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Offshoring, Labour Market Institutions and the Elasticity of Labour Demand

by

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Abstract

This paper analyses the evolution of the elasticity of labour demand and the role of offshoring therein using industry-level data for a large number of OECD countries. The first main finding is that the wage elasticity of labour demand has increased substantially. The finding that employment has become increasingly sensitivity to wages is shown to be robust to a wide variety of econometric specifications of labour demand, although some of this association may reflect a trend increase in the speed of adjustment rather than an increase in the long-run wage elasticity. A second finding is that more intensive offshoring is associated with more elastic labour demand, consistent with increased offshoring having expanded the flexibility of firms to adjust the mix of domestic workers and foreign value-added in production when relative factor prices change. More in particular, the average elasticity of labour demand appears to be about 30% to 40% larger in absolute value than the counter-factual elasticity which would have prevailed had offshoring not been possible. Increases of this magnitude might well have important implications for job security and worker bargaining power. Finally, we find some evidence that strict employment protection legislation weakens the link between offshoring and higher labour demand elasticity. This suggests that the impact of offshoring on labour demand elasticity depends on the national institutional environment.

JEL classification: F16

Keywords: Employment protection legislation, international outsourcing, labour demand, worker insecurity

Outline

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Non-Technical Summary

Much previous work on the labour market effects of globalisation has focused on the way trade changes the structure of labour demand across different sectors of the economy and types of workers. In effect, globalisation is represented as a series of incremental demand shocks to which labour markets need to adjust. The overwhelming consensus in the literature is that the total gains accruing to workers from globalisation greatly exceed the losses, although there will be both winners and losers in the absence of compensating government interventions.

The sanguine view of the labour market impact of globalisation that predominates in the academic literature stands in contrast to more alarmist perceptions frequently expressed in the public debate. A German Marshall Fund poll released at the end of 2006 finds that while most of the respondents in seven OECD countries agree that freer trade yields benefits to business and consumers, approximately one-half of them also believe that "freer trade costs more jobs than it creates". A 2005 Eurobarometer opinion poll further showed that more of the European Union's population has a negative than a positive view of globalisation (46% versus 37%) and that negative views often reflect concerns over job losses or a "race to the bottom" in employment conditions. Widespread public unease about globalisation may reflect globalisation-induced changes in the way the labour market adjusts to demand shocks and the nature of the employment relation, which go beyond to the transitory adjustment costs and relative wage adjustments which have been the focus of most of the academic literature.

Dani Rodrik from Harvard University hypothesised that globalisation increases the responsiveness of employment and wages to economic shocks, by increasing the own-price elasticity of labour demand. If confirmed by empirical analysis, such a link could help to explain a number of concerns that regularly feature in the public debate. First, it may explain why workers appear to feel increasingly insecure, since the wage and employment effects of a given shock are amplified by an increase in the labour demand elasticity. Second, a more elastic labour demand would also tend to reduce the bargaining power of workers relative to employers, possibly contributing to explain the fall in national wage shares. Third, such an increase might also reduce the scope for risk-sharing arrangements between workers and firms, for example when firms provide stable wages to long-term workers, despite fluctuations in external labour market conditions. Finally, an increase in the elasticity of labour demand will make the wage and employment effects of non-wage costs more pronounced.

This paper contributes to the existing literature in three ways. First, this paper documents how the elasticity of labour demand has evolved across a wide range of OECD countries. We find that the elasticity of labour demand has increased substantially over this period, particularly in the manufacturing sector.

Second, the paper analyses the impact of globalisation on the elasticity of labour demand by specifically focusing on offshoring. The rise in offshoring, and the development of international production networks more generally, provides a plausible explanation behind the observed increase in the elasticity of labour demand as it may significantly have expanded the flexibility of firms to adjust the mix of domestic workers and imported intermediate inputs in production in response to changing market conditions. Our findings suggest that offshoring generally has tended make labour demand more elastic. In our estimation sample, the average elasticity of labour demand appears to be about 30% to 40% larger in absolute value than the counter-factual elasticity which would have prevailed had offshoring not been possible. Increases of this magnitude might well have important implications for job security and worker bargaining power.

A final contribution of the paper is to show that labour market regulations, such as employment protection legislation (EPL), can influence how offshoring impacts upon labour-demand elasticity by affecting the

ease with which firms can substitute between factor inputs. Our results suggest that the link between offshoring and more elastic labour demand is stronger in countries where EPL is relatively weak, while in countries with strict EPL, offshoring does not exert a strong impact on the elasticity of labour demand

1. Introduction

Much previous work on the labour market effects of globalisation has focused on the way trade changes the structure of labour demand across different sectors of the economy and types of workers. In effect, globalisation is represented as a series of incremental demand shocks to which labour markets need to adjust. The overwhelming consensus in the literature is that the total gains accruing to workers from globalisation greatly exceed the losses, although there will be both winners and losers in the absence of compensating government interventions. As concerns short-run adjustment costs, workers displaced by trade represent only a small share of total labour turnover and the labour market adjustment difficulties that they encounter appear to be similar to those experienced by other job losers (Kletzer, 2002; OECD, 2005). As concerns long-run effects, globalisation appears to have been one of the factors tending to depress the relative wages of low-skilled workers, but to have played a relatively limited role in the overall increase in earnings inequality during the past several decades (Slaughter, 2000; Feenstra, 2007). By comparison, trade generates large increases in average living standards (Bradford, *et al.*, 2005).

The sanguine view of the labour market impact of globalisation that predominates in the academic literature stands in contrast to more alarmist perceptions frequently expressed in the public debate. A German Marshall Fund poll released at the end of 2006 finds that while most of the respondents in seven OECD countries agree that freer trade yields benefits to business and consumers, approximately one-half of them also believe that "freer trade costs more jobs than it creates" (GMF, 2006). A 2005 Eurobarometer opinion poll further showed that more of the European Union's population has a negative than a positive view of globalisation (46% versus 37%) and that negative views often reflect concerns over job losses or a "race to the bottom" in employment conditions (European Commission, 2005). While public perceptions may not reflect an accurate assessment of the actual labour market effects of globalisation, they may nevertheless provide some useful insights. In particular, the widespread public unease about globalisation may reflect globalisation-induced changes in the way the labour market adjusts to demand shocks and the nature of

the employment relation, which go beyond to the transitory adjustment costs and relative wage adjustments which have been the focus of most of the academic literature.[1]

Rodrik (1997) hypothesised that globalisation increases the responsiveness of employment and wages to economic shocks, by increasing the own-price elasticity of labour demand. If confirmed by empirical analysis, such a link could help to explain a number of concerns that regularly feature in the public debate. First, it may explain why workers appear to feel increasingly insecure (see Alibert *et al.* 2006; OECD, 1997), since the wage and employment effects of a given shock are amplified by an increase in the labour demand elasticity.[2] Second, a more elastic labour demand would also tend to reduce the bargaining power of workers relative to employers, possibly contributing to explain the fall in national wage shares (IMF, 2007). Third, such an increase might also reduce the scope for risk-sharing arrangements between workers and firms, for example when firms provide stable wages to long-term workers, despite fluctuations in external labour market conditions (Bertrand, 2004). Finally, an increase in the elasticity of labour demand will make the wage and employment effects of non-wage costs more pronounced.

There is little evidence to date about whether labour demand has become more elastic as international economic integration has deepened, although two papers using data for the United States find some evidence that this may be the case. Using respectively industry-level and plant-level data for the United States, Slaughter (2001) and Senses (2006) find that the elasticity of labour demand increased during the 1980s for production workers in a number of manufacturing industries. A growing number of studies have explicitly analysed the impact of globalisation on the elasticity of labour demand, but the evidence is rather mixed. Similar to the analysis in this paper, most of these studies have used industry-level data to address this question. Slaughter (2001) finds only limited evidence that increased

1 . Another, but not mutually exclusive, explanation is that public opinion reflects a tendency to scapegoat globalisation for wage stagnation and rising inequality which are largely due to other factors. Scheve and Slaughter (2007) argue that the recent increase in support for protectionist policies in the United States is closely related to "the astonishing skewness of U.S. income growth".

2 . The relative magnitude of employment and wage changes also depends on the elasticity of labour supply (*i.e.* the slope of the labour supply curve). When labour supply is perfectly elastic, as is commonly assumed in firm-based theories, a more elastic labour demand results in higher employment volatility, but has no impact on wages. When labour supply is perfectly inelastic, labour demand shocks only affect the wage and an increase in demand elasticity does not affect the volatility of either employment or wages. However, this is an unlikely case for firm or industry-level analysis. Intermediate values for the labour supply elasticity imply that an increase in labour demand elasticity increases both employment and wage volatility *ceteris paribus*. OECD (2007) provides estimates of the potential contribution of globalisation to employment and wage volatility.

trade integration accounts for the rising trend in his estimates of labour demand elasticity in the United States. Bruno *et al.* (2004) estimate dynamic labour demands for seven major OECD countries for the period 1976-1996 and find that import penetration raised the elasticity of labour demand in the United Kingdom, but had no such impact elsewhere. Molnar *et al.* (2007) perform similar estimations for a number of OECD countries and find that outward foreign direct investment may have rendered labour demand more elastic in the manufacturing sector, but that the opposite may have happened in the services sector.

