure 3.4. shows that the value of capital assets in agriculture declined rapidly until 2002, when nominal land prices recovered with the upsurge in inflation and the increase in net farm income that resulted from the collapse of the exchange rate. The result (Figure 3.5.) was that the amount of real net farm income generated from each R100 in assets increased in the second half of the decade, a reflection of improved efficiency in the use of capital.

Figure 3.4. The real value of capital assets on commercial farms



Source: Adapted from DAFF, 2010. Abstract of Agricultural Statistics. Pretoria, National Department of Agriculture, Forestry and Fisheries.

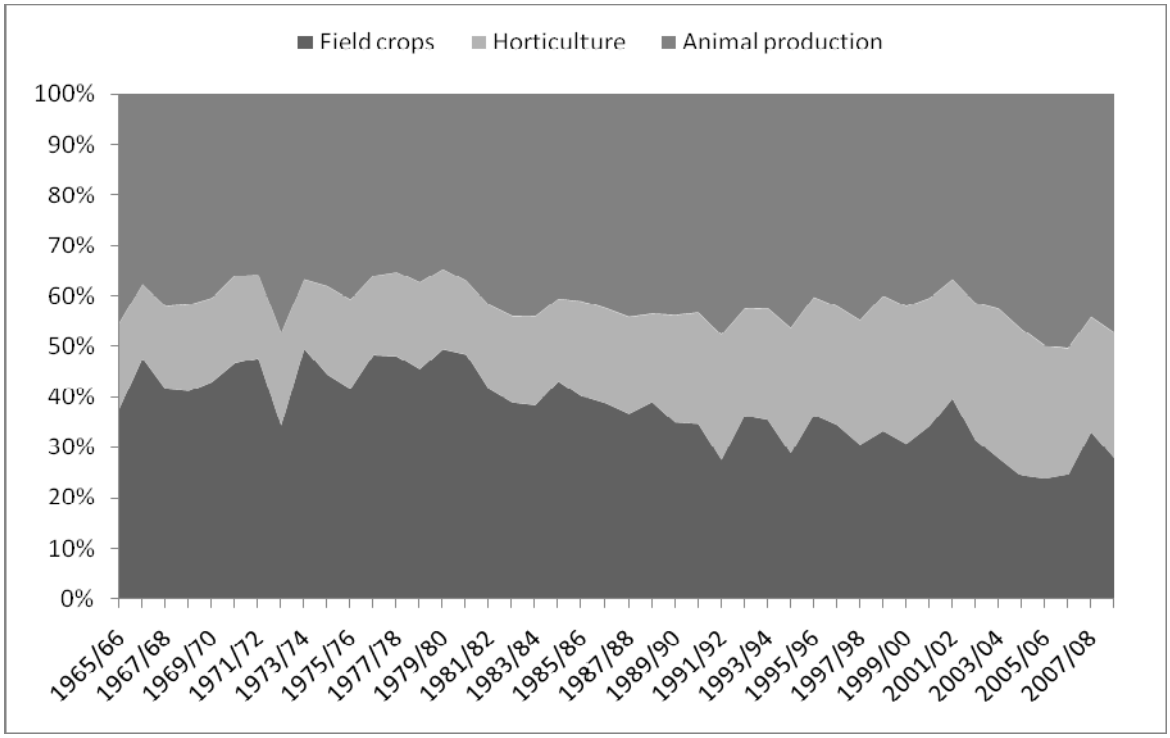
Figure 3.5. Net farm income generated from R100 in capital assets



Source: Adapted from DAFF, 2010. Abstract of Agricultural Statistics. Pretoria, National Department of Agriculture, Forestry and Fisheries.

197. Animal production has maintained its relative share (more than 40%) of total agricultural production over the period 1965 to 2009, as can be expected of a semi-arid country like South Africa, where only 17% of the available agricultural land is suitable for cultivation. However, the relative share of different kinds of animal products has shifted over this period: the production and consumption of red meat has stagnated, while the production of poultry meat has increased considerably. Horticulture has increased its share of production by 10 percentage points up to 27%, at the expense of field crops). As the production of virtually all agricultural commodities has increased over the past couple of decades, this means that the production of horticultural products has, on average, increased at a faster than average rate. This is especially the case with fruit and wines, which have shown exceptional growth.

Figure 3.6. Agricultural production shares by agricultural sectors, 1965 to 2004



Source: Adapted from DAFF, 2010. Abstract of Agricultural Statistics. Pretoria, National Department of Agriculture, Forestry and Fisheries.

3.2.2. The trade portfolio

198. Trade has been a major driver in the composition of agricultural output as the fast-growing horticultural sector has taken the lead in agricultural exports. The overall trade picture, and agriculture's contribution, is reflected in Table 3.1, which shows the trends in South Africa's agricultural trade since the 1970s. A number of important shifts can be identified from these data:

- Agriculture's share of total exports was between 8% and 10% since the start of the 1980s (prior to this date, gold bullion exports were not included in total export data). In the second half of the 1990s the proportion increased from below 8% to above 9%, showing that during this period agriculture played the role of a catalyst of export-led growth for the country as a whole. Since then it has declined to under 7%.

- The next row in the table shows the share of exports in total agricultural production: the share declined from around a third during the 1970s to just above a fifth between 1980 and 1994, and then increased back to the level of the earlier period. Since then it has declined to around a quarter. This clearly shows the effect of sanctions in the middle period. This also partly explains the relative lack of competitiveness of agriculture (to be discussed below); during the latter part of the 1990s, the sector achieved little more than a re-entry into markets lost during the 1970s and 1980s.

- Exports of processed agricultural products[63] have increased faster than exports of unprocessed agricultural products – the share of processed agricultural exports has increased from around 40% to 60% since 1970, with the sharpest increase occurring since 1990.

- Agricultural imports have grown faster than agricultural exports, and agriculture's share of total imports has remained relatively stable since 1970. However, the greater import propensity of the rest of the economy meant that agriculture's share of total imports declined from 6.6% to 5.2% after 1999.

- During this period, however, imports increased from 4.55% of total agricultural output to a quarter of total agricultural output.

- As a result, import cover (the ratio of agricultural exports to agricultural imports, a measure of the ability of the agricultural sector to pay for its own imports) declined drastically from 3.95:1 to 1.63:1 from 1970 to 2005, and has been at 1.1:1 on average for the past three years.

- In the final line of the table total exports plus total imports are given as a proportion of total agricultural production, which serves as a measure of the 'openness' of the sector to trade. There has been a significant and consistent increase in this measure over the period under consideration.

199. There are, in addition, five further structural shifts in South Africa's agricultural trade portfolio that started during the 1990s that should also be noted:

- The concentration of agricultural exports remains high. In 1997 the top ten HS 4-digit product lines accounted for 63% of the total and by 2007 these same lines accounted for an even greater 66%.

