

# 9

## The Labour Market Impact of International Outsourcing

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### 9.1 Introduction

Over recent years the phenomenon of international outsourcing has provoked a considerable amount of public concern and anxiety. Despite the advocated benefits in terms of efficiency gains, the prevalent view appears to be that international outsourcing severely threatens domestic jobs and wages, in particular for low-skilled workers. However, this view is mainly fuelled by anecdotal evidence since, despite the strong public interest, academic research which analyses the phenomenon of outsourcing empirically is only in its infancy. Also, from a theoretical point of view, the effects of international outsourcing on the labour market outcomes for low-skilled workers seem to be ambiguous.

If one looks at labour markets across industrialised countries it is a common stylised fact that over the past decades the share of low-skilled workers in total employment has been steadily declining and, importantly, this process has been taking place within most manufacturing industries (see, for example, Berman, Bound and Machin, 1998; Machin and Van Reenen, 1998 for a number of OECD countries). At the same time, the relative wages of low-skilled workers have been falling substantially in many countries (Feenstra and Hanson, 2001) while in some countries, such as Germany, relative wages appear to have remained constant (Fitzenberger, 1999), accompanied by sharp increases in relative unemployment rates of low-skilled workers (Reinberg and Hummel, 2005). While it is widely accepted in the literature that skill biased technological change is at least partly responsible for this development, the role of international trade, and more specifically international outsourcing, is still surrounded by much controversy.

This chapter gives an overview of a number of recent studies on the labour market impact of international outsourcing. It surveys evidence on the extent to which outsourcing affects the demand for low-skilled workers and, thus, poses a threat to low-skilled jobs and wages. In Section 9.2, we first discuss ways of quantifying international outsourcing and provide an overview of its development over recent years in Germany and the UK. We focus on these two countries for a number of reasons: firstly, they are two of the main economies in the European Union but, as noted above, have shown different developments in terms of labour market outcomes for low-skilled workers, and have different labour market institutions; secondly, as we discuss below, much of the empirical evidence for European countries looks at these two economies.

Section 9.3 briefly discusses the theoretical literature on international outsourcing and summarises the predicted labour market impact. Section 9.4 gives an overview of the large body of literature that empirically assesses the impact of international outsourcing within an industry panel framework. However, industry level studies suffer from a number of shortcomings such as aggregation bias, potential endogeneity bias or poor skill classifications. A number of more recent papers take these shortcomings into account and analyse the effects of outsourcing using individual worker data. This literature is introduced in Section 9.5. Section 9.6 summarises and draws some conclusions.

## 9.2 Stylised facts on outsourcing

As a working definition, we understand outsourcing to be the process of splitting production processes into several stages that are carried out at different locations. In principle this process can be entirely domestic, leaving all production stages within a single country. However, in open economies, firms may economise on lower production costs abroad. Outsourcing therefore becomes international; it reorganises production within a potentially global network of domestic firms, foreign subsidiaries and subcontractors and is characterised by an intensive trade in intermediate goods. Anecdotal evidence on firms shifting production stages abroad by subcontracting to legally independent suppliers or establishing foreign production sites is manifold. However, systematically measuring the process of international outsourcing presents a challenge.

Most authors rely on trade statistics, exploiting the close relation between international outsourcing and trade in intermediate goods.

Authors such as Yeats (2001) seek to measure international outsourcing or, as he calls it, production sharing, by directly quantifying trade in intermediate goods, assessing the intermediate character of the traded goods on the basis of disaggregated goods classifications. His calculations indicate that trade in machinery and transport equipment parts and components accounts for about 30 per cent of total trade in that sector and is growing rapidly. Within the machinery and transport equipment sector, imported parts and components in 1995 accounted for 14.1 per cent of the production value in the European Union, 6.7 per cent in Japan and 11.6 per cent in North America. Clearly, this indicates the large role of international outsourcing within this industry. However, these calculations most likely are upward biased, as imported parts and components (of machinery and transport equipment) are assumed to be intermediate goods imports of the respective broader industry that produces such parts and components itself (machinery and transport equipment industry). This abstracts from the possibility that parts and components from one industry can also be used by other manufacturing and service industries or by final consumers.

Authors such as Feenstra and Hanson (1999) or Campa and Goldberg (1997) quantify international outsourcing by combining input coefficients from input-output tables and trade data. The estimated value of imported intermediate inputs of an industry thereby largely depends on whether one applies a 'narrow' or a 'wide' definition of international outsourcing.

Campa and Goldberg (1997) assume that the total sum of imported intermediate goods in each industry as a share of the respective industry's production value represents a reasonable indicator for international outsourcing. They present industry level calculations for four OECD countries. In US manufacturing, the calculated average outsourcing intensity doubled from 4.1 per cent in 1975 to 8.2 per cent in 1995. In the UK, the outsourcing intensity in manufacturing increased from 13.4 per cent in 1974 to 21.6 per cent in 1993, while, over the same period it rose from 15.8 to 20.2 per cent in Canadian manufacturing. Only in Japan did the average manufacturing outsourcing intensity fall, from 8.2 per cent in 1974 to 4.1 per cent in 1993.