Several recent studies have used firm-level data to analyse this question. Fabbri *et al.* (2003) look at the probability of plant shutdown across domestic and multinational firms, providing some evidence that multinationals have a higher elasticity of labour demand than domestic firms. Similarly, Görg *et al.* (2006) find that multinationals in Ireland have more elastic labour demands than domestic firms, although this difference narrows as multinationals become more integrated into the local economy through supplier linkages. By contrast, Barba-Navaretti (2003) and Hakkala *et al.* (2007) find no evidence that labour demand is more elastic in multinational firms. Barba-Navaretti (2003) provides evidence that multinationals have less elastic labour demands than domestic firms in the long-run in a number of European countries.[3] However, he also finds that multinationals have a larger short-run elasticity indicating they adjust their employment levels more quickly in response to shocks, than do domestic firms. Finally, Senses (2006) finds that offshoring (or 'international outsourcing') initially increases the elasticity of labour demand but may decrease it after offshoring surpasses a certain threshold. Overall, these findings provide some evidence that international economic integration increases the substitutability of domestic workers by foreign factors, but also suggest that the relationship between labour-demand elasticities and globalisation is complex and may vary depending on the nature of the trade in question and the national labour market context.[4]

3 . He explains this finding by pointing out that multinationals tend to have higher levels of skill-intensity and that the elasticity of labour demand declines in the average level of skills (due to the greater importance of firm-specific human capital).

4. Fajnzylber and Maloney (2000), Krishna *et al.* (2001) and Hasan *et al.* (2007) analyse the elasticity of labour demand in the context of rapid trade liberalisations in various developing countries and also obtain mixed results. Fajnzylber and Maloney (2000) do not detect a systematic relationship between the elasticity of labour demand and trade reform in either Chile, Colombia or Mexico. Krishna *et al.* (2001) estimate unconditional labour demands to emphasize the role of scale effects for Turkey but also find no relationship. Hasan *et al.* (2007) study changes in the elasticity of labour demand during the Indian trade reform. They find that trade reform increased the elasticity of labour demand and that the increase is more pronounced in states with relatively flexible labour market regulations.

The first contribution of this paper is to document how the elasticity of labour demand has evolved across a wide range of OECD countries. For this purpose, various labour demand models are estimated using industry-level data for the period 1980-2002 and 11 OECD countries. We find that the elasticity of labour demand has increased substantially over this period, particularly in the manufacturing sector. This finding is robust to a wide variety of econometric specifications of labour demand. However, it is possible that a considerable part of the increasing sensitivity of employment to wages reflects an increase in the speed with which labour demand reacts to changes in relative input costs, rather than an increase in the long-run elasticity. While this is an important distinction, a globalisation-induced increase in either the speed of labour demand adjustment or the magnitude of the long-run adjustment would be likely to increase structural adjustment pressures, as a result of globalisation or other factors, in the labour market.

The paper further contributes to the literature analysing the impact of globalisation on the elasticity of labour demand by specifically focusing on offshoring. The rise in offshoring, and the development of international production networks more generally, provides a plausible explanation behind the observed increase in the elasticity of labour demand as it may significantly have expanded the flexibility of firms to adjust the mix of domestic workers and imported intermediate inputs in production in response to changing market conditions (Rodrik, 1997; Senses, 2006; Thesmar and Thoenig, 2007). Moreover, many of the countries analysed here witnessed a significant development of international production networks during the sample period, which to an important extent reflects the spreading practice of offshoring (OECD, 2007).

We argue that the impact of offshoring on the elasticity of labour demand is theoretically ambiguous and hence ultimately an empirical issue. While offshoring is expected to increase a firm's substitution possibilities between factor inputs, the elasticity of substitution is only one of several factors determining the own-price elasticity of labour demand, which are likely to be affected by offshoring. In particular, it seems reasonable to assume that offshoring by firms in the most developed countries will also lead to a reduction in the cost share of labour. Making use of a standard decomposition of the determinants of labour demand elasticity into substitution and scale effects, we show that a simultaneous increase in the constant-output elasticity of substitution and decrease in the cost share of labour in production will have off-setting effects on the total elasticity of

labour demand: reinforcing the substitution effect, while dampening the scale effect. If the price elasticity of product demand is large enough relative to the elasticity of substitution in production, than offshoring can reduce labour demand elasticity, rather than increase it.

For this part of the analysis the paper uses industry-level data from 17 OECD countries to estimate the impact of offshoring on labour demand elasticity, where offshoring is measured as the share of imported intermediate inputs in domestic production (Feenstra, 1996).[5] Our findings suggest that offshoring generally has tended make labour demand more elastic. In our estimation sample, the average elasticity of labour demand appears to be about 30% to 40% larger in absolute value than the counter-factual elasticity which would have prevailed had offshoring not been possible. Increases of this magnitude might well have important implications for job security and worker bargaining power.

A final contribution of the paper is to show that labour market regulations, such as employment protection legislation (EPL), can influence how offshoring impacts upon labour demand elasticity by affecting the ease with which firms can substitute between factor inputs.[6] More specifically, one would expect the link between offshoring and more elastic labour demand to be stronger in countries where EPL is relatively weak, while in countries with strict EPL, offshoring is expected exert a moderate impact on the elasticity of labour demand. In fact, it may even make labour demand less elastic when the price elasticity of product demand is large enough relative to the elasticity of substitution which is more likely the stricter EPL. We find that, consistent with our expectations, strict EPL weakens the link between offshoring and higher labour demand elasticity.

Our findings on the role of EPL accord well with previous findings reported by Hasan *et al.* (2007) and Senses (2006). Hasan *et al.* find that trade liberalisation in India has increased the elasticity of labour demand more strongly in states where employment protection legislation is less strict. The possibility that offshoring may reduce the elasticity of labour demand does not feature in their paper, however, because this possibility is closely tied to the specific nature of offshoring and is unlikely to apply to trade

5 . Note that whilst most previous research has focused on the relative flexibility of multinationals to adjust their input mix across national borders, and therefore on substitution within the firm, offshoring defined as the share of imported intermediate inputs in production is more general. The latter captures substitution opportunities both within and outside the firm (*i.e.* though both intra-firm and arm's-length trade).

6 . In the presence of EPL, the effective elasticity of substitution between labour and other factors of production may be lower than the purely technological elasticity of substitution.

liberalisation generally. By contrast, Senses analyses the specific impact of offshoring on the elasticity of labour demand. She argues that the impact of offshoring on the elasticity of labour demand is nonlinear as its impact depends on the initial cost share of labour. More in particular, offshoring is more likely to make labour demand less elastic the smaller the initial cost share. She also provides empirical evidence that this is the case in US manufacturing.

The outline of this paper is as follows. Section 2 uses a simple decomposition of the own-price elasticity of labour demand to identify the multiple channels through which offshoring may affect labour demand elasticity. Section 3 sets out the econometric framework. Section 4 presents the baseline results for the evolution of labour demand elasticity since 1980, along with a wide range of robustness checks. Section 5 analyses the role offshoring and employment protection in explaining differences in the elasticity of labour demand across industries and countries. Section 6 concludes.

2. Theoretical background

Assuming perfect competition, constant returns to scale and homogenous firms, the price elasticity of industry-level labour demand η_{LL} can be expressed as the weighted average of two components: i) the constant-output elasticity of substitution, σ; and ii) the (absolute) price elasticity of product demand, η_P; where the cost share of labour , s_L, acts as the weighting factor (Hamermesh, 1993):

$$\eta_{LL} = -(1 - s_L)\sigma - s_L\eta_P \quad (1)$$

The first component captures the substitution effect, which reflects the extent to which a firm substitutes away from labour when faced with an increase in its price, for a given level of output. The second component captures the scale effect, which represents the reduction in employment due to the reduction in output that occurs to the extent that the increase in labour costs leads to higher output prices and therefore lower sales. For a given cost share of labour, the scale and substitution effects due to a change in the wage work are

both negative. The larger the cost share, the greater the relative importance of the scale effect in determining the total elasticity of labour demand.[7]

Differentiating equation 1 with respect to offshoring (measured by the share of imported intermediate inputs in production, s_M), provides a useful expression for the marginal change in labour demand elasticity due to a marginal change in offshoring:

$$\frac{\partial \eta_{LL}}{\partial s_M} = [\Delta \text{ substitution effect}] + [\Delta \text{ scale effect}]$$

$$= \left[-(1-s_L)\frac{\partial \sigma}{\partial s_M} + \sigma \frac{\partial s_L}{\partial s_M} \right] + \left[-s_L \frac{\partial \eta_P}{\partial s_M} - \eta_P \frac{\partial s_L}{\partial s_M} \right] \quad (2)$$

Offshoring may thus influence the elasticity of labour demand through three channels, namely, its potential impacts on the elasticity of substitution, the cost share of labour and the price elasticity of product demand. In the absence of direct evidence concerning these impacts, it appears reasonable to conjecture that increased offshoring will tend to increase σ, decrease s_L and have little or no impact on η_P:

- To the extent that setting up an international production network involves a fixed cost (Antras, 2003), the constant-output elasticity of substitution between workers at home and value-added produced abroad will tend to be greater for firms that already offshore and have thus established an international production network.[8] In other words, by incurring the fixed cost to set up an international production network firms not only can take advantage of lower production costs abroad, but can also increase their flexibility in production, by allowing them to more easily vary their input mix across locations in response to changes in their economic environment.[9]

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7 . Chirinko and Mallick (2006) note that if costs shares are allowed to change the first of Marshall four rules of labour demand, which states that labour demand is more elastic the more easily substitutes for labour can be obtained, is no longer generally valid.