- While the EU remains the largest destination for agricultural exports, there has been a rapid increase in exports to the rest of Africa, to the extent that these made up 25% of total agricultural

[63] These are higher value agricultural exports, as opposed to manufactured agricultural goods, *i.e.* food and beverages.

exports by 2000 and 33% by 2009; by contrast, agricultural imports from Africa make up only 6% of total agricultural imports.

- The 25 most important agricultural and food exports from South Africa were responsible for 92% of total export earnings after 2000, with the horticultural industry responsible for 52% of all export earnings in 2008.

- Argentina emerged as the main country of origin for food and agricultural imports into South Africa (largely animal feed, a consequence of the rapid increase in poultry consumption), followed by the United States, the UK, Australia and Zimbabwe.

- South Africa's trade balance in the manufactured goods category of food and beverages was positive for most of the second half of the 1990s; however, by 2005 imports were equal to exports, *i.e.* there was a neutral trade balance.

200. At the end of the 19th century, South Africa's main agricultural exports were wool, fruit and wine, and this is essentially still the case today (these products contributed 51% of total agricultural exports in 2008). However, this aggregation hides a number of underlying trends that show that the sector has been more dynamic than this would suggest. For example, wool, which once dominated the country's total exports, had become relatively insignificant prior to increased world prices over the most recent years. On the other hand, the origin of farm exports has not shifted much: most farm exports still come from the Western Cape, with recent significant increases seen only from the Northern Cape (due to increased exports of table grapes).

201. Oyewumi et al (2006) examined the export mix from South African agriculture using the PRODY index, which assesses the potential for growth[64] and development through agricultural trade. This methodology postulated that the level of sophistication of the export product can stimulate or retard the growth of GDP. The study found that there is room for the government to encourage the diversification of new export products, such as meat and dairy products. However, the 'traditional' exports of sugar, some fresh fruits and nuts scored highest on the sophistication levels within the current export basket.

3.3. Agricultural employment in South Africa

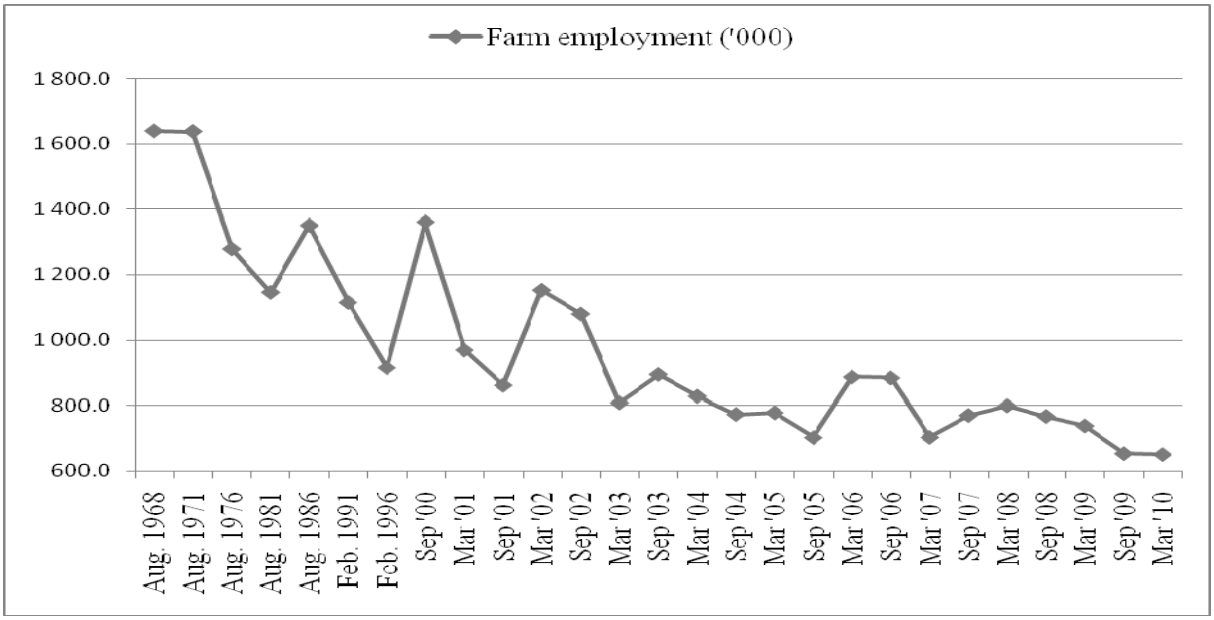
202. Figure 3.7. shows total employment of farm workers and domestic servants on commercial farms in South Africa. While the employment levels are notoriously difficult to enumerate, (given the presence of seasonal labour, etc.), the trend is unambiguous. Agriculture has shed about a million workers over the past four decades. Employment on farms fell by 50% or 800,000 workers from 1968 to 2003. Most of this decline took place before the democratic elections in 1994 and the subsequent opening up of trade in agricultural goods with the rest of the world. Nevertheless, since 2003 almost 200,000 additional employment opportunities have been lost in primary agriculture. Where there have been increases in employment, for example as shown for the Northern Cape and the Western Cape from 2009 to 2010 (Table 3.2.), the employment opportunities were mostly limited to seasonal workers and these numbers are volatile from year to year. This is because the first quarter is the time of harvest in the orchards and vineyards of these two provinces.

203. Unfortunately, even less is known about the levels of wages in agriculture. Ngqangweni (2010) presented the data in Figure 3.8., which shows that the average wage in the sector is well above the statutory minimum wage, which was around R 1,000 per month in 2007. In contrast, Aliber *et al.* (2007)

[64] The PRODY analysis framework was developed by Hausmann et al (2005), Rodrik (2006) and Hausmann and Klinger (2006). Based on an assumption that an item that is exported by high income countries contributes to higher growth than those items exported by low income countries, the PRODY index provides a rule of thumb as to the potential for growth of items by comparing a country's export portfolio with those of other countries.