However, according to Feenstra and Hanson (1999), the above definition might be too broad if one understands international outsourcing to be the result of a make-or-buy decision. Following this approach, it is not the total sum of imported intermediate inputs, but only the part that could be produced within the respective domestic

industry that actually constitutes outsourcing. However, depending on the aggregation level, the range of products that an industry can produce varies. Accordingly, the more highly aggregated the industries are, the broader the definition of international outsourcing becomes. Specifically, Feenstra and Hanson (1999) show that, in US manufacturing, narrowly defined outsourcing intensity, calculated as the sum of intermediate imports of an industry from the same two digit industry in relation to total industry expenditure for non-energy inputs, increased from 2.2 per cent in 1972 to 5.7 per cent in 1990.

In a related article, Hummels et al. (2001) combine input-output tables and trade data to measure what they call vertical specialisation by quantifying inputs that are both imported and subsequently processed and used in exported goods. Although the concept of vertical specialisation is different from international outsourcing, it is at least loosely related in that it is concerned with the specialisation of a country in a specific segment of the international value chain of production. The authors' calculations for thirteen countries indicate that between the early 1970s and the early 1990s, vertical specialisation significantly increased in all countries except Japan.

An alternative approach to quantifying international outsourcing draws heavily on data on 'outward processing trade'. Regularly, tariff regulations of industrialised countries provide specific exemptions for goods that are exported, further processed or assembled abroad and subsequently reimported. As a result, customs authorities collect specific data on these transactions. Yeats (2001) reports that in 1989, imports to the US under the outward processing trade regulation accounted for about 16 per cent of all US imports. Görg (2000), using Eurostat data for EU countries, shows that this type of trade accounted for roughly 20 per cent of imports from the US into the EU in 1994, while Egger and Egger (2001) find that outward processing exports by EU manufacturing increased by 6 per cent per year between 1995 and 1997.

However, it is important to stress that the available data most likely underestimate the true importance of outward processing trade, because many imports are already exempt from tariffs due to bilateral and multilateral trade agreements, and are therefore not separately measured, even though they constitute outward processing trade (Yeats, 2001). Also, more importantly, outward processing trade, even if accurately measured, by definition only constitutes a fraction of international outsourcing. Inputs from foreign affiliates or subcontractors that are not outward processing trade are completely neglected. Hence, arguably,

the aforementioned strategies that combine trade data and input-output tables are better suited to measure international outsourcing.

To quantify and compare outsourcing intensity in the United Kingdom and Germany we construct two measures of international outsourcing that follow the concepts proposed in Feenstra and Hanson (1996, 1999) and Campa and Goldberg (1997). Narrow international outsourcing is measured as the shift of a two digit industry's *core activities* abroad, represented by the value of the industry's imported intermediate inputs from the *same* industry abroad, as a share of the domestic industry's production value. The challenge is to measure the respective industry's imports of intermediate goods. A simple procedure would be to assume that all imports from a certain industry  $i^*$  abroad are directed towards the respective domestic industry  $i$  and nowhere else. Essentially, this would amount to the construction of industry level import penetration ratios, which are however rather poor measures of industries' outsourcing activities. Instead, input-output data are utilised in order to allocate imports according to their usage as input factors across industries.

The use of input-output tables renders obsolete the differentiation of intermediate goods on the basis of disaggregated goods classifications. Imports are always counted as intermediate goods imports if they are used in the production of manufacturing industries.

Formally, narrow outsourcing is constructed as:

$$OUTS_{it}^{narrow} = \frac{IMP_{i^*t} \times \Omega_{i^*it}}{Y_{it}} \quad (9.1)$$

with  $IMP_{i^*t}$  denoting imported inputs from industry  $i^*$  abroad and  $Y_{it}$  the production value of industry  $i$  at time  $t$ .  $\Omega_{i^*it}$  denotes the share of imports from the foreign industry  $i^*$  consumed by the domestic industry  $i$  in  $t$  with  $\sum_{i=1}^I IMP_{i^*t} \times \Omega_{i^*it} = \text{total imports}$  from industry  $i^*$  used in manufacturing in  $t$ . Adding imports used in agriculture, mining, services, private and public consumption, investment, supply inventory and exports yields the total amount of imports from the foreign industry  $i^*$ .

Loosening the concept of an industry's *core activities* and following Campa and Goldberg (1997), wide outsourcing is defined somewhat less conservatively as a two digit industry's purchase of intermediate goods from abroad represented by the respective industry's sum of imported intermediate goods from *all* manufacturing industries  $j$  relative to the