8 . In the industry-level empirical analysis in Section 5, we expect the elasticity of substitution to be positively correlated with offshoring intensity mainly because the latter gives an indication of the pervasiveness of offshoring across firms within an industry, i.e. the number of firms that has established an international production network in an industry. One may refer to this as the extensive margin of offshoring.

9 . Note the argument here is slightly different from that expressed in Kohler (2005) who shows that offshoring may be expected to increase the elasticity of substitution between domestic capital and

- The impact of offshoring, which involves trade in intermediate inputs, on product market competition for final goods is *ex ante* unclear.[10] In principle, offshoring may have an impact on the number of available varieties (under monopolistic competition) or on mark-ups (under monopolistic competition or oligopoly). However, it is unclear how offshoring will affect market thickness or mark-ups and we assume that offshoring does not affect the price elasticity of product demand.

- In the literature, it is typically assumed that the most labour-intensive activities are offshored first, particularly when the focus is on developed countries which are relatively well endowed in capital and skilled labour. As a result, offshoring is expected to lead to a reduction in the cost share of labour. [11]

Assuming that $\Delta\sigma > 0$ and $\Delta s_L < 0$, the expression in the first square brackets in equation 2 is the sum of two negative terms and hence unambiguously negative (i.e. $-(1-s_L)\Delta\sigma + \sigma\Delta s_L < 0$). That is, offshoring reinforces the substitution effect and hence tends to make labour demand more elastic. Assuming that $\Delta s_L < 0$ and $\Delta\eta_P = 0$, the expression in the second square brackets in equation (2) is unambiguously positive (i.e. $-\eta_P\Delta s_L > 0$). That is, offshoring weakens the scale effect by lowering the labour cost share and hence the extent to which higher wages are passed through onto higher prices. Since the overall impact of offshoring on labour demand elasticity is the sum of offsetting substitution and scale effects, its sign is theoretically indeterminate.[12] Rodrik's conjecture

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domestic labour. In his model, offshoring amplifies the effect of a change in relative price of labour on the substitution between capital and labour by inducing the relocation of increasingly skill-intensive stages of production abroad. As a result, the capital-labour ratio increases by more than it would have done in the absence of offshoring.

10 . By contrast, liberalisation of trade in final goods can be expected to increase competition on product markets and hence to make product demand more price elastic.

11 . The average offshoring intensity in an industry gives an indication of the extent to which domestic production activities have been relocated offshore. One may refer to this as the intensive margin of offshoring.

12 . Lommerud *et al.* (2006) analyse a model in which offshoring necessarily reduces labour demand elasticity, because only the scale effect operates. In their model, monopolistic competitive firms produce final output using a continuum of intermediate inputs, whose production only requires labour. Producers can choose where to produce intermediate inputs, but cannot substitute intermediate input activities for each other. In this setup, offshoring dampens the scale effect, by reducing the cost share of domestic labour in production, making labour demand less elastic. This strengthens the collective bargaining position of workers who remain in employment, allowing them to capture a disproportionate part of the rents. The feedback effect to worker bargaining power reduces the incentives for firms to engage in offshoring and this disincentive is more

that globalisation raises the elasticity of labour demand is less likely to apply to the case of offshoring the larger is the price elasticity of product demand relative to the constant-output elasticity of substitution.[13] By contrast, this analysis suggests that Rodrik's intuition is on more solid ground as concerns the impact of the liberalisation of trade in final goods.[14]

Finally, it is worth emphasising that the elasticity of labour demand at the industry-level, as analysed here, is very different from the national labour demand elasticity in general equilibrium trade models. We analyse partial equilibrium elasticities defined over a single sector, whereas the latter models define general equilibrium elasticities over multiple sectors. As a result of general equilibrium effects, the former cannot be easily aggregated to obtain the national labour demand elasticity (Slaughter, 2001).

3. Econometric framework and data

3.1 The basic model

In order to estimate the constant-output elasticity of labour demand and the total elasticity of labour demand we make use of both the conditional and unconditional labour-demand models. In the conditional model, the profit-maximising level of labour demand is determined by minimising the costs of production conditional on output. More specifically, industry *i*'s production costs $C_i(w_i, x_i)$ are a function of factor prices w (for the variable factors) and output x. By Shephard's lemma, the partial derivatives of the cost function with respect to variable factor prices give factor demands.

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important in the presence of stronger trade unions. Thus, Lommerud *et al.* conclude that de-unionisation, rather than unionisation as typically suggested, creates incentives for firms to relocate certain production activities abroad.

13. More formally, equation 2 implies that offshoring will increase (absolute) labour demand elasticity provided that:

$$\eta_P - \sigma > -(1 - s_L)\frac{\partial \sigma}{\partial s_M}\left(\frac{\partial s_L}{\partial s_M}\right)^{-1}$$

Since the expression on the right-hand side of this inequality is positive, $\eta_P > \sigma$ is a necessary but not sufficient condition for offshoring to reduce the wage elasticity of labour demand. Kohler (2004) and Senses (2006) also analyse conditions under which offshoring can make labour demand less elastic. They use different models which impose more structure on how offshoring affects the production process, than is done here. Both models imply that increased offshoring is more likely to make labour demand less elastic the more important is the initial scale of offshoring.

14. In terms of the notation of equation 2, lower barriers to final goods trade would be expected to result in increased product market competition so that $\Delta\eta_P > 0$ and $\Delta s_L = \Delta\sigma = 0$, implying that labour demand becomes more elastic as a result of a reinforced scale effect.

In the unconditional labour-demand model, it is assumed that firms maximise profits, $\Pi_i(w_i, p_i)$, by choosing the optimal mix of input quantities and the level of output for given input and output prices. The profit-maximising quantity of factor demand is obtained by setting the partial derivative of profits with respect to that factor's price equal to zero. In the case of labour demand, this corresponds to adjusting hiring so that the marginal value product of labour equals the wage.

Log-linear specifications of the conditional and unconditional labour demand models are employed, which has the advantage that the coefficients can be interpreted as elasticities (Hamermesh, 1993). As is common in the literature, capital is treated as quasi-fixed (see for example Berman *et al.* (1994)). There are two reasons for doing so. First, this avoids measurement problems related to the user cost of capital. Second, to the extent that in the unconditional labour-demand model one may not be able to effectively control for the location of the labour demand curve, there is a risk of confounding shifts in the labour-demand schedule with changes in its slope. Including the capital stock rather than the cost of capital helps to control for this, while it also leaves some scope for changes in output.[15]

Omitting country and time subscripts for ease of presentation, conditional labour demand in industry *i* is represented by:

$$\ln L_i = \alpha_0^c + \sum_{j=1}^{J} \alpha_j^c \ln w_{ij} + \beta_k^c \ln k_i + \beta_y \ln y_i + \varepsilon_i \qquad (3)$$

where L corresponds to industry-level labour demand; w to the nominal price of variable factors (*i.e.* the wage and the price of materials); k to the capital stock, y to gross output and ε to a random error term.

Similarly, unconditional (or 'capital-constrained') labour demand in industry *i* is represented by:

$$\ln L_i = \alpha_0^u + \sum_{j=1}^{J} \alpha_j^u \ln w_{ij} + \beta_k^u \ln k_i + \beta_p \ln p_i + + \varepsilon_i \qquad (4)$$

15 . This thus represents a compromise solution between identification of the labour-demand curve and the ability to capture scale effects in the unconditional labour-demand model. As such, one may alternatively like to refer to it as the capital-constrained model.

where L corresponds to industry-level labour demand; w to the price of variable factors; k to the capital stock, p to the price of gross output and ε to a random error term. Given the homogeneity properties of the cost and profit functions, estimation efficiency could potentially be improved by imposing this constraint on the empirical model. However, Clark and Freeman (1980) argue that doing so may aggravate bias in the estimation when measurement error is important. As imposing homogeneity was generally rejected by the data, we report regression results which do not impose this restriction on the estimated coefficients.

3.2 The trend in labour demand elasticity

For the construction of our dataset we combined information from OECD STAN Database, Groningen Growth and Development Centre, 60-Industry Database and OECD STAN Input-Output Database. These databases contain industry-level data from national statistical offices which have been harmonised, as much as possible. The resulting dataset covers the period 1980-2002 for the 11 OECD countries and 20 industries identified in Table A1 in the annex.