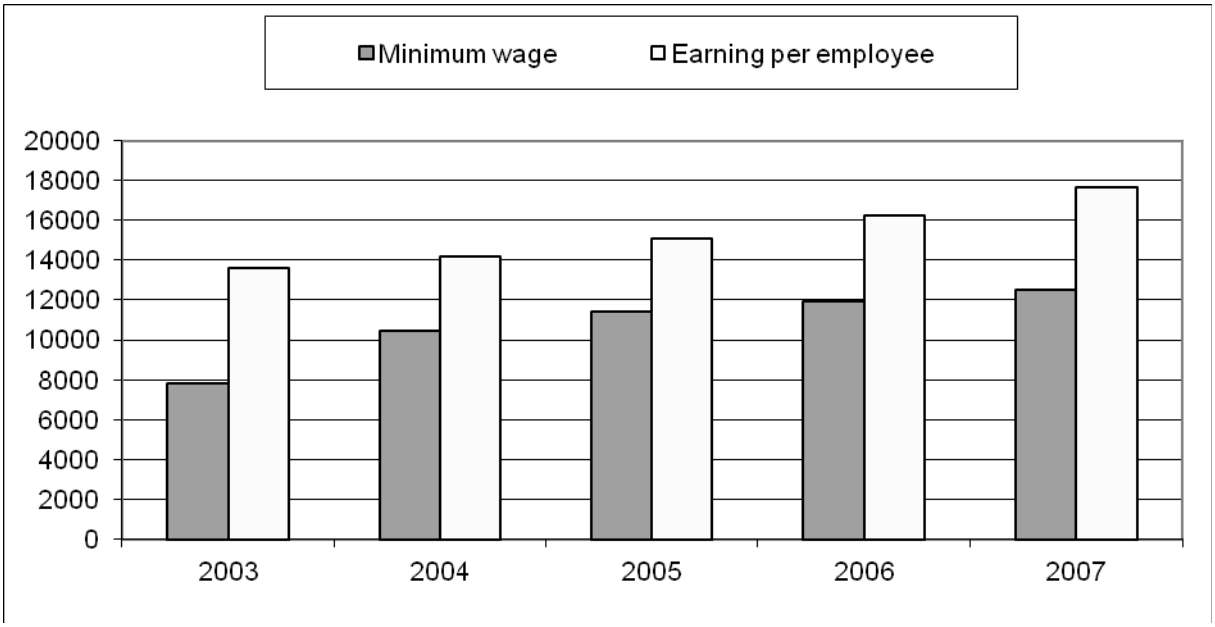
shows in Table 3.4. that average wages were R 6,607 per year (or about R550 per month) in 2002. They note, however, that this is the average for regular, seasonal and temporary workers.

Figure 3.7. Total employment in agriculture in South Africa, 1968-2010



Source: Stats SA: Agricultural Censuses and Surveys to February 1996; thereafter Labour Force Survey

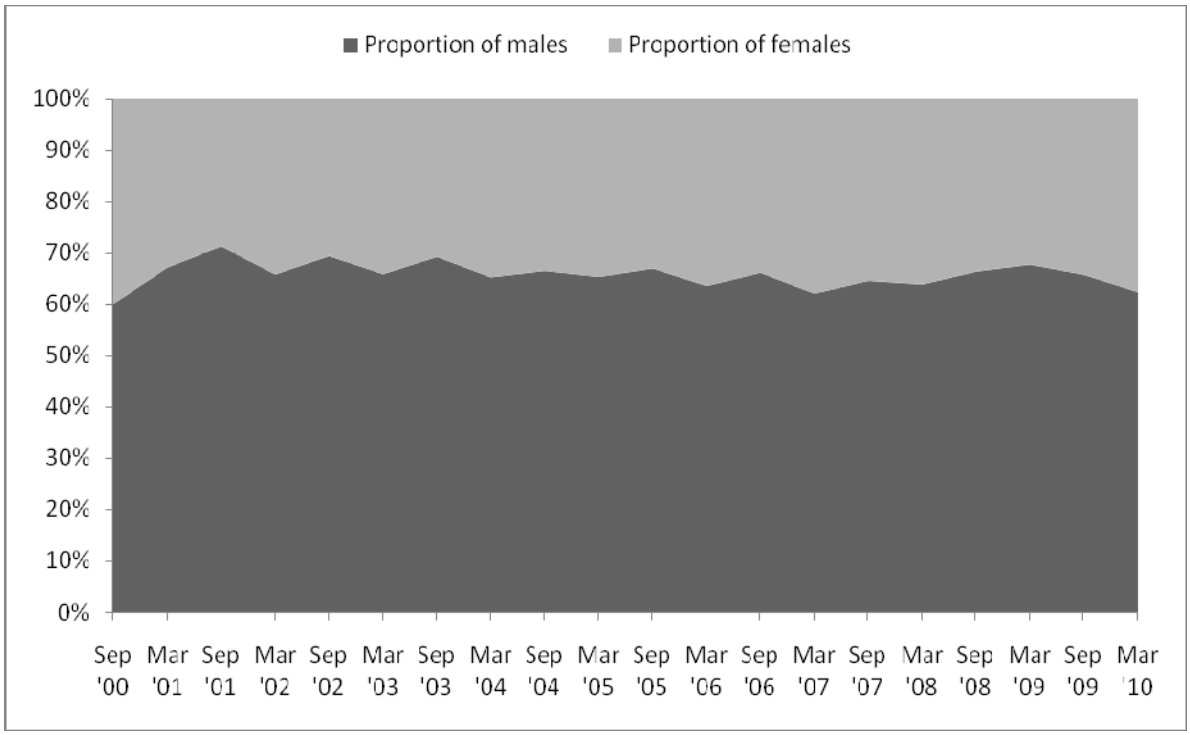
Figure 3.8. Minimum and average wages in agriculture, 2003-2007 (R per year)



Source: Ngqangweni, 2010.

204. Finally, Figure 3.9. shows the gender composition of farm workers. This has hardly changed from a ratio of about two thirds male and one third female: radical shifts such as between March and September 2003 appear to be related to data problems. What these data also show is that hiring and firing seems to be consistent with respect to gender.

Figure 3.9. The gender composition of the farm labour force



Source: Ngqangweni, 2010.

3.4. A review of South African studies of the trade and employment relationship

205. The issue of trade liberalisation and poverty reduction in South Africa has attracted considerable attention over recent years. This includes a special edition of the *Journal of Studies in Economics and Econometrics* (SEE) published in August 2007 presenting some of the papers written for the South African Trade and Poverty Project, an undertaking dedicated to analyzing the trade and poverty linkage. Edwards and Stern (2007) summarise the set of papers in this publication in the following manner:

> *"... the net impact of the resulting trade reforms should be to contribute to growth, employment and raising average incomes. But this net impact conceals a range of differential effects: the benefits of reform do not accrue automatically and equally to all households or communities and in some cases poverty and unemployment may rise".*

206. Furthermore, they argue that tariff liberalisation alone was not sufficient to reduce unemployment and poverty, and especially not amongst the unskilled and rural poor. Overall, during the 1990s, employment creation through export growth was closely matched by employment loss through import penetration, with no net gain. The study concludes that although poor consumers have gained the most from lower tariffs, they have not gained (or lost) in terms of employment. This is partly because the poor are largely disconnected from the formal sector and partly because economic and export growth has not created employment anyway. Finally, they argue it could be in part because liberalisation has not been complete.

207. Edwards and Stern also provide a summary analysis of the changes in openness of South African sectors from 1994 to 2004. Table 3.4. illustrates the highly aggregated treatment of agriculture in this analysis. While their analysis highlights that the effective rate of protection in the agricultural, forestry and fishing sector was reduced to 1.7%, it should be noted that the sub-sector of 'Food' still maintained an effective protection rate of 40.7% and an average tariff of 11.2%. Not shown is that the export orientation of 'Food', calculated as the share of exports in domestic production, increased from 6.7% to 9.1%, while the comparable import penetration figure similarly increased from 7.6% to 9.8% over the same time span.