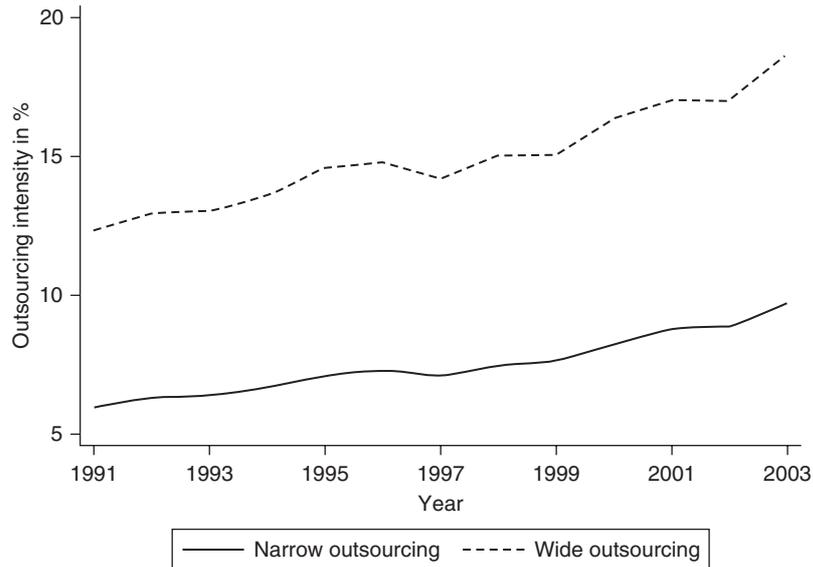


Figure 9.1: International outsourcing in UK manufacturing

domestic industry's production value:

$$OUTS_{it}^{wide} = \frac{\sum_{j^*=1}^J IMP_{j^*t} \times \Omega_{j^*it}}{Y_{it}} \quad (9.2)$$

Figures 9.1 and 9.2 show the development of international outsourcing in the manufacturing sector in the UK and Germany between 1991 and 2003.<sup>1</sup> In the UK in 2003 the outsourcing intensity was 9.5 per cent following the narrow definition (as in Equation (9.1)) and 18.5 per cent applying the wide definition (as in Equation (9.2)). In Germany narrow outsourcing is, with 7.2 per cent, somewhat less pronounced while wide outsourcing, with 19.6 per cent, slightly exceeds the UK value.

As is apparent in Figures 9.1 and 9.2, in both countries international outsourcing has grown substantially over recent years, and the development of narrowly and broadly defined outsourcing appears to be fairly parallel. For the UK, narrowly defined international outsourcing increased significantly by around 59 per cent while broadly defined outsourcing increased by around 50 per cent between 1991 and 2003.

158 *Globalisation and Labour Market Adjustment*

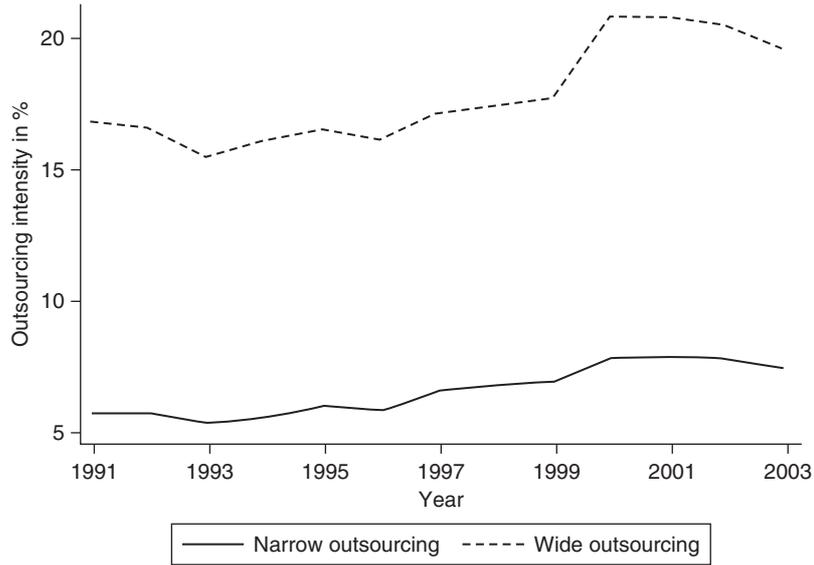


Figure 9.2: International outsourcing in German manufacturing

Over the same period, increases in the outsourcing intensity were significantly less pronounced in German manufacturing, with 27 per cent for narrow and 16 per cent for wide outsourcing.

As demonstrated by Geishecker (2006a), by differentiating imports by source countries, one can construct outsourcing proxies for different geographic regions, at least if one is willing to assume that  $\Omega_{i^*it}$  is constant across regions. Equations (9.3) and (9.4) show the decomposition of the outsourcing measure by geographic region, which is simply additive since the denominator is always the same and the weight  $\Omega_{i^*it}$  is assumed to be constant across regions:

$$OUTS_{it}^{narrow} = \frac{IMP_{i^*t} \times \Omega_{i^*it}}{Y_{it}} = \frac{\sum_{c=1}^C IMP_{i^*ct} \times \Omega_{i^*it}}{Y_{it}} \quad (9.3)$$

$$OUTS_{it}^{wide} = \frac{\sum_{j^*=1}^J IMP_{j^*t} \times \Omega_{j^*it}}{Y_{it}} = \frac{\sum_{c=1}^C \sum_{j^*=1}^J IMP_{j^*ct} \times \Omega_{j^*it}}{Y_{it}} \quad (9.4)$$

where  $c$  indicates the geographic region.