The two labour-demand models are estimated using 5-year differences. Differencing takes account of any time-invariant fixed effects. Long differences are used to account for lags in the adjustment of labour demand to shocks. Moreover, estimates based on long differences are less sensitive to bias due to measurement error than either fixed effects or first-differences (Griliches and Hausman, 1986) as well as to inter-temporal or cross-country-differences in labour market policies that affect the speed of adjustment. In order to ensure that the results are not driven by changes in the composition of industries and countries over the estimation period, a balanced panel is used.[16] To remove some of the volatility in the estimated elasticity of labour demand, the estimates are based on a three-year moving averages, rather than a single year.[17]

3.3 Offshoring, institutions and labour demand elasticity

16 . Using an unbalanced panel that fully exploits the available data does not alter the message of the results. Not surprisingly, the differences across different specifications tend to be more pronounced, due to differences in the sample.

17 . This does not, however, affect the main results.

Offshoring is measured using data on imported intermediate inputs for the years 1995 and 2000, which are obtained from the 2006 edition of the OECD's Input-Output Database. Following Feenstra and Hanson (1999), we adopt two measures of offshoring intensity: intra-industry and total offshoring. Total offshoring refers to total imported purchases from all industries as a share of value-added, whereas intra-industry offshoring refers to imported intermediate inputs from the same industry only. As changes in imported intermediate inputs from the same industry are more likely to reflect new substitution opportunities associated with the international fragmentation of production, we prefer the intra-industry measure of offshoring to the broader measure. While previous research has mostly focused on the difference between multinationals and domestic firms, and therefore on substitution within the firm, the measure of imported intermediate inputs used here is more general, capturing substitution opportunities both within and outside the firm (*i.e.* though intra-firm and arm's-length trade).

Offshoring measured at the level of the industry gives an indication of i) the likelihood that firms in that industry are part of international production networks - the extensive margin of offshoring - which is positively correlated with the elasticity of substitution and i) the average intensity of offshoring in that industry - the intensive margin of offshoring - which effectively measures the share of production that has been relocated abroad. With the present data it is impossible to distinguish between the extensive and intensive margin of offshoring and therefore the extent to which offshoring affects the elasticity of labour demand by enhancing substitution possibilities versus by changing the cost share of labour in domestic production.

In order to analyse the role of offshoring at the industry level we extend our basic specification for industry labour demand to include interaction terms between the wage variable and the average offshoring intensity in the industry. As the interaction terms are based on the average offshoring intensities over the sample period, there is no need to include the average intensities separately, because their independent effects drop out of the estimation model after differencing. Note that we are evaluating the effect of the average offshoring intensity in each industry on the elasticity of labour demand, relative to a situation with no offshoring. This differs from Senses (2006), who is mostly interested in the effect of an increase in offshoring, as that allows her to study the non-linear relationship between offshoring intensity and the elasticity of labour demand. In the present paper, we

focus on the level of offshoring since doing so exploits the relative strength of our dataset. Directly measuring the total effect of offshoring on the elasticity of labour demand also allows us to focus on a dimension of globalisation that is important from a policy point of view.

While the inclusion of the interaction terms allows us to evaluate the average marginal effect of offshoring on labour demand elasticity, it does not take account of the possibility that the impact of offshoring varies across industries, countries or time, since this impact depends on the relative sizes of the different terms appearing in equation 2. Ideally, we would like to analyse how the impact of offshoring on the elasticity of labour demand depends on each of these terms. As the different terms of equation 2 are not directly observable in our data, we propose to employ data on the stringency of employment protection legislation (EPL) — which provides a source of exogenous variation in the effective elasticity of substitution — to provide an indication of the importance of this form of heterogeneity. Since EPL has a tendency to restrict the substitution possibilities of firms, it can be expected to weaken the tendency for offshoring to reinforce the substitution effect and hence to raise labour demand elasticity.

Using EPL as a proxy for a relatively weak substitution effect from offshoring raises two potential problems. First, while employment protection clearly lowers the effective elasticity of substitution in the short-run, by reducing the speed with which firms adjust input quantities in response to economic shocks, it may not necessarily do so in the long-run. However, even if EPL only affects the short term elasticity this may still have important implications for adjustment pressures for workers. Second, EPL appears to be positively correlated with product market regulation and hence potentially negatively correlated with the degree of product competition and η_P (OECD, 2002). If this is indeed the case, stricter EPL will tend to weaken the impacts of offshoring in both reinforcing the substitution effect and weakening the scale effect, so that it is no longer clear that stricter EPL weakens the link between offshoring and more elastic labour demand. Fortunately, it is straightforward to assess the suitability of EPL as a proxy for institutional factors that increase the strength of the scale effect relative to the substitution effect by evaluating the impact of EPL on the elasticity of labour demand. As we will see in Section 5, strict EPL reduces the constant-output and total elasticity of labour demand by approximately the same amount. This suggests that EPL has a significant effect on the elasticity of

substitution, but does not appear to be importantly related to the degree of product market competition.

Accordingly, we argue that the extent to which engaging in offshoring (*i.e.* establishing an international production network) changes the elasticity of labour demand depends on the strictness of employment protection legislation. The stricter is EPL, the less investing in offshoring technologies pays off in terms of increased flexibility in production. This has two implications. First, this will dampen the impact of offshoring on the effective elasticity of substitution and the elasticity of labour demand. Second, and perhaps more interestingly, this will also change the relative importance of the substitution and scale effects of offshoring in favour of the latter. This will make it more likely for offshoring to make labour demand more *inelastic*, rather than more *elastic*, as is typically assumed.

In the empirical analysis, the stringency of employment protection legislation is measured using internationally comparable data provided by Bassanini and Duval (2006). We use the EPL indices to split the sample in half between countries with relatively high levels of EPL and countries with relatively low EPL. Estimating labour demand models separately for samples of countries with strict and weak EPL regimes, we expect offshoring to be less strongly associated with increases in labour demand elasticity in the strict EPL sample.

As before, labour demand models were estimated in five-year differences. Due to data availability, the dataset used to analyse the impact of offshoring on labour demand elasticity is quite different in terms of coverage from that used to analyse the trend elasticity of labour demand. The dataset covers the years 1995 and 2000 and the 17 countries and 23 industries identified in Table A1 in the annex.

4. Trend labour demand elasticity

4.1 Baseline results

This section analyses whether the elasticity of labour demand changed during the period 1980-2002. Figure 1 shows the estimated elasticities for our baseline models. The estimates suggest that the elasticity of labour demand has significantly increased (in absolute values) since 1980. The estimated elasticities range from about 0.2, in absolute value, at the beginning of the sample to around 0.5 towards the end of the period. This

evolution approximately encompasses the usual range found in other studies of labour demand elasticity (*i.e.* between 0.15 and 0.7, see Hamermesh, 1993). Re-estimating the elasticity of labour demand using the total number of hours instead of the total number of employees produces qualitatively similar the results.

[Insert Figure 1 here]

The underlying estimates that were used to draw Figure 1, along with those obtained from a number of alternative specifications, are reported in Table 1. All the elasticity estimates displayed in Figure 1 are negative and statistically significant at least at the 10% confidence interval (see the estimates for five-year differences using all industries). Re-estimating the same specification, but in three-year differences, leads to qualitatively similar results.[18] When the elasticity of labour demand is estimated separately for the manufacturing and the services sectors, a very similar pattern is found for the manufacturing industries, as for the overall economy, but there is no clear evidence of an increase in the elasticity of labour demand in the services sector. To the extent that services are less tradable than manufactured goods, this difference may indicate that globalisation is part of the story. However, the results for the services sector should be interpreted with caution, because these estimates are based on very small samples due to numerous gaps in the available data.[19]

[Insert Table 1 here]

The elasticities of labour demand displayed in Table 1 correspond to conditional (or 'constant output') elasticities, and therefore do not capture the impact on labour demand elasticity of any competitive advantages in the product market resulting from offshoring. In order to estimate the total elasticity of labour demand, taking account of both substitution and scale effects, unconditional labour-demand models were also estimated over the sample period (Table 2). These results also suggest that the labour demand has become more elastic since the early 1980s. The estimated unconditional elasticities are similar to those obtained from the conditional model, but mostly smaller in absolute value, contrary to the prediction from the theory of labour demand set out in Section 2. Slaughter (2001) experienced similar

18 . All the difference-specifications were estimated in three-year moving averages.

19 . Better coverage of manufacturing industries may also explain why the results for manufacturing are so similar to those for the overall economy.

problems using data for the United States and suggested that this arises because shifts in labour demand cannot be adequately accounted for with the available data.[20] For this reason, the focus in the remainder of this section will be on conditional elasticities, rather than the total elasticity of labour demand. The estimates of the conditional elasticity of labour demand should be interpreted as providing a lower bound of the total elasticity of labour demand. However, the trend increase in the estimated conditional elasticity of labour demand need not understate the increase in the total elasticity. Indeed, the decomposition analysis in Section 2 implies that offshoring will increase the conditional labour demand elasticity more strongly than the total elasticity, since only the latter is affected by the weakening of the scale effect (*cf.* equation 2).