Also, not shown is that more detail is available in the manufacturing sector, where the 'usual suspects' of textiles, clothing and footwear as well as motor vehicles continue to have high effective rates of protection. While liberalisation has occurred across the board, it has not been even, and there is a potential for further liberalisation.

208. The methodology used in the Trade and Poverty Project was based on the work of McCullough, *et al.* (2001), who trace the linkages from trade reform through to prices, consumption, production and employment. This framework identifies the three channels of distribution which affect price transmission. The channels relevant for this paper are: to what extent enterprises impact wages and employment as well as how the government affects taxes and government expenditure. For the agricultural sector both positive and negative effects on employment can be expected. The positive effects are brought about when liberalisation enhances the ability of the export sector to expand. Conversely, the negative effects are related to reduced domestic prices from tariff and other reforms that drive competitive and efficiency gains in the import competing sectors that, in turn, lead to labour shedding. In the wider analysis of poverty reduction there may well be a compensating reduction in food prices from these reforms, but as the focus of this paper is on employment this aspect is not considered.

209. A particular feature of South African agriculture is its acutely dualistic nature. Namely, there is a modern commercial sector, earning more than 95% of the gross farm income, and the numerically larger subsistence sector. . The consequences are apparent in the South African poverty data: Edwards and Stern (2007) show that 32.1% of the total population were in the lowest 'ultra poor' quintile of households in terms of expenditure in 2000, concentrated in the rural areas. Some 35% to 40% of adults in this quintile do not participate in the labour force and of those who do participate more than half are unemployed. Pauw *et al*. (2007) go further and show that formal agriculture contributes no more than 6% to poor households' income, but provides 15% to 20% of employment opportunities. This reflects both the low wages in agriculture and its importance as an employer of the poor, but it also highlights how potentially better access to international markets may aid the poor if it stimulates demand for their labour in this regard. In addition, subsistence farming is an important activity for the poor in South Africa, accounting for 20% and 8% of employment in the lowest and next to lowest quintiles respectively.

210. The dualistic nature of the sector, its associated high concentration of unemployed and poor in the rural sector as well as limited data make it difficult to draw conclusive evidence on the impact of liberalisation. As a result the Trade and Poverty Project struggles to find concrete data past the aggregate level. Case studies are presented for the clothing and automobile sectors, but little detail is available in the agricultural sector other than the work in the wheat to bread chain, discussed later.

211. Cattaneo (2011) outlines how South Africa's Trade Policy and Strategy Framework document identifies the government's major national development goals as, *inter alia*, employment creation, economic growth, poverty reduction, industrial development and restructuring, and the promotion of high value-added exports. She argues that the structural problems of the South African economy require extensive state intervention through a wide range of economic and social policies, while acknowledging that the economic and social debate in this area has become polarized and ideological. Central to this debate is the question of the impact of trade liberalisation on growth, employment and poverty (often more attention is given to poverty reduction rather than employment per se).

212. The first aspect of this complex relationship is the *process* of trade liberalisation, which is well documented and straightforward. The second aspect, the *extent* of liberalisation, is equally well documented but not so universally accepted, with different opinions on future scenarios. The final aspect, namely the *impact of trade liberalisation*, has been more difficult to assess in South Africa, especially with respect to trade volumes, employment, prices and productivity. This is the aspect on which Cattaneo concentrates. Researchers have used a variety of methodological approaches and Cattaneo and Dodd (2007) review those adopted to explore the impact of trade liberalisation in South Africa on growth and poverty in particular. They argue that the debate on trade reform needs to move beyond the one focusing exclusively on free trade

and protectionism, as neither extreme is particularly relevant to South Africa. The conclusion is that "neither trade liberalisation nor the economic growth that has occurred has been able to address the problem of poverty in a context of rising inequality and severe joblessness". What is needed is attention to wider-ranging structural transformation, rather than an ideological debate oscillating between "free trade" and "protectionism". In reality, the solutions may lie in the middle with selective policy intervention in support of structural transformation and a focus on building capacity to enhance government's ability to undertake such intervention (Cattaneo, 2011). However, Sandrey *et al.*, (2008) show that the substantial unilateral trade liberalisation that has taken place in agriculture in particular leaves South Africa with very limited trade policy space[65].

213. Segal and Brawley (2009) agree that the free trade-protectionism debate is not particularly relevant to South Africa and unhelpful for understanding why unemployment has remained high despite trade liberalisation. The distortions created by the apartheid era are especially important for the rural sector. Poverty levels need to be placed in a historical and political-economy perspective to explain why following liberalisation production became increasingly capital- and skill-intensive and why we did not observe the expected increase in employment of the abundant low-skilled labour. Segal and Brawley categorise the trade reform debate in a fashion similar to that of Cattaneo. On one hand, there are free marketers pleading for more time for comparative advantage to work and, on the other hand, those who assess the liberalisation as a failure, as it left too many unemployed. They offer the explanation that unleashed market forces merely reinforced the apartheid distortions that artificially cemented the power in the skilled labour[66] sectors through the enforced resettlement of black people[67]. Treating trade as a macroeconomic phenomenon and employment at the microeconomic level tends to ignore this background setting, where unskilled labour, and especially that in the agricultural sector, was not mobile. This limitation, coupled with data restrictions on the product-specific sectors in the broader agricultural industry, accentuates the problem of providing a definitive analysis of the employment impact of trade reforms in South Africa (as the Trade and Poverty Project confirms).

214. Chinembiri (2010) analysed the impacts of trade liberalisation on employment at the aggregated levels for South Africa and found that derived labour demand in the primary sectors (agriculture, fishery forestry and mining activities) and the secondary sectors (manufacturing, utilities and construction industries) have been impacted negatively by increased imports. Meanwhile, there was insufficient statistical evidence from the aggregate data to suggest that derived labour demand was increased by increased exports openness.

215. At a more disaggregated level Hobson (2006) examined the wheat-to-bread value-chain in South Africa. He found that there had been considerable employment increases following liberalisation, but that employment growth took place in the downstream baking sector rather than in wheat growing sector. Indeed, after the virtual removal of wheat tariffs (reduced to 2%), substitution of labour for capital had taken place in the wheat growing sector in order to exploit economies of scale and counter the reduced prices caused by increased imports. At liberalisation of the full value-chain there where around 3,000 bakers registered, with 80% of the production in the hands of the six main groups. By 2004 there were approximately 7,900 baking units (an increase of over 150%), with 85 wholesale bakeries, 600 in-store bakeries, 3,700 independent bakers, and 3,500 franchise bakers, with the main growth in the latter. In

[65] This of course opens up a whole debate as to what particular further adjustment policies in response to liberalisation are appropriate. Given that there is little policy space for tariff adjustments perhaps some aspects of labour markets need to be examined. However, given the informal nature of much of the agricultural labour market it is difficult to see where specific policy interventions may be appropriate.