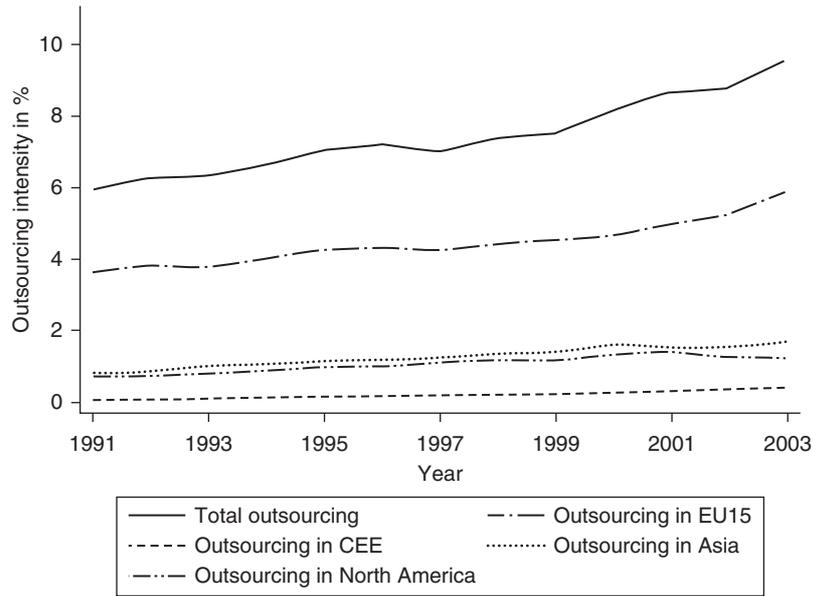


Figure 9.3: Narrow outsourcing in UK manufacturing by region

Figures 9.3 and 9.4 show the development of narrowly defined international outsourcing to the European Union (EU15), Central and Eastern Europe (CEE), Asia, North America and the whole world for the entire manufacturing sector for the UK and Germany, respectively.<sup>2</sup> From the figures it is evident that for the UK as well as Germany the large majority of outsourcing takes place within the European Union (EU15). In comparison, outsourcing to North America, Asia or Central and Eastern Europe is of much lower magnitude, although for Germany outsourcing towards Central and Eastern Europe is growing rapidly. Evidently most outsourcing does not occur in the direction of low wage countries, but takes place among countries with reasonably similar productivity and wages. This indicates the importance of other factors, such as economies of scale, as determinants of international outsourcing.

Summarising, international outsourcing has grown substantially, particularly in the UK, but also in German manufacturing. Nevertheless, the intensity of international outsourcing is somewhat more pronounced in German than in UK manufacturing. However, regarding the geographic distribution of international outsourcing, both countries have similar patterns with outsourcing towards the EU15 taking the largest share.

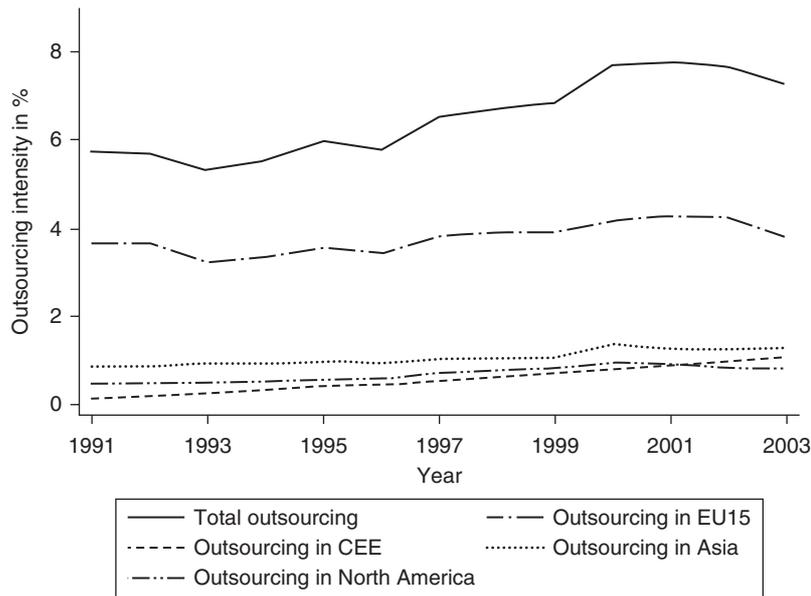
160 *Globalisation and Labour Market Adjustment*

Figure 9.4: Narrow outsourcing in German manufacturing by region

### 9.3 Theoretical background

Given the increasing importance of international outsourcing, it has been of much concern as to what the potential implications of this are for labour market outcomes, in particular for low-skilled workers in industrialised countries. Over recent years, a number of theoretical contributions such as Feenstra and Hanson (1996), Arndt (1997, 1999), Dearnorff (2001, 2002), Jones and Kierzkowski (2001) and Kohler (2004) have greatly advanced theoretical insights into the potential effects of international outsourcing for different skill groups. However, the implications of international outsourcing in terms of relative factor demand are not clear-cut.