[Insert Table 2 here]

4.2. Sensitivity analysis of trend labour demand elasticity

An important question is whether the upward trend in the estimated elasticity of labour demand in Figure 1 could result from problems with the empirical specification that was used and thus be spurious. Two key identifying assumptions were relied upon in estimating these elasticities: i) that the (differenced) data on sectoral employment reflect the long-term level of labour demand; and ii) that labour supply is perfectly elastic. Since it is not possible to directly verify the validity of either of these assumptions, it is important to assess the robustness of the estimation results to alternative estimation strategies.

4.2.1 Dynamic labour demand estimates

In terms of the first identifying assumption, one worry would be that Figure 1 is picking up an increase in the speed with which labour demand reacts to changes in wages, rather than an increase in the total response, once a new equilibrium level of employment is reached. In recent decades, many OECD governments have implemented structural reforms, such as relaxing employment protection legislation or encouraging more vigorous product market competition, which may have had the effect of speeding up the response of employment to changes in the economic environment (OECD, 2006). In order to ensure

20. As is shown in Table 1, including import penetration and the industry-specific exchange rate to control for the location of the demand curve does not make a substantial difference. However, this problem does not arise in the analysis of the impact of offshoring on labour demand elasticity in Section 5, which presents estimates based on better quality data on inputs, outputs and prices derived from complete input-output tables. Unfortunately, those data are only available for the 1995-2000 period and cannot be used to analyse the trend in labour demand elasticity.

that the estimated trend in the labour demand elasticity captures the long-term relationship between wages and labour demand, the estimations were conducted in five-year differences, thereby removing much of the variation due to changes in short-term dynamics.

An alternative to estimating a static labour demand model in long differences is to estimate a dynamic labour demand which explicitly accounts for short-term dynamics. The following dynamic specification of labour demand was estimated:

$$\ln L_{it} = \alpha_o + \alpha_1 L_{it-1} + \sum_{j=w,m} \alpha_j \ln w_{ijt} + \sum_{j=w,m} \alpha_{1j} \ln w_{ijt-1} + \sum_{j=k,q} \beta_j \ln x_{ijt} + \sum_{j=k,q} \beta_{1j} \ln x_{ijt-1} + \varepsilon_i$$

(4)

where L refers to labour demand in industry-country pair i at time t, w the price of labour and materials, x to the capital stock and output and ε_i to a random error term. Each regression makes use of five years of data.[21] The dynamic model in equation (4) is estimated with OLS, fixed effects and difference-GMM as introduced by Arellano and Bond (1991). The fixed effects estimates are biased due to the correlation of the (transformed) lagged dependent variable and the random error term. The major advantage of the difference-GMM is that it corrects for this bias, but this estimator also tends to yield less precise estimates.[22] The short-term wage elasticity is directly given by the estimated wage coefficient (α_w). In order to calculate the long-term elasticity, one needs to adjust the wage coefficient using the coefficient on the lagged dependent variable (α_1) which represents an (inverse) measure of the speed of adjustment. Table 3 reports the short-term elasticities, the coefficients on the lagged dependent variable and the corresponding long-term-elasticities.[23]

[Insert Table 3 here]

Both the fixed effects and GMM estimates suggest that short-term and long-run elasticities of labour demand have increased in absolute value, consistent with the static estimates of labour demand discussed above. However, the fixed effects and GMM results

21 . For example, data for the period 1980-1984 were used to estimate the elasticity for 1984.

22 . The GMM estimates in Table 3 are however statistically significant at least at the 10% level and mostly at 1% level.

23 . Difference GMM is implemented using the two-step method. The Hansen-test on the validity of the instruments and Arellano-Bond test for no second order autocorrelation could not be rejected in any of the cases at the 5% level.

also differ in important ways. While the fixed effects estimates suggest that the speed of adjustment has declined over time and therefore that the long-term elasticity has increased by more than the short-term elasticity, the GMM estimates point at an increase in the speed of adjustment, which had a dampening effect on the trend increase in the long-run elasticity of labour demand. These differences suggest that the fixed effects estimates are badly biased and that the GMM estimates should be preferred. Fitting the long-term elasticities based on the GMM estimates with a regression line suggests that the long-term elasticity increased somewhat over the sample period, but that this increase may be considerably smaller than that depicted in Figure 1. In other words, our baseline results probably confound an increase in the speed of adjustment — potentially due to structural reforms enacted during this period — with increases in the long-run elasticity of labour demand to some extent. Nonetheless, it appears that the labour demand has become more elastic in both the short and long run.

4.2.2 Wage endogeneity

As is standard in the literature, labour demand elasticity was estimated on the assumption that labour supply is perfectly elastic.[24] While such an assumption may be reasonable when using firm-level data, it is of questionable validity at the industry level.[25] To the extent that this identifying assumption is violated, the elasticity of labour demand will be upward biased (*i.e.* its absolute value will be underestimate) due to the positive correlation between wages and labour supplies. However, the extent to which this bias affects the estimated change in demand elasticity *over time* is unclear. Should the elasticity of labour supply have increased over time, then the estimation results probably would be biased towards finding a spurious increase in the elasticity of labour demand. The trend increase in the labour market participation of women or the rising proportion of immigrants may have tended to raise labour supply elasticity during the sample period, and created

24. As a result, shifts in labour supply, as captured in our regression model by changes in the wage variable, trace out the labour demand curve (Slaughter, 2001). The location of the labour demand schedule is pinned down by controlling for output and capital. Note that the regressions do not explicitly control for labour productivity, which may also lead to shifts in the labour–demand curve. R&D intensity, a standard proxy used in this context, is only available from 1987 onwards. In an effort to control for factor-biased technological change, import penetration and the industry-specific exchange rate were included as a robustness check. This did not change the results in any significant way.

25. In so far as workers change sectors in response to inter-industry wage differentials in the long-run, as in the Heckscher-Ohlin-Viner model, the assumption of perfectly elastic labour supply may be less problematic over relatively long time horizons. This is another reason for estimating the model in five-year differences.

such a bias. The results presented in Figure 1 only account for this kind of bias to the extent that it concerns the correlation in the wage variable and the *time-invariant* component of the error term. We will now attempt to address this problem more fully using two different strategies: difference GMM and instrumental variable estimation. The results are reported in the last three columns of Table 3.

Difference GMM not only controls for the bias that can arise from the correlation between the lagged dependent variable and the error term in a dynamic model, but also for endogeneity due to any of the other explanatory variables. We therefore re-estimate the dynamic model with Difference-GMM but this time explicitly treating the wage variable as being endogenous. The GMM estimates in the last three columns are very similar to those in columns 4-6, providing some indication that changes in the composition of labour supply are unlikely to fully account for the rise in the elasticity of labour demand.

An alternative estimation strategy is to make use of instruments to account for changes in the composition of the labour force. Above we noted two changes in the composition of the labour force that may have rendered labour supply more elastic and thereby account for the observed trend in the elasticity of labour demand: increased female labour force participation and immigration. In order to directly address the bias that may result from changes in the composition of the labour force we need an instrument that affects female force participation and/or immigration, but not labour demand. While no suitable instrument could be identified for immigration, Bassanini and Duval (2006) provide a number of potentially useful instruments for female labour supply.[26]

Policy variables that have an important effect on female labour supply are well suited to account for the effect of increased female labour force participation on the elasticity of labour demand, as they are unlikely to be correlated with the unobserved component of labour demand (e.g. as a result of unobserved productivity shocks). Two such policy variables are considered: i) family cash benefits and ii) the relative marginal tax rate on "second earners". The index of family cash benefits measures the increase in household

26. In principle, the historic pattern of immigration by country of destination could provide the basis for constructing an appropriate instrument to account for the correlation between immigrant inflows and market conditions, similar to that used by Antonji and Card (1991). They analyse the relationship between immigration and the economic outcomes of low-skilled natives using the stock of foreign-born individuals by country of origin and region in 1970 as an instrument for the change in the population of foreign-born individuals. The instrument is based on the insight that immigrants tend to locate in regions with large populations of previous immigrants from the same country of origin.

disposable income from child benefits for a couple with one child. Higher benefits reduce the labour supply of mothers, through an income effect, while also increasing the incentive to have children, which may also be expected to have a negative effect on female labour supply. The relative marginal tax rate on second earners is defined as the ratio of the marginal tax rate faced by the second earner in a dual-earner couple with two children to the tax wedge for a single-earner couple with two children. The higher this ratio, the lower the incentive for the second earner — typically the wife — to participate in the labour force. Thus, both policy variables are expected to reduce female labour supply. Data for both variables were obtained from Bassanini and Duval (2006).

In addition to these two policy variables, two other instruments for female labour supply were considered: the average number of children and the average number of years of education of the female population aged 25 years and above. These two variables are likely to be predetermined with respect to current market conditions, but to have an important effect on female labour supply. These variables may therefore be useful complements to the policy variables described above. Data on the number of children and the female education were also taken from Bassanini and Duval (2006).