[66] They cite references from Sherer (1998) that record almost full employment amongst the white population during the 1960s, where only 3.1% were classified as unskilled.

[67] Under apartheid, millions of people in the rural areas were resettled out of the commercial farming areas to the Bantustans in an attempt to consolidate these latter areas geographically.

addition, it was estimated that 53,200 informal bakers (including home industries and cake decorators) operate in non-licensed premises. Detailed employment figures were not available, but Hobson considered that this expansion of the baking industry had employed significant amounts of semi-skilled labour in South Africa.

3.5. Modelling the relationship between agricultural trade and employment

216. In this section we employ two different economic models to assess the potential linkages between agricultural trade liberalisation and employment in South Africa. The first uses the internationally accepted Global Trade Analysis Project (GTAP) model to simulate the so-called tripartite free trade agreement (FTA) whereby the three African regional trade blocs, namely Southern African Development Community (SADC), East African Community (EAC) and Common Market for Eastern and Southern Africa (COMESA) enter into an agriculture-only FTA.[68] The second approach is to use the South African PROVIDE Project computable general equilibrium (CGE) model to assess specifically liberalisation impacts on South African agricultural employment.

3.5.1. Liberalisation of the agricultural sector in Eastern Africa

217. In assessing South Africa's future trade policy options the increasing focus on the African continent, and in particular the so-called 'tripartite' agreements, has to be considered. Jensen and Sandrey (2011) focus on the quantitative analysis of how South Africa's trading relationship with the tripartite countries may be advanced by the adoption of a free trade agreement between South Africa (or, more properly, SACU) and the remaining countries of SADC, EAC and COMESA. To assist with this analysis the internationally accepted benchmark, GTAP database, and its associated general equilibrium model is used as an analytical tool. The starting point for this analysis was the 'known' and best-estimate conditions that will prevail at the end of a given period (2020 in this case). It was followed by an assessment of the difference that the full FTA between SADC, EAC and COMESA would make after each of these three regions has made the necessary steps to full sub-regional integration. Thus, Sandrey and Jensen were not examining the benefits to SADC, EAC and COMESA of taking their FTAs to their logical conclusions, but rather the next and final steps in regional integration past that intermediate point.

218. To allow an analysis of employment effects of liberalisation in South African agricultural, we started from an earlier point using the latest GTAP pre-release Version 8 database that represents global trade in the year 2007, measured in millions of (2007) US dollars, and simulated the full tripartite FTA from that time. Two points need to be stressed: the first is that benefits from this FTA include the intermediate benefits of the full implementation of the individual FTAs in the region, while the second is that we simulate liberalisation of the agricultural sector only as represented by all agricultural tariffs going to zero along with an assumed 2% reduction in non-tariff barriers (NTBs) to agricultural trade, with manufacturing and service barriers remaining unchanged. We eschew a discussion of the methodology and assumptions used in the model and refer to Jensen and Sandrey for that information and background.

[68] In recent years countries have increasingly become focused on enhancing market access through regional integration in light of the stalled decade-long WTO Doha round of trade of negotiations. Africa is no exception and in 2008, Heads of State and Government from the member states of the regional economic communities (RECs) of the COMESA generally representing the North-Eastern states of Africa, the EAC representing the central Eastern states and SADC representing the Southern states of Africa agreed to establish a Free Trade Area (FTA). The aim of the FTA among others is to enhance market access, harmonise policies in areas of common interest and address the confusing issue of multiple membership. This new configuration would see an expanded market covering 26 countries with an estimated population of 500 million people, a GDP of US$624 billion and a per capita GDP of US$1,184.

3.5.1.1. GTAP welfare results

219. The GTAP output gives welfare gains that are expressed as the Equivalent Variation (EV) that measures annual change in a country's income (gains or losses) following the changes. This EV in income is simply defined as the difference between the initial pre-FTA income and the post-FTA income after implementation of the change, with all prices set as fixed at current (pre-FTA) levels and the data expressed in US$ millions, or in other words, as one-off increase in annual welfare at the assessed end-point of 2007.

220. The results for South Africa are impressive: welfare increases by some $382 million, a figure close to the total gain to Africa of $433 million and one that represents 0.132% of South African GDP in 2007. These gains are split between $156 million from expansion of the amount of capital employed in the economy, $95 million from allocative efficiency gains, $92 from terms of trade improvements and the final $39 million from increased labour-employment. Most of these ($365 million) come from the elimination of agricultural tariffs across the tripartite regions with the remainder from reductions in NTBs. We decompose the gains to South Africa by (a) country and region as well as (b) by GTAP commodity. We find that for (a) the main gains are $152 million from the rest of East Africa (read Kenya), Mozambique ($56 million), rest of Southern Africa (Angola and Democratic Republic of the Congo - $50 million), Mauritius ($39 million) and Zimbabwe ($37 million). For (b) sugar at $138 million is the main contributor, followed by other processed foods with $77 million, beverages and tobacco with $66 million and vegetable oils with $23 million.

221. The gains to Africa, and South Africa in particular, are somewhat offset by losses of $273 million to non-African countries and give an overall global welfare increase of $159 million. Other major African gainers in the $25 to $36 million range are the rest of SACU (an aggregation of Lesotho, Namibia and Swaziland)[69], Ethiopia, Mozambique, Tanzania and Uganda. The main African losers are the rest of Southern Africa and the rest of East Africa (an aggregation centred on Kenya), while the other African countries and regions gain or lose single-digit million dollar values. Not surprisingly, all non-African countries and regions lose, with the main losers being the EU ($72 million), the USA ($44 million) and the 'rest of the world' ($82 million).

3.5.1.2. Sector results

222. Table 3.5. reports selected highlights of the sectoral changes in South Africa and shows how the changes in agriculture are concentrated in secondary agriculture and, in particular, sugar, 'other food products', beverages and tobacco. There is a marginal reduction in the natural resources sector as allocation effects across the economy take place and a somewhat larger reduction in the manufacturing sector, caused by the same effects. Note that there are significant changes to services as a result of the general expansion of the South African economy. Also note from the right hand column that the output price changes are modest, in particular for secondary agriculture.

3.5.1.3. Labour market results

223. The all-important labour market results for South Africa are shown in Table 3.6. For both unskilled and skilled labour in primary agriculture there is an increase of 1.09% and 1.08% respectively, while for secondary agriculture the increases rise to 1.44% for both types of labour. There are small percentage losses in the manufacturing and services sectors offsetting this, but the overall results for unskilled labour are positive across the board. Results for capital accumulation in South Africa are also positive. Not shown is that the agricultural employment gains for the rest of SACU are even higher (around 1.2% for primary agriculture and 3% for secondary agriculture) and positive but low (around 0.1%) for Botswana.

[69] Note that Botswana is modeled separately.