For example, Feenstra and Hanson (1996) formulate a model of international outsourcing, which is a specific form of a Heckscher–Ohlin type model with only one final good and two countries, North and South, one specialising in high skill production and the other in low skill production. By changing relative unit costs of production, for instance due to capital flows from the North to the South or Hicks-neutral technological progress in the South, production fragments, with low skill

intensity production shifting from the North to the South, which raises the average skill intensity of production in both regions. As a result, relative demand for skilled labour increases in both the North and in the South. Thus, international outsourcing has the same effects as factor biased technological change, which simultaneously occurs worldwide, i.e. in both countries.<sup>3</sup>

Similarly, Arndt (1997, 1999) develops a model of international outsourcing that is also based on a Heckscher–Ohlin type framework, but makes less restrictive assumptions. In his setting he considers trade between a small price-taking economy and the rest of the world, allowing for two factors of production and two final goods. If, within the model, the low skill intensive industry shifts some fragments of production abroad, this results in a productivity improvement in the low skill intensive industry and, with given world prices, ultimately in higher relative wages for low skilled workers. Thus, the effects of outsourcing correspond to sector biased technological change.<sup>4</sup>

However, it is also easily conceivable that the high skill intensive industry shifts some less skill intensive fragments of production abroad. Again, this acts as technological progress in the skill intensive sector and thus raises (lowers) relative wages for high-skilled (low-skilled) workers. Both scenarios are, in principle, equally plausible, and outsourcing can therefore lead to relative wage gains or losses for low-skilled workers.

To complicate things, if one considers a Heckscher–Ohlin type model with many goods and many factors, as in Jones and Kierzkowski (2001) or Deardorff (2001), the implications of international outsourcing become even more ambiguous. Thus, depending on the models' assumptions and framework, low-skilled workers could either gain or lose from international outsourcing in terms of relative wages.

What is important to note, however, is that all of the aforementioned general equilibrium models assume that labour market adjustments are achieved by sufficiently flexible relative wages. Although this may be justifiable in the long run, in the medium and short run, especially in many European countries, relative wages might be fairly rigid. If this is the case, labour market adjustments to international outsourcing have to be achieved mainly by changes in employment. More specifically, Krugman (1995) stresses the implications of rigid relative factor prices for employment and welfare in a parsimonious two country, two factor and two sector model. With rigid relative wages, relative factor proportions (that is the ratio of skilled to unskilled workers) are also fixed in each sector. Thus, there is not sufficient scope for low-skilled workers from

the low skill intensive sector to move into the high skill intensive sector. As a result reduced demand for low-skill intensive goods has to be met by unemployment of low-skilled workers. Furthermore, due to reduced employment, domestic income also falls, multiplying the immediate adverse effect.

Another important limitation of the aforementioned models that needs to be kept in mind is that they generally abstract from adjustment costs. However, as authors such as Davidson and Matusz (2004) convincingly show, if displaced workers experience spells of unemployment and in some cases have to be retrained, short-run adjustment costs can consume a significant part of the overall gains from international trade (see Chapter 2 of this volume). In terms of policy recommendations it is therefore important not only to focus on the long-run effects of international outsourcing, but also to obtain a better understanding of its immediate short-run effects.

#### **9.4 Empirical evidence: industry level**

In the last few years there has been an upsurge of empirical studies assessing the labour market impact of international outsourcing. The first strand of this literature has used industry level data and has been concerned mainly with partial equilibrium effects, as labour is implicitly or explicitly assumed to be immobile between sectors.<sup>5</sup> We review a number of these contributions in this section.<sup>6</sup>

Feenstra and Hanson (1996) provide one of the first empirical assessments of the impact of international outsourcing on the relative demand for low-skilled workers. In their study for the United States they approximate international outsourcing by the share of imports from a particular industry abroad in total domestic demand for that industry's products. Their empirical model is based on a translog cost function with capital as a quasi-fixed input. From this cost function, a cost share equation for non-production workers is derived. In order to assess the impact of outsourcing, Feenstra and Hanson extend the cost share equation to include each industry's outsourcing intensity. Following this procedure the authors report that approximately 15–33 per cent of the increase of the cost share of non-production labour over the period 1979–87 can be explained by international outsourcing. In a follow-up study, Feenstra and Hanson (1999) apply the narrow definition of international outsourcing (as discussed in Section 9.2) by focusing on imported intermediate inputs of an industry from the same industry abroad. According to this study international outsourcing can explain

between 11 per cent and 15 per cent of the observed decline in the cost share of production labour in US manufacturing between 1979 and 1990.

Morrison-Paul and Siegel (2001) extend the above studies by simultaneously incorporating several trade and technology related measures that can shift relative labour demand in a system of factor demand equations. Their results suggest that international outsourcing, as well as trade and technological change, significantly lowered relative demand for low skilled labour in the US.

Kletzer (2000) follows a different approach. Instead of focusing on net labour demand effects, as in the above papers, she is concerned with industry level displacement rates and analyses the role of changes in exports, import penetration and imported intermediate goods, which arguably correspond to international outsourcing, for the US. While the author finds that overall import penetration increases industry displacement rates significantly, imports of intermediate goods have no effect. Furthermore, when she controls for industry fixed effects, even overall import penetration is rendered insignificant.

As regards evidence for European countries, a number of studies should be mentioned. In one of the first studies, Anderton and Brenton (1999) look at the case of the UK and estimate the impact of outsourcing for a panel of eleven disaggregated (low skill intensive) textile and (high skill intensive) mechanical engineering industries. The authors approximate outsourcing by industry level import penetration ratios, but distinguish between imports from low and high wage countries. While the effect of import penetration is, in general, not statistically significant for the mechanical engineering industries, in the textiles industry up to 40 per cent of the observed rise in the cost share of skilled workers between 1970 and 1983 can be explained by import penetration from low wage countries. To take account of Krugman's (1995) point that adjustment may be through unemployment rather than wages, they also examine the effect of outsourcing on the employment share of skilled relative to unskilled workers. Again, they find no statistically significant results for the engineering industry, but a positive relationship in the textile industry: import penetration can explain up to 33 per cent of the rise in the employment share of skilled relative to unskilled workers over the observed periods. Hence, for the UK, adjustment works through both the wage and employment channels. This may not be too surprising, as it has a relatively flexible labour market compared to other European countries.