Even when using several instruments at the same time, their performance may be quite weak because they only vary across countries and time, and not across industries. To the extent that women are more likely to work in certain industries, as a result of historical or cultural factors, the impact of the instruments is likely to differ across industries. Accordingly, each of these variables was multiplied by the share of female employees in industry employment.[27] Since each of the transformed instruments varies along all three dimensions of the data, their explanatory power should be enhanced.

[Insert Table 4 here]

Table 4 reports the estimated labour demand elasticities for four different instrumental variable specifications using: i) the two policy variables; ii) the policy variables plus the number of children; ii) the policy variables plus female education; and finally, iv) all four instruments combined. While the results are fairly similar across the four specifications, they may also be deemed inconclusive. For the majority of years, the estimated labour

27 . These shares are averaged across countries and time and are calculated from the EU Labour Force Survey.

demand elasticities are insignificant. Where the estimated elasticities are statistically significant, they tend to be substantially larger (in absolute value) than for the corresponding years in our base-line specification. This is in line with expectations, because female labour supply tends to be more responsive to changes in wages thereby reducing the scope for elasticity-dampening feedback effects, which translates into more elastic labour demand. Finally, the estimates continue to suggest that, if anything, labour demand has become increasingly elastic over time.[28]

In sum, it appears unlikely that changes in the speed of labour demand adjustment or the composition of labour supply can fully account for the observed increase in the elasticity of labour demand. Nonetheless, our estimates of the trend in labour demand elasticities are subject to considerable uncertainty.

5. Offshoring, labour market institutions and the elasticity of labour demand

5.1 Baseline results

We now turn to the role of offshoring in explaining inter-industry differences in the labour demand elasticity using data for the years 1995 and 2000. The time dimension of this analysis is thus more limited than that for the estimates reported in Section 4, since we are now working with a single cross section of 5-years differences, but the country and industry coverage are considerably broader (cf. Table A1 in the annex). Furthermore, the availability of full input-output tables for 1995 and 2000 means that better measures of inputs, outputs and prices are available for estimating labour demand.

The baseline results are reported in Table 5. The conditional and unconditional labour demands appear to be well identified. All variables have their expected sign and tend to be statistically significant.[29] Importantly, given the focus of this paper, the marginal effect of the wage is considerably larger in absolute value in the unconditional labour demand model

28 . Senses (2006) is able to exploit the variation across local labour markets in wage levels to construct much more powerful instruments for the endogeneity of the wage when estimating labour demand and how it is affected by offshoring. It is reassuring that her results are largely consistent with those reported here, despite the absence of fully satisfactory instruments.

29. The price of materials and the price of output are insignificant when included simultaneously. This is not surprising as these variables are highly correlated due to the way they are constructed. (The price of materials is effectively defined as a weighted average of the price of outputs across industries.)

than in the conditional labour demand model, consistent with economic theory.[30] Evaluated at the sample mean values of offshoring intensity, the marginal effect in the conditional labour demand model equals -0.31 and that in the unconditional model -0.46 (based on intra-industry offshoring using all industries).[31] Both are well within the usual range of wage elasticity estimates surveyed by Hamermesh (1993). Moreover, these estimates do not vary much across the different specifications: i) whether the model is estimated for all industries or only manufacturing industries; and ii) whether the interaction terms are defined using intra-industry or total offshoring.[32] The relative sizes of the output-conditional and total wage elasticities imply that the substitution effect in equation 1 is approximately twice as large as the scale effect and thus accounts for about two thirds of the total elasticity of labour demand. Combining these estimated elasticities with the 10 percent average cost share of labour in the estimation sample, it is possible to back out estimates of the elasticity of substitution and the price elasticity of product demand (i.e. parameters σ and η_P in 1): the estimated elasticity of substitution is 0.34 (0.31/0.9) and the price elasticity of product demand is 1.5 ((0.46-0.31)/0.1).

[Insert Table 5 here]

Offshoring has a negative and statistically significant effect on the labour demand elasticity in all specifications. Considering the estimated coefficients for intra-industry offshoring and all industries, a 10 percentage-point increase in the intensity of intra-industry offshoring raises the absolute constant-output elasticity of labour demand by 0.025 and the total elasticity by 0.033. These results are qualitatively unchanged when restricting the sample to manufacturing industries, but do differ according to the offshoring measure that is used to define the interaction term. A 10 percentage-point increase in the intensity of total offshoring raises the absolute elasticity of labour demand by only 0.001 in the conditional model and 0.012 in the unconditional model. Thus, intra-industry offshoring appears to have a stronger impact on the elasticity of labour demand than the total level of offshoring in an industry. This make intuitive sense because intra-industry offshoring is

30 . Recall that the regression results in Section 4 generally failed to satisfy this condition. The estimates in Table 5 are probably better behaved because they are based on better measures of inputs, outputs and prices, as these measures could be derived from harmonised input-output tables.

31 . The mean intensity of intra-industry and total offshoring in all industries is 0.33 and 0.63 respectively. In manufacturing, the mean intensity of intra-industry and total offshoring is 0.42 and 0.80. The marginal effect of intra-industry offshoring on labour demand in all industries is then given by the coefficient on the wage variable plus 0.33 times the coefficient on the interaction term.

32. The results are also very similar when excluding the interaction terms.

more likely to substitute for domestic value-added previously performed in that industry, than total offshoring, which is likely to include many activities previously outsourced to other domestic industries.

In order to give a clearer idea of the quantitative importance of offshoring for the labour demand elasticity it may be helpful to calculate the counter-factual labour demand elasticity in the absence of offshoring. The estimates suggest that the constant-output elasticity would have been -0.22 in the absence intra-industry offshoring, as compared to -0.31 at the average level of offshoring in the estimation sample. Similarly, the total elasticity of labour demand would have been -0.35 in the absence of offshoring, instead of -0.46 with the observed level of offshoring. These calculations suggest that the elasticity of labour demand was about 31% to 41% larger in absolute value during the period 1995-2000 than it would have been if offshoring had not been possible. Increases of this magnitude might well have important implications for employment security and worker bargaining power.

5.2 The role of employment protection legislation (EPL)

We now analyse the role of employment protection legislation in influencing the labour demand elasticity, including how it is affected by offshoring. We first assess whether EPL is a useful indicator of the impact of national labour market institutions on the wage elasticity of labour demand. Table 6 reports estimated coefficients for a basic labour demand model (*i.e.* without a wage-offshoring interaction) that was estimated separately for countries characterised by, respectively, strict and weak EPL. In all cases, the elasticity of labour demand is considerably smaller in absolute value in countries where EPL is strict, than where it is weak, which is consistent with EPL depressing the effective elasticity of substitution below the level of substitution that is technologically feasible. Moreover, the difference between the constant-output and the total elasticities of labour demand does not appear to depend on the EPL regime. This suggests that the impact of EPL on the elasticity of labour demand operates largely through its impact on the elasticity of substitution and that EPL is not serving as a proxy for lower product market competition. The often large differences in the estimated coefficients between the weak and strong EPL samples suggests that these estimates may be picking up the effect of EPL in slowing employment adjustment, along with its impact in lowering the size of the adjustment in long-run equilibrium.

[Insert Table 6 here]

Tables 7a and 7b report estimation results for labour demand models that include the interaction between the wage variable and the level of offshoring. As before, we observe that EPL is an important determinant of the elasticity of labour demand. Looking first at the results for all industries, the marginal wage effects of offshoring evaluated at the sample mean varies from -0.18 to -0.39 in countries with relatively strict EPL, whereas it varies from -0.57 to -0.73 in countries with weak EPL. Again EPL mostly affects the elasticity of labour demand through its impact on the elasticity of substitution. This can be seen by comparing the relative size of the marginal wage effects across EPL regimes for, respectively, the conditional and unconditional specifications. In countries with strict EPL the constant-output elasticity (about -0.18) accounts for slightly more than half of the total elasticity (that ranges from -0.28 to -0.39). Under weak EPL, the constant-output elasticity (ranging from -0.57 to -0.59) accounts for about 80% of the total elasticity (that ranges from -0.68 to -0.73).

[Insert Tables 7a and 7b here]

The results based on manufacturing industries alone are qualitatively similar. However, the differences discussed above tend to be more extreme and the estimates somewhat less precise due to smaller sample sizes. In countries with strict EPL, the constant-output elasticity (ranging from -0.12 to -0.15) accounts for less than half of the total elasticity (ranging from -0.28 to -0.36). Under weak EPL, the constant-output elasticity (ranging from -0.81 to -0.83) accounts for around 85% of the total elasticity (ranging from -0.91 to -0.96).

The analysis on EPL strictness thus suggests that EPL affects labour demand elasticity primarily by diminishing the elasticity of substitution and hence the contribution of the substitution effect to the total elasticity of labour demand. On this basis, we would expect offshoring to increase the elasticity of labour demand more strongly in countries where EPL is relatively weak. Indeed, offshoring may even reduce elasticity in the context of strict EPL: as EPL becomes more binding, the offshoring-induced weakening of the scale effect becomes relatively larger compared with the offshoring-induced reinforcement of the substitution effect.