224. In the general discussion earlier we have provided an example on how alternative labour market closures in a CGE model can influence the final welfare results and, hence, policy advice given. In this current scenario the results of the base simulation are similarly driven by the labour market assumptions as shown in case (B) of Table 3.7., where the employment changes in unskilled labour were modelled as a function of the unemployment rate for the differing partners. Their alternative scenarios are: (A) where the employment is fixed and changes are reflected in the wage rate; (C) where the real wage rate is pegged to the inflation rate (*i.e.* real wages are held constant and the adjustment comes through increased employment); and (D) where the real wage is fixed and all adjustments must come through the number of unskilled persons employed.

225. In the base simulation (B), whereby the unskilled labour supply is a function of the unemployment rate, the employment of total unskilled labour increases by 0.064% and the real wage rate by a greater figure of 0.214%, with the changes in the agricultural sector as shown in Table 3.7. Scenario (A) protects those already in employment: the level of employment is fixed and all adjustments must take place within the wage rate. This is, as expected, more beneficial to those in employment, although their economy-wide wage rate increases by only 0.242%. It is less beneficial for (i) those not in employment and (ii) the economy as a whole as the overall gains are lower than the base case of (B). Scenario (D) has welfare gains double that of (B) as here more emphasis is placed on employment rather than on wages, which are held constant in real terms. The best results are those reported in scenario (C), where the real wage is fixed and all adjustments must come through the number of unskilled persons employed. Here the welfare and real GDP results are around three times higher than the base or primary simulation, and economy-wide employment is up by around 0.553%. This result again highlights that, if South Africa is serious about increasing both welfare and employment in the economy, policy makers may need to move towards creating jobs rather than rewarding those actually in employment.

226. Looking more carefully at the output we find that agricultural factor income increases by 1.84%. The individual contributions to this are land (0.797%), unskilled labour (0.513%), skilled labour (0.007%), and capital (0.527%). Labour is, therefore, one of the significant contributors to the final welfare result.

3.5.2. Liberalisation of the agricultural sector in South Africa

227. Section 5.1 discussed the results from the Global Trade Analysis Project (GTAP) model simulating the so-called tripartite free trade agreement (FTA), whereby the three east African regional trade blocs of SADC, EAC and COMESA enter into a genuine agriculture-only FTA. Results from the GTAP model were used as a starting point for the single-country CGE model for South Africa to determine the likely impacts of liberalisation on employment in agriculture in South Africa, discussed in this section. More specifically, the weighted average changes in import prices and export prices for all commodities faced by the South African industries and markets, generated with the GTAP model, were introduced as a single shock to the PROVIDE model.

228. The single-country CGE model used here is the PROVIDE Project CGE model (PROVIDE, 2005). The model allows for a generalised treatment of trade relationships by incorporating provisions for non-traded exports and imports, as well as the relaxation of the small-country assumption for exported commodities that do not face perfectly elastic demand on the world market. It also incorporates the Armington function for imports and a constant elasticity of transformation (CET) specification for exports. The model allows for modelling of multiple product activities through an assumption of flexible proportions of commodity outputs by activities with commodities differentiated by the activities that produce them. The model contains nested production functions and value-added production technologies are specified as Constant Elasticity of Substitution (CES). Household consumption expenditure is represented by Stone-Geary utility functions.

229. Model closures include a flexible exchange rate, fixed government expenditure and investment shares of absorption. Capital and land are assumed fully employed and mobile. For the labour market

closure it was assumed that skilled and semi-skilled labour are fully employed, implying flexible wage rates for these two categories of labour. For unskilled labour the real wage is fixed and adjustments come through the number of unskilled persons employed. The implication of the assumptions with regard to labour is that employment increases are possible for unskilled workers only.

230. The data for the model are presented in a social accounting matrix (SAM) for South Africa for 2007 (Punt, 2010). The SAM contains provincial details for the agricultural production accounts, as well as for all the household and labour accounts. The version of the SAM used in this study contains 417 accounts: 49 product groups (of which 13 are agricultural products), trade and transport margins, 83 activities (of which 47 are agricultural activities), 1 capital account, 1 land account, 142 labour accounts, 126 household accounts, 1 corporation account, 8 tax accounts, 1 general government account, an investment and savings account, an account for stock changes and an international trade and transfers account. Agricultural activities are distinguished by region. Hence, a given agricultural activity represents all farming activities within that region and each region has a fixed total supply of land, but the enterprise mix within that region can vary. The regions within provinces are based on district municipalities.

231. The changes in international prices for agriculture and food were found to have a positive impact on employment as show in Table 3.8. Additional employment opportunities created throughout the economy are estimated at 9,470 (0.08%), of which on aggregate 4,864 (51.3%) are in primary agriculture and the remainder in the food sector (4,603). The net impact on other manufacturing, mineral resources and services is negligible. Out of the total jobs created, 5,481 (57.9%) are for black females, 3,917 (41.4%) for black males and 68 (0.7%) for white males. By assumption of the model all the jobs are created in the unskilled categories, because skilled and semi-skilled workers are assumed to be fully employed. The table below shows the distribution of the employment created throughout the nine provinces of South Africa. The most jobs are created in KwaZulu-Natal (3,657), known for its sugar production, followed by Gauteng (1,316) and the Western Cape (1,205). Gauteng is predominantly metropolitan and most of the employment opportunities created here are in value-adding. The Western Cape is one of the main horticultural export provinces and a notable amount of value-adding activities in the food industries is also found in the Western Cape. The main grain producing provinces, Free State and North West and the most sparsely populated Northern Cape, benefit least in terms of employment growth (both in absolute and percentage terms).

232. Households are also affected differently as shown in Table 3.9. Changes in households incomes are affected by the ownership of all factors, not only labour. Along racial lines, it can be seen that on average the household income of non-white households increases by 0.19% and that of white households by 0.10%. Classified by level of income, the lower income households are found to experience an average increase of 0.17% compared to 0.15% for higher income households, so there is a modest amount of redistribution taking place. Households are also classified according to their main source of income, which can be a) work in the agricultural sector, b) wages and salaries in other economic sectors, c) interest, rental or other income because of asset ownership and d) welfare grants. The households earning the majority of income through work in the agricultural sector experience the greatest increase in household income (0.55%), followed by households earning returns on assets (0.27%) and then households earning the majority of income through work in non-agricultural sectors (0.13%). Households living on welfare grants are, as expected, not affected substantially through the growth in the economy as a result of trade, but there is still a benefit of 0.03%. When looking more closely at households earning the majority of income from work in the agricultural sector, it can be seen that there is no notable difference in the proportional increase in income for those households where the income earner is self-employed and those where the income-earner is working for someone else. The total net increase in household income amounts to $510 million.