Hijzen, Görg and Hine (2005) extend the work of Anderton and Brenton (1999) using data for UK manufacturing industries for 1982 to 1996.

They measure international outsourcing in a similar manner to Feenstra and Hanson (1996, 1999), as a share of imported intermediate inputs – arguably a more appropriate measure of outsourcing than the import penetration ratio used by Anderton and Brenton. Their data cover all manufacturing sectors, and they simultaneously estimate a system of four variable factor demands (skilled, semi-skilled, unskilled labour and materials) using panel data techniques. Estimating a system of variable factor demands provides more detailed information on the impact of structural change on industry level factor demands. They find strong evidence that international outsourcing reduces the demand for unskilled labour in the UK. They also estimate cost and employment share equations and, similar to Anderton and Brenton, find these effects to be present in both settings.

Turning to a European country with arguably fairly rigid labour markets (certainly compared to the UK or US), Falk and Koebel (2002) present an analysis of the effect of outsourcing on wages using industry level data for Germany. They use a Box-Cox cost function, which nests the normalised quadratic as well as the translog functional form, and estimate elasticities of substitution from a system of input-output equations. International outsourcing is implemented in the model as a flexible choice variable captured by relative prices for imported intermediate goods and purchased services. Their findings suggest that between 1978 and 1990, neither imported material inputs nor purchased services substituted for unskilled labour in German manufacturing industries.

Their approach can be criticised since the impact of international outsourcing is only captured by relative price changes for imported intermediate inputs. However, intensified international outsourcing is consistent with unchanging or even increasing observed relative prices for imported intermediate inputs. Factors such as trade liberalisation, the opening up of former communist states or new advances in communication technologies reduce the costs of outsourcing. These developments are not necessarily reflected in relative prices for intermediate goods if outsourcing costs were previously prohibitive.

In a more recent study for Germany, Geishecker (2006a) uses the Feenstra and Hanson (1996, 1999) approach, measuring international outsourcing as the value of imported intermediate goods. His focus is on the impact of outsourcing (implemented as a technological shift parameter) on the relative demand for low-skilled workers in Germany during the 1990s, differentiating between the effects of outsourcing to different geographic regions. Furthermore, following authors such as

Egger and Egger (2003), he applies instrumental variable techniques to account for the endogeneity of international outsourcing using lagged outsourcing values as instruments. In this study, international outsourcing is found to be an important factor for reducing the relative demand for manual workers in German manufacturing. Distinguishing outsourcing by geographic regions, Geishecker finds that outsourcing to the European Union has no statistically significant impact. By contrast, a one percentage point increase in outsourcing towards Central and Eastern Europe lowers the wage bill share of manual workers by more than four percentage points for narrow outsourcing and by almost three percentage points for wide outsourcing. By way of assessing the economic relevance of these estimates, Geishecker (2006a) demonstrates that increased international outsourcing to Central and East Europe can explain around 50 per cent of the overall decline in the wage bill share of manual workers during the 1990s. This contrasts strongly with the earlier findings of Falk and Koebel (2002) who find no significant impact of outsourcing on the relative demand for low-skilled (manual) workers.

Although the industry level studies discussed in this section have, in general, greatly advanced the understanding of the labour market effects of international outsourcing, they have some inherent shortcomings that potentially limit the applicability of their findings. First of all, the use of aggregated industry level data can seriously bias estimated coefficients as individual heterogeneity is not captured by unconditional industry means of employment and wages. Furthermore, most industry level studies assume international outsourcing to be exogenous to labour demand, an assumption that is rarely tested. If international outsourcing is, however, jointly determined with the demand for labour, estimated coefficients suffer from endogeneity bias. Authors such as Egger and Egger (2003) and Geishecker (2006a) propose instrumental variable techniques to overcome this problem. However, finding valid instruments may, however, prove to be difficult in practice. Finally, aggregated industry level data typically suffer from poor skill classifications, with most studies associating non-manual workers with high skills and manual workers with low skills. Clearly, this is only a crude approximation, however, and due to limited data availability at the industry level it is hard to assess the extent to which this affects the estimation results.

### **9.5 Empirical evidence: micro level**

More recently, a new strand of the literature has attempted to overcome these shortcomings by using firm or individual level data and

assessing the impact of international outsourcing in a microeconomic framework.

The aggregation bias of industry level studies concerns the failure of such studies to control for individual heterogeneity, i.e. compositional changes within the sample. Individual labour market outcomes are determined by a wide range of characteristics such as age, marital status, education, occupation or firm size. In addition, unobserved individual characteristics play an important role. Simply calculating unconditional industry means of individual labour market outcomes neglects these heterogeneous determinants and is therefore inappropriate if the composition of the workforce changes. Moreover, even if the composition of an industry's workforce does not change, there is the possibility of a time constant selection of certain characteristics into the respective industry which could deliver biased results if, for example, firms with certain worker characteristics are more likely to outsource and also more likely to pay higher wages. Aggregation to the industry level without controlling for this process leads to an omitted variable bias as the error term is correlated with the industry's outsourcing intensity. While the latter problem of time constant selection is easy to tackle in industry level studies by allowing for an unobserved industry fixed effects, the former problem of compositional change is more difficult to address. The use of micro level data, however, allows one to control adequately for micro level observed and unobserved heterogeneity.