Our empirical results confirm the hypothesis that offshoring increases labour demand elasticity more strongly in countries where EPL is weak. The wage-offshoring interaction term is typically insignificant in countries with strong EPL, but negative and statistically significant in countries with weak EPL. This suggests that strict EPL prevents firms from taking advantage of the greater flexibility that potentially can be derived from operating an international production network. Indeed, the estimation results for the manufacturing sector indicate a weakly significant positive effect of offshoring on the total elasticity of labour demand in the strict-EPL sample.

6. Concluding remarks

In this paper, we analyse the evolution of the wage elasticity of sectoral labour demand since 1980, paying particular attention to the role of offshoring. This analysis makes use of industry data for a wide range of OECD countries. The first main finding is the elasticity of labour demand has increased substantially during the last two decades. This finding is shown to be robust to a wide variety of econometric specifications of labour demand, although we are not able to clearly differentiate between a trend increase in the speed of employment adjustment and an upward trend in the long-run wage elasticity. Both faster and larger adjustments to changes in market conditions are likely to increase adjustment pressures in labour market, although they may also bring important gains in allocative efficiency.

The second main finding is that both offshoring and national institutional environments — as illustrated by differences in EPL strictness — play an important role in explaining differences in the elasticity of labour demand across industries and countries. In a first attempt to improve our understanding of the determinants of the elasticity of labour demand, we focussed on the role of offshoring, which represents one specific form of technological change. The estimation results indicate that the recent rise in offshoring may help to account for the simultaneous increase in the elasticity of labour demand. Such a relationship is plausible in that it seems likely that the development of international production networks may have significantly expanded the flexibility of firms to adjust the mix of domestic workers and foreign value-added in production in response to changes in market conditions.

We also emphasise that the role of offshoring is complex and depends on the relative magnitudes of the elasticity of substitution in production, the labour cost share and the price elasticity of product demand, as well as how strongly all three are affected by the expansion of offshoring. Dividing our sample between countries with strict and weak EPL, we show that the link between offshoring and more elastic labour demand only holds in countries where EPL is relatively weak. Offshoring does not appear to make labour demand more elastic in countries with strict EPL. In fact, there is some weak evidence that offshoring makes labour demand less elastic.

The paper suggests a number of useful areas for further work intended to further clarify both the impact of trade on labour demand elasticity and the implications of this impact for labour market functioning and the welfare of workers. As concerns the impact of trade on elasticity, this paper's analysis underlines the heterogeneity of these impacts, both by arguing that the impact of offshoring is likely to be quite different from that of trade in final goods and by showing that the national institutional context — as illustrated by EPL strictness — appears to have a major influence on the impact of offshoring. Progress in constructing better measures of different forms of trade and relevant labour market institutions could make an important contribution to obtaining more reliable estimates of the impacts of trade on the sensitivity of labour demand to relative factor prices. We suspect that firm-level data will also need to play a large role, since the use of industry-level data in this and a number of earlier papers makes it somewhat problematic to identify the labour demand curve. As concerns the implications for labour market functioning, some pioneering work has suggested that globalisation may be related to the falling wage share in national income (IMF, 2007) or greater employment and earnings insecurity for workers (OECD, 2007). Increased labour demand elasticity could represent an important intervening variable in any such links between globalisation and the overall functioning of the labour market. However, this conjecture awaits serious empirical analysis.

ANNEX

Variable Definitions

Employment	Log of total persons engaged.
Wage	Log of total labour costs divided by the number of employees.
Materials	Log volume of materials at 2000 constant prices.
Price of materials	Log price index of materials. Data adjustments: For observations for which information on the price of materials was not available, the price of materials was imputed. The composition of inputs was obtained from the input-output tables. The price index of materials was imputed by multiplying the share of total purchases (domestic plus imported) by industry i from supplying industry j in total intermediate purchases (domestic plus imported) by industry i with the price of value-added of industry j.
Capital stock	Log volume of gross capital stock at 2000 constant prices. Data adjustments: For countries for which the capital stock was not available or industry coverage was insufficient, capital stocks were reconstructed from gross fixed capital formation using a perpetual-inventory method based on an assumed depreciation rate of 10%.
Output	Log volume of output at 2000 constant prices.
Price of output	Log price index of output.
Mark-up	Ratio of value-added over the wage bill.
Intra-industry offshoring	Ratio of imported intermediate inputs from the same industry to value-added.
Total offshoring	Ratio of total non-energy intermediate inputs imported from abroad to value-added.

Sample Coverage

Table A1: Sample coverage

	Countries	**Industries (ISIC Rev. 3)**
Section 4 - The trend labour demand elasticity	Austria, Belgium & Luxembourg, Denmark, Finland, France, Italy, the Netherlands, Norway, Spain, the United Kingdom and the United States	15-16, 17-19, 20, 21-22, 23, 24, 25, 26, 27-28, 29-33, 34-35, 36-37, 40-41, 45, 50-52; 70, 55, 60-64, 65-67, 75, 80-99
Section 5 - Offshoring, labour market institutions and the elasticity of labour demand	Australia, Austria, Belgium & Luxembourg, Canada, Denmark, Finland, France, Germany, Greece, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, the United Kingdom and the United States	15-16, 17-19, 20, 21-22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36-37, 40-41, 45, 50-52; 70-71;73-74, 55, 60-63, 72

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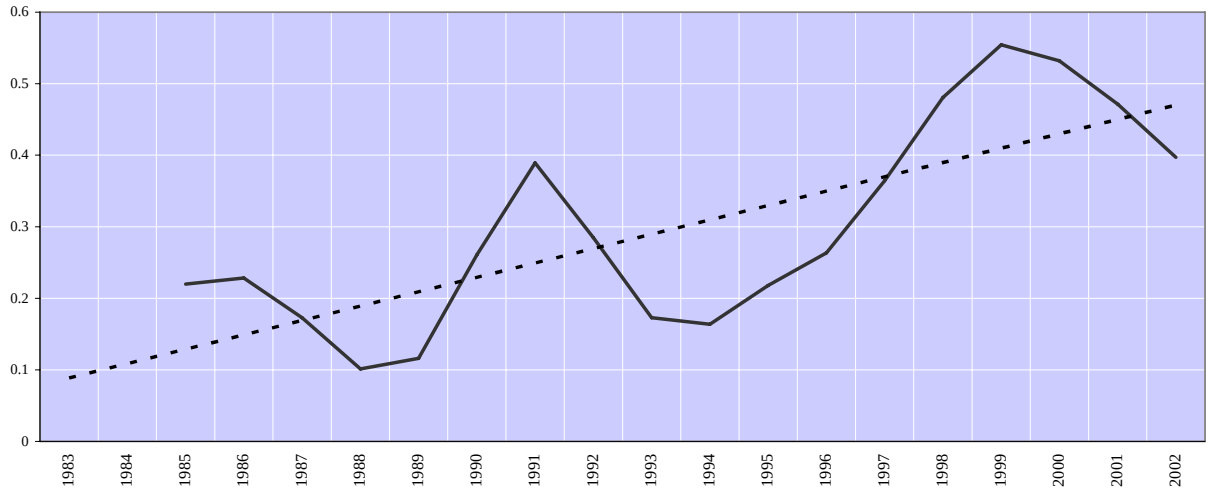
FIGURES AND TABLES

Figure 1. **Trend in the conditional wage elasticity of labour demand, 1980-2002**[a]



a) Absolute values of estimates from Table 1 (5-year differences for all industries).

Table 1: Elasticity estimates from static model of conditional labour demand[a]

	3-year differences			5-year differences			5-year differences, Manufacturing			5-year differences, Manufacturing plus additional controls[b]			5-year differences, Services		
year	Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.	
1983	-0.286	0.086	***												
1984	-0.267	0.065	***												
1985	-0.257	0.059	***	-0.220	0.096	**	-0.276	0.132	**	-0.303	0.135	**	-0.193	0.074	***
1986	-0.194	0.057	***	-0.229	0.072	***	-0.250	0.087	***	-0.280	0.095	***	-0.263	0.094	***
1987	-0.094	0.058		-0.173	0.056	***	-0.153	0.066	**	-0.166	0.070	**	-0.262	0.086	***
1988	-0.103	0.058	*	-0.101	0.054	*	-0.041	0.063		-0.048	0.061		-0.272	0.100	***
1989	-0.237	0.117	**	-0.116	0.065	*	-0.094	0.084		-0.144	0.086	*	-0.200	0.075	***
1990	-0.350	0.125	***	-0.261	0.115	**	-0.324	0.159	**	-0.381	0.152	**	-0.118	0.056	**
1991	-0.299	0.156	*	-0.389	0.130	***	-0.515	0.178	***	-0.501	0.155	***	-0.082	0.071	
1992	-0.169	0.062	***	-0.285	0.129	**	-0.330	0.172	*	-0.291	0.138	**	-0.112	0.080	
1993	-0.159	0.060	***	-0.173	0.067	***	-0.152	0.083	*	-0.143	0.070	**	-0.197	0.089	**
1994	-0.256	0.061	***	-0.164	0.063	***	-0.153	0.075	**	-0.215	0.066	***	-0.227	0.091	**
1995	-0.282	0.068	***	-0.218	0.067	***	-0.219	0.078	***	-0.266	0.071	***	-0.194	0.085	**
1996	-0.384	0.062	***	-0.263	0.068	***	-0.275	0.080	***	-0.289	0.072	***	-0.153	0.067	**
1997	-0.476	0.061	***	-0.364	0.060	***	-0.411	0.073	***	-0.386	0.071	***	-0.141	0.050	***
1998	-0.527	0.063	***	-0.481	0.058	***	-0.568	0.069	***	-0.513	0.064	***	-0.157	0.046	***
1999	-0.481	0.070	***	-0.554	0.055	***	-0.661	0.063	***	-0.600	0.062	***	-0.195	0.046	***
2000	-0.459	0.058	***	-0.532	0.060	***	-0.621	0.074	***	-0.611	0.072	***	-0.221	0.047	***
2001	-0.395	0.072	***	-0.471	0.057	***	-0.509	0.073	***	-0.565	0.077	***	-0.278	0.054	***
2002	-0.331	0.084	***	-0.397	0.071	***	-0.407	0.089	***	-0.439	0.091	***	-0.314	0.058	***