3.5.3. Discussion of the modelling results

233. This section has employed two different economic models to assist in assessing the impacts of agricultural liberalisation on employment in the sector. While they are different, with different underlying assumptions and structures, they both indicate a positive relationship between liberalisation and

employment in the sector. This contrasts with the empirical evidence showing what has happened over recent years as discussed in sections 3 and 4. One hypothesis for this dichotomy between model results and past history may be that the post-apartheid adjustment has largely taken place in the agricultural sector and, therefore, the past may not be an accurate indicator of the future in South African agriculture. This is reinforced by Table 3.1., where it can be seen that liberalisation has left exports as a percentage of production virtually at the same level as prior to liberalisation, albeit following a decline. Conversely imports as a percentage of production have been rising steadily.

234. Another hypothesis is that trade liberalisation often goes hand in hand with productivity increases. Domestic productivity increases was not explicitly modelled as a future scenario, but the impacts thereof might have been quite significant historically because South Africa experienced a period of isolation before international markets reopened. Therefore, as the results suggest, trade liberalisation under ceteris paribus conditions will lead to increases in employment, but in reality these increases might be outweighed by the job losses associated with productivity increases. Also, during the period associated with trade liberalisation in South Africa, labour legislation has changed quite significantly and there has been a process of land reform, both of which are often accused of leading to job losses. The expected job creation as a result of trade liberalisation is a result of the stimulation of economic activity because of an increase in production for the export market and given the assumption that there exists a certain level of unemployment in the economy, the economy responds through expansion.

235. The GTAP model suggests increases of around 1% in agricultural employment in the primary sector and of 1.5% in the secondary sector. This is in response to general output price increases of around 0.5% in the agricultural sector. Employment results from the PROVIDE model are remarkably similar: an increase of 9,500 persons employed in primary and secondary agriculture combined or 1.5% of the 650,000 total, as shown in Table 3.7. Encouragingly from an equality- and social cohesiveness perspective, the increase from the PROVIDE model is weighted towards female jobs created (60% of the total) and, along racial lines, the average household income of non-white households increases by 0.19%, a figure double that of the 0.10% increase in income of white households. The smallholder sector is not explicitly captured in the PROVIDE model and many of these farmers do not produce for the export market. The benefit of trade liberalisation to the smallholder sector will come from the increases in the producer prices of most primary agricultural products for the domestic market.

3.6. The Gathering of the Threads

236. The linkages between agricultural trade and employment in South Africa have to be assessed against the background of the significant agricultural reform process over the last ten to twelve years as well as the legacy of the policies and resulting institutional framework inherited from the apartheid era. By the late 1970s the racial segregation of South African agriculture was complete, subsidization of commercial farming peaked and the productive base of the farming sector in the homelands ceased to provide any meaningful income opportunities to all but a handful of farmers. By the end of the 1990s, the deregulation of domestic agricultural markets as well as the liberalisation of trade was all but complete.

237. However, despite reformist policies such as land reform and institutional restructuring, the sector remained divided: on the one hand, commercial (largely white) farmers faming on privately owned land, and on the other hand, small-scale subsistence (exclusively black) farmers in the communal areas. There are fewer than 40,000 commercial farms overall. While fewer than 2,500 farmers produce more than half the total output, well over 1.2 million are subsistence farmers. The latter represent a wide range of farming systems, with a few commercial farmers and mostly homestead gardens. Where employment data for agriculture do exist, it is almost always for the commercial farmers only. This, combined with the poor quality of employment data, complicates analysis of the linkages between reform and employment in the sector. The principal policy dilemma in this case is that reforms designed to improve productivity in agriculture are at odds with the policy of trying to decrease rural unemployment and, thus, poverty.

238. Other reforms in the post-apartheid era have included the introduction of minimum wages and improved employment conditions for farm workers; the deregulation of the Control Boards that were responsible for interventions in the agricultural market; substantial liberalisation of international trade; and the withdrawal of a large proportion of the farmer support services provided to commercial and small-scale farmers alike. While these reforms took place after South Africa became a signatory to the Marrakech Agreement, the country unilaterally lowered most of its tariffs in agriculture to well below the bound rates of the Agreement on Agriculture. There are two consequences of the comprehensive shifts in policy that are important: the change in the agricultural production portfolio of the country and the shift in trade patterns.

239. Since 1965-67 animal production has generally maintained its relative share of total agricultural production (40%) and, given the nature of South Africa's agricultural resources with only some 17% of the available agricultural land suitable for cultivation, this is to be expected. However, the relative share of different kinds of animal products has shifted over this period, with the production and consumption of red meat stagnating and being replaced by the increasing production of poultry meat. Horticulture has increased its share of production by 10 percentage points to 27% at the expense of field crops (with historical highs of 49.5% in 1980 and historical lows of 24.1% in2005). This increased horticultural production is especially apparent in the case of fruit and wines that experienced exceptional growth.

240. It is the demand-pull from an increase in exports of horticultural products that is driving the relatively faster growth in their production. This, in turn, has influenced the agricultural trade balance of the country, although it is a striking feature of South African agricultural exports that there have been limited overall changes in its export portfolio and destination for several decades. Conversely, equally influential on the other side of the agricultural trade balance has been the dramatic increase in soybean-oil cake for poultry feed: from R195 million in 1996 through to R2.4 billion in 2010.

241. While the employment levels are notoriously difficult to enumerate, (given the presence of seasonal labour, etc.), the trend is unambiguous: agriculture has shed about a million workers over the past four decades. Employment on farms fell by 50% or 800,000 workers from 1968 to 2003 in the period prior to democratization and the significant agricultural reforms. Nevertheless, since 2003 almost another 200,000 employment opportunities have been lost in primary agriculture. There are some signs of improvement, but many of the newly created employment opportunities are limited to seasonal workers during harvest in the orchards and vineyards and, thus, remain volatile. One encouraging feature is that the hiring and firing patterns seem to be gender neutral.

242. Reviews of the linkages between trade liberalisation and poverty reduction in South Africa have attracted considerable attention over recent years. There are no conclusive answers except that liberalisation alone was not sufficient to reduce unemployment and poverty, especially not amongst the unskilled and rural poor. This is partly because the poor are largely disconnected from the formal sector, partly because economic and export growth has not created employment anyway, and finally because liberalisation is still seen as incomplete by some.

243. The recent initiative of South Africa's Trade Policy and Strategy Framework identifies the government's major national development goals as, *inter alia*, employment creation, economic growth, poverty reduction, industrial development and restructuring, and the promotion of high value-added exports. However, the key question about the impact of trade liberalisation on growth, employment and poverty is a complex and largely unanswered one. The *process* of trade liberalisation is well-documented and straightforward. The *extent* of liberalisation is equally well-documented, but not universally accepted. Most difficult to assess has been the *impact* of trade liberalisation in South Africa on trade, employment, prices and productivity, and this is especially true for assessing the impact of trade liberalisation on growth and poverty. Researchers have argued that the political economy questions surrounding the distortions created by the apartheid era are particularly important for the rural sector where production became increasingly capital- and skill-intensive following liberalisation (contrary to the initial expectations that there would be an increase in employment of the abundant low-skilled labour).