Despite these potential advantages, only a few studies have used firm level data to look at the labour market effects of international outsourcing. Head and Ries (2002) use Japanese firm level data to look at the effect of international outsourcing on relative labour demand at the level of the plant. They find that Japanese firms that increase employment in foreign affiliates in low income countries raise the skill intensity of employment in their headquarters (as measured by the share of non-production workers). No such effect is apparent for firms outsourcing production to high income countries.

Görg and Hanley (2005) examine the effect of international outsourcing on labour demand at the plant level using data for the Irish electronics sector. Estimating a dynamic employment equation they find that, in the short run, plant level labour demand is significantly reduced by outsourcing. In addition, they are able to separate the effects of outsourcing of materials from that of services and find that the former has a stronger impact than the latter. However, due to data limitations they

cannot extend the analysis to distinguish between high- and low-skilled labour. In addition, they point out that their analysis, being concentrated on one sector only, fails to pick up overall economy-wide employment gains, because it merely captures employment losses within this one sector. Hence it fails to pick up extra-sectoral employment leakages.

Since the labour market effects of outsourcing ultimately concern individual workers, it is fruitful to examine individual worker data. However, to date, only a few studies have done so, using household panel data combined with industry level outsourcing measures. The use of this type of data arguably has some further advantages. Due to the disaggregated nature of the analysis, the potential endogeneity of industry level variables (in particular outsourcing) is considerably reduced, as individual characteristics are unlikely to affect industry level aggregates. In addition, individual level data typically provide more detailed information about individual skills than do industry or firm level data.

Geishecker and Görg (2004) look at the wage effects of international outsourcing for the years 1991–2000 using individual worker data for Germany from the German Socio-Economic Panel. This is combined with industry level information on outsourcing from input-output tables. They, thereby, extend the work by Geishecker (2006a) who found, using industry level data, that there are relative wage effects of international outsourcing. Furthermore, Geishecker and Görg (2004) extend the literature by employing more accurate definitions of workers' skill levels. One definition distinguishes three skill categories that comply with the International Standard Classification of Education (ISCED), and the other applies a skill grouping that is based on required on the job skills rather than educational attainment. Utilising the more detailed micro data, Geishecker and Görg (2004) incorporate the industry's international outsourcing activity as a shift parameter in a Mincerian wage model and find that outsourcing has had a marked impact on wages. For workers in the lowest skill categories, real wages were reduced by up to 1.5 per cent while real wages for high-skilled workers grew up to 2.1 per cent.

In addition to the wage effects, Geishecker (2006b) focuses on the employment effects of international outsourcing using the same database as in Geishecker and Görg (2004). Specifically, he investigates the impact of outsourcing on job security, i.e. the risk of exiting employment, capturing the risk of leaving employment within a micro-level hazard rate model.<sup>7</sup> The main advantage is that he can control for a wide range of person-specific observed and unobserved characteristics and, most importantly, for duration dependence. He finds that

international outsourcing over the period 1991 to 2000 significantly increases the individual risk of leaving employment by 13 per cent. However, he does not find significant differences in the impact of international outsourcing on employment security for the different skill groups (low, medium and high skilled). This is an interesting result as it diverges from the findings of industry level studies that typically identify low-skilled workers as more adversely affected by international outsourcing than high-skilled workers. It is important to keep in mind, though, the finding by Geishecker and Görg (2004) that wages for unskilled workers are negatively affected by international outsourcing, while those for skilled workers are positively affected. Hence, while both types of workers face an equal level of threat of losing their jobs, high-skilled workers that are able to stay in employment gain in terms of wages, while unskilled workers that keep their job face lower wages.

Munch (2005) provides a similar study for Denmark, a country with arguably a less rigid labour market than Germany. Specifically, he analyses the impact of industry level international outsourcing on job separations using yearly data for a 10 per cent sample of the Danish population using an employment duration model. Unobserved individual heterogeneity is captured within a random effects mass point model. Estimating a single risk model, his general finding is that international outsourcing, at least when broadly defined, has a significant but small impact on individual job separation risks. Estimating a competing risk model and differentiating between exit into unemployment and changing jobs, he finds that international outsourcing increases the risk of becoming unemployed, but that the effect is only statistically significant for low-skilled workers. For high-skilled workers, international outsourcing increases the probability of changing jobs, but has no effect on the individual hazard of becoming unemployed.