244. This paper uses two different computer models to assess the impact of liberalisation on employment in the agricultural sector. While they are different, with different underlying assumptions and structures, they both indicate a positive relationship between liberalisation and employment in the sector, in contrast to the empirical evidence over recent years. Perhaps the post-apartheid adjustment has largely taken place in the agricultural sector and, therefore, the past may not be an accurate indicator of the future in South African agriculture.

245. The GTAP model suggests increases in agricultural employment in the primary sector of around 1% and of 1.5% in the secondary sector. This is in response to general output price increases of around 0.5% in the agricultural sector. The PROVIDE model also gives an employment increase of 1.5%, based upon the latest numbers of persons employed in agriculture. Importantly this job increase is orientated towards females and the increase in non-white household income is double that of white household income.

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TABLES

Table 3.1. South Africa's trade in agricultural goods since 1965

	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-05	2006-08
Exports								
Total exports (Rm)	2,092	7,305	20,746	45,164	72,534	133,623	272,382	497,210
Total agricultural exports (Rm)	689	1,412	1,946	3,613	5,520	12,132	22,293	32,279
Gross value of output (Rm)	2,100	4,234	8,458	16,087	25,581	42,349	68,282	112,189
Agricultural exports as a % of total exports	32.92	19.33	9.38	8.00	7.61	9.08	8.18	6.49
Agricultural exports as a % of output	32.80	33.35	23.01	22.46	21.58	28.65	32.65	28.77
Processed agricultural exports (Rm)	341	724	942	2,010	2,865	6,650	13,384	17,327
Unprocessed agricultural exports (Rm)	347	688	1,004	1,604	2,654	5,482	8,909	11,495
Processed agricultural exports/total agricultural exports	49.56	51.25	48.42	55.62	51.91	54.81	60.04	60.11
Imports								
Total imports (Rm)	3,243	6,536	18,240	32,499	55,122	125,364	264,682	525,835
Total agricultural imports (Rm)	174	290	870	1,689	3,476	8,317	13,687	29,440
Agricultural imports as a % of total imports	5.38	4.43	4.77	5.20	6.31	6.63	5.17	5.59
Agricultural imports as a % of output	8.30	6.84	10.29	10.50	13.59	19.64	20.05	26.24
Import cover	3.95	4.88	2.24	2.14	1.59	1.46	1.63	0.98
Openness	41.10	40.19	33.30	32.96	35.16	48.29	52.69	55.01

Source: Adapted from DAFF, 2010. *Abstract of Agricultural Statistics*. Pretoria, National Department of Agriculture, Forestry and Fisheries.

Table 3.2. Farm employment by province, first quarter, 2008-10

Province	2008	2009	2010
Eastern Cape	75,000	82,000	61,000
Free State	85,000	89,000	75,000
Gauteng	58,000	56,000	29,000
KwaZulu-Natal	129,000	134,000	115,000
Limpopo	70,000	60,000	44,000
Mpumalanga	76,000	81,000	65,000
North West	59,000	49,000	41,000
Northern Cape	65,000	41,000	44,000
Western Cape	181,000	145,000	177,000
Total	798,000	737,000	651,000

Source: Stats SA, Labour force survey 2010, adapted from Holborn, 2010.

Table 3.3. Average wages in agriculture, 1971-2002

	Number of farms	Employment	Workers/farm	Wage/worker	Wages/farm
1971	90,422	1,516,013	17	2,884	48,345
1985	65,880	1,323,694	20	4,330	87,000
1993	57,980	1,093,265	19	4,806	90,625
2002	45,818	940,820	21	6,607	135,658

Source: Aliber, *et al.*, 2007.

Table 3.4. Measures of openness by sector, 1994-2004

	Average schedule tariff %		Effective protection rate	
	1994	2004	1994	2004
Agriculture, forestry & fishing	9	3.3	9.9	1.7
Mining	2.8	0.8	2.3	0.2
Manufacturing	22.9	8.2	52.2	13.8
Food	22.8	11.2	94.7	40.7
Beverages	36.4	8.2	86.2	21.8

Source: Adapted from Edwards and Stem, 2007.

Table 3.5. Changes by GTAP sector

	Change in production		% change in		
	$ million	%	exports	imports	prices
Primary agriculture					
other grains	24	1.3	7.9	0.6	0.4
vegetable fruits	26	0.5	0.6	2.5	0.4
cane production	28	4.0			0.5
other crops	55	2.0	21.7	6.0	0.6
other agricultural products	26	0.6	-0.3	0.8	0.3
Secondary agriculture					
other meats	40	1.1	25.0	1.2	0.2
vegetable oils	58	4.4	36.0	1.3	0.1
dairy	37	1.0	22.9	4.0	0.1
sugar	231	11.7	51.8	4.0	0.1
other foods	200	1.3	10.3	1.1	0.1
beverages and tobacco	116	1.0	7.6	1.4	0.2
Other sectors					
natural resources	-18	-0.1	-0.2	-0.2	0.0
manufacturing	-267	-0.2	-0.7	0.3	0.1
services	1019	0.1	-0.6	0.4	0.2
Total	1621				

Table 3.6. South Africa, percentage change in employment and capital stock in agriculture

	Agriculture		Manufacturing	
	primary	secondary	& services	Total SA
Unskilled labour	1.09	1.44	-0.02	0.06
Skilled labour	1.08	1.44	-0.02	0
Agricultural capital	1.12	2.05	0.13	0.22

Table 3.7. Unskilled labour market closure, percentage change employment and real wage

EV US$ mill		QGDP%	CPI%	Assumptions	Changes for South Africa	
(A)	295	0.095	0.132	Fixed employment	Employment	0.00
					Real wage	0.242
(B)	382	0.132	0.127	..U.. (1-U)	Employment	0.064
					Real wage	0.214
(D)	767	0.291	0.113	Wage Pegged To CPI	Employment	0.329
					Real wage	0.113
(C)*	1050	0.41	0.09	Fixed Real wage	Employment	0.553
					Real wage	0.00

Source: GTAP output, where * for case (C) is the case (K) with fixed real wages in Table 3.5. above.

Table 3.8. Employment created (numbers)

Province	Primary Agriculture	Secondary Agriculture / Processed Food	Mining, other manufacturing and services	Total
Western Cape	357	854	-6	1.205
Eastern Cape	368	518	150	1 036
Northern Cape	117	59	-30	147
Free State	138	162	18	317
KwaZulu-Natal	2,832	896	-72	3,657
North West	306	372	-133	544
Gauteng	30	1,289	-2	1,316
Mpumalanga	548	253	5	806
Limpopo	169	200	70	438
Total	4,864	4,603	0	9,466

Table 3.9. Change in household income

Category	% Change in household income
Race of head of household	
Black	0.19
White	0.10
Level of household income	
Poor	0.17
Non-poor	0.15
Main source of household income	
Work in agriculture	0.55
Wages and salaries	0.13
Assets	0.27
Welfare	0.03
Type of employment in agriculture	
Labourers	0.54
Self-employed	0.55