In a related approach, Pfaffermayr, Egger and Weber (2007) use individual level data to focus on inter-sectoral worker flows that arise as a consequence of outsourcing. They calculate the transition probabilities of employment, using a worker flow framework similar to that pioneered by Kletzer (2000). Utilizing a random sample from Austrian social security data, the authors estimate a transition model for multiple states, i.e. employment in the service sector, the trade sector, the manufacturing sector, unemployment and out of the labour force.<sup>8</sup> Their results suggest that international outsourcing significantly reduces the probability of transition into manufacturing employment, at least into that part of manufacturing that has a revealed comparative disadvantage and, thus, is more affected by international competition.<sup>9</sup>

## 9.6 Conclusions and policy implications

Broadly speaking, there is evidence from the EU and other countries that international outsourcing leads to a shift in relative demand for labour, and that this can have implications for the wage bill as well as the employment prospects of high- versus low-skilled labour. What are the policy implications of these findings? First of all, it is important to stress that the crucial issues for policy-makers are the medium and long-run effects of international outsourcing. However, empirical studies generally deal with partial equilibrium (short-run) effects. Thus, factor movements between sectors or long-run competitiveness effects due to outsourcing are not taken into account. However, the partial equilibrium results give some indication of the direction in which the labour market adjustment in response to international outsourcing seems to go.

A common conclusion of most theoretical contributions is that international outsourcing generally improves welfare as it yields substantial efficiency gains.<sup>10</sup> However, welfare gains are not conclusive if some of the standard assumptions of general equilibrium models are altered. Krugman (1995) shows that only with sufficiently flexible factor prices can potential gains from trade be realised. In addition, Davidson and Matusz (2004) demonstrate that, although welfare gains dominate, adjustment costs can consume a substantial part of these gains if workers experience unemployment or have to be retrained. Thus, policies that foster wage flexibility and lower adjustment costs can certainly increase the ability to reap gains from international outsourcing (and trade more generally).

Even if international outsourcing does indeed lead to welfare gains, the question is whether the potential losers ought to be compensated. As the analysis showed, it is in particular low-skilled workers who feel the pressure from international outsourcing. Hence, as a reaction, it may be essential for workers to either obtain higher qualifications or to find new employment opportunities in other sectors of the economy. However, changing industry most likely results in substantial losses in terms of post-displacement earnings (e.g. Burda and Mertens, 2001; Haynes et al., 2002) which is a significant obstacle for such transitions. Insurance schemes that partly compensate workers for their potentially lower post-displacement earnings, as discussed in Kletzer (2004), are therefore a particularly interesting policy which might help the transition between sectors. However, crowding-out and windfall effects may significantly limit the scope of action for policy-makers.

**Data appendix**

Industry level data on international outsourcing were constructed by combining input-use tables from input-output statistics (for Germany: Tables 1.1.1991–1.1.1999 in Statistisches Bundesamt, 2002, and Table 1.1 in Statistisches Bundesamt, 2004; for the UK: Input-Output Supply and Use Tables, 1992–2000, Combined Use matrix, intermediate demand, provided by Office for National Statistics, 2002).

Although for Germany use tables for imported goods are available this is not the case for the UK. Accordingly, in order to ensure the highest possible level of comparability, we only use combined use tables capturing domestic production and imports.

Constructed use shares  $\Omega_{i*it}$  were carried forward and backward to fill in values for 1991 and 2001, 2002, 2003.

Import data were obtained from the OECD International Trade by Commodity statistics. Disaggregated trade data, which complies with the five digit Standard International Trade Classification (SITC Rev. 3), was aggregated to two digit industries applying a concordance table between SITC Rev. 3 and the International Standard Industrial Classification of All Economic Activities (ISIC Rev. 3).

**Notes**

1. The data used to construct these figures are described in the appendix.
2. Outsourcing in CEE, EU15, Asia and North America does not fully add up to total outsourcing. CEE includes: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia.
3. This implies that there is a problem of identification in empirical studies, which need to make sure that they are able to control for technological change in order to identify the effect of outsourcing. This is done, for example, in Machin and Van Reenen (1998) and Hijzen et al. (2005) by including industry level R&D intensity as a control variable to capture the impact of changes in technology on relative labour demand. Feenstra and Hanson (1996, 1999) represent technical change in the form of expenditures on high-technology capital such as computers.
4. Accordingly, in a scenario in which world prices are not given, changes in relative factor prices depend on the elasticity of world demand.
5. Contributions that empirically assess the labour market impact of international outsourcing in general equilibrium include Hijzen (2007), Tombazos (2003), Harrigan (2000), Harrigan and Balaban (1999) and Feenstra and Hanson (1999).
6. Our review does not claim to be exhaustive, but focuses on the evidence for the US, UK and Germany. See Feenstra and Hanson (2001) for a more comprehensive review, covering also studies for other countries.
7. This study is therefore related to the industry level displacement studies by authors such as Kletzer (2000) and Davidson and Matusz (2004).

8. To control for unobserved individual heterogeneity the authors chose a fixed effects specification. Although such a fixed effects specifying has the clear advantage that no assumptions about the correlation between the unobserved component and the individual time varying variables have to be made, the estimator used does not allow computing the probabilities of the transition matrix as no constant can be estimated.
9. However, Pfaffermayr et al. (2007) do not address the issue of duration dependence and the potentially different impact of international outsourcing for employment transitions of different skill groups.
10. In line with this, studies such as Görg, Hanley and Strobl (2007) and Amiti and Wei (2006) show that international outsourcing is associated with higher productivity at the firm or industry level in the short run. An important exception in the theoretical literature is Kohler (2004) who points to the possibility of welfare losses due to outsourcing under certain conditions.

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172 *Globalisation and Labour Market Adjustment*

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