Robust standard errors, * significant at 10%; ** significant at 5%; *** significant at 1%

a) OLS estimates using five-year differences.

b) Import penetration rates and industry-specific exchange rates were added to the model to control for the location of the demand curve.

Table 2: Elasticity estimates from static model of unconditional labour demand

	3-year differences			5-year differences			5-year differences, Manufacturing			5-year differences, Manufacturing plus additional controls			5-year differences, Services		
year	Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.	
1983	-0.168	0.093	*												
1984	-0.202	0.069	***												
1985	-0.225	0.059	***	-0.219	0.094	**	-0.249	0.136	*	-0.225	0.142		-0.162	0.081	*
1986	-0.210	0.057	***	-0.261	0.071	***	-0.269	0.093	***	-0.255	0.099	**	-0.244	0.099	**
1987	-0.112	0.056	**	-0.203	0.057	***	-0.181	0.073	**	-0.175	0.075	**	-0.251	0.089	***
1988	-0.111	0.059	*	-0.125	0.055	**	-0.085	0.067		-0.093	0.066		-0.267	0.102	***
1989	-0.235	0.119	**	-0.128	0.068	*	-0.132	0.094		-0.181	0.093	*	-0.195	0.077	**
1990	-0.328	0.121	***	-0.264	0.119	**	-0.341	0.167	**	-0.395	0.161	**	-0.110	0.057	*
1991	-0.259	0.149	*	-0.385	0.131	***	-0.501	0.180	***	-0.488	0.154	***	-0.080	0.071	
1992	-0.098	0.059	*	-0.249	0.117	**	-0.271	0.150	*	-0.227	0.112	**	-0.109	0.079	
1993	-0.118	0.067	*	-0.131	0.059	**	-0.107	0.069		-0.109	0.059	*	-0.170	0.099	*
1994	-0.217	0.068	***	-0.135	0.066	**	-0.120	0.079		-0.209	0.069	***	-0.217	0.099	**
1995	-0.261	0.068	***	-0.202	0.068	***	-0.196	0.080	**	-0.256	0.073	***	-0.187	0.090	**
1996	-0.364	0.062	***	-0.253	0.067	***	-0.257	0.079	***	-0.272	0.073	***	-0.139	0.068	**
1997	-0.439	0.063	***	-0.351	0.058	***	-0.394	0.073	***	-0.370	0.072	***	-0.135	0.052	**
1998	-0.501	0.063	***	-0.458	0.058	***	-0.545	0.070	***	-0.494	0.067	***	-0.161	0.047	**
1999	-0.455	0.072	***	-0.536	0.056	***	-0.644	0.065	***	-0.581	0.065	***	-0.203	0.046	***
2000	-0.439	0.057	***	-0.516	0.063	***	-0.606	0.076	***	-0.591	0.074	***	-0.232	0.046	***
2001	-0.389	0.073	***	-0.445	0.058	***	-0.484	0.076	***	-0.529	0.081	***	-0.282	0.053	***
2002	-0.343	0.081	***	-0.396	0.074	***	-0.411	0.091	***	-0.447	0.090	***	-0.287	0.052	***

Robust standard errors, * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3: Elasticity estimates from dynamic model of conditional labour demand

	Fixed Effects			Difference GMM			Difference GMM with endogenous wage		
	α_w	α_1	$\alpha_w /(1- \alpha_1)$	α_w	α_1	$\alpha_w /(1- \alpha_1)$	α_w	α_1	$\alpha_w /(1- \alpha_1)$
1984	-0.232	0.487	-0.452						
1985	-0.234	0.620	-0.616						
1986	-0.154	0.727	-0.565						
1987	-0.077	0.684	-0.243	-0.240	0.799	-1.193	-0.218	0.774	-0.965
1988	-0.105	0.708	-0.360	-0.361	0.667	-1.085	-0.328	0.681	-1.029
1989	-0.259	0.689	-0.832	-0.407	0.617	-1.062	-0.390	0.611	-1.001
1990	-0.235	0.661	-0.693	-0.498	0.613	-1.285	-0.478	0.592	-1.172
1991	-0.352	0.592	-0.863	-0.352	0.526	-0.743	-0.306	0.505	-0.619
1992	-0.313	0.517	-0.648	-0.481	0.500	-0.963	-0.449	0.505	-0.907
1993	-0.260	0.761	-1.085	-0.373	0.447	-0.674	-0.386	0.440	-0.689
1994	-0.295	0.738	-1.126	-0.406	0.592	-0.996	-0.411	0.607	-1.044
1995	-0.365	0.558	-0.825	-0.289	0.520	-0.602	-0.337	0.560	-0.766
1996	-0.328	0.638	-0.905	-0.323	0.407	-0.544	-0.356	0.431	-0.624
1997	-0.429	0.702	-1.438	-0.197	0.423	-0.341	-0.226	0.482	-0.437
1998	-0.460	0.758	-1.904	-0.204	0.557	-0.461	-0.304	0.550	-0.677
1999	-0.574	0.708	-1.968	-0.590	0.619	-1.548	-0.628	0.617	-1.639
2000	-0.528	0.760	-2.200	-0.858	0.569	-1.991	-0.865	0.550	-1.923
2001	-0.422	0.730	-1.563	-0.811	0.530	-1.727	-0.803	0.550	-1.787
2002	-0.348	0.783	-1.607	-0.794	0.559	-1.800	-0.766	0.590	-1.871

Standard errors omitted for ease of presentation.

Table 4: Instrumental variable estimates of conditional labour demand elasticity

	5-year differences with IV											
	Policy[a]			Policy + Children[b]			Policy + Education[c]			All		
year	Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.	
1984												
1985												
1986												
1987	-0.580	1.641		-1.841	1.729		0.585	0.577		-0.099	0.494	
1988	0.781	1.445		-0.177	0.623		0.761	0.463		0.554	0.424	
1989	0.102	2.445		-0.325	0.596		0.631	0.390		0.440	0.346	
1990	2.135	3.540		0.378	0.438		0.801	0.544		0.516	0.380	
1991	0.588	0.906		0.557	0.579		1.099	0.737		0.871	0.567	
1992	-0.266	0.371		-0.349	0.377		0.164	0.362		0.114	0.360	
1993	0.331	0.479		0.488	0.486		0.536	0.427		0.570	0.427	
1994	0.301	0.491		0.384	0.466		0.341	0.419		0.393	0.402	
1995	0.034	1.331		0.022	0.938		-0.459	1.015		-0.327	0.806	
1996	-0.432	0.786		-0.163	0.628		0.211	0.701		0.306	0.603	
1997	-0.710	0.253	***	-0.672	0.232	***	-0.438	0.226	*	-0.404	0.204	**
1998	-0.542	0.206	***	-0.501	0.201	**	-0.416	0.193	**	-0.369	0.188	*
1999	-0.374	0.506		-0.424	0.501		-0.229	0.512		-0.277	0.504	
2000	-1.183	0.307	***	-1.127	0.249	***	-1.160	0.303	***	-1.116	0.247	***
2001	-0.790	0.168	***	-0.660	0.149	***	-0.821	0.169	***	-0.675	0.149	***
2002	-0.352	0.235		-0.173	0.211		-0.404	0.235	*	-0.227	0.206	

Robust standard errors, * significant at 10%; ** significant at 5%; *** significant at 1%.

a) "Policy" refers to two policy variables, namely: i) family cash benefits and ii) the relative marginal tax rate on "second earners". The index of family cash benefits measures the increase in household disposable income from child benefits for a couple with one child. The relative marginal tax rate on second earners is defined as the ratio of the marginal tax rate faced by the second earner in a dual-earner couple with two children to the tax wedge for a single-earner couple with two children (see Section 4 of this paper and Bassanini and Duval (2006) for more details). Both variables are multiplied by the average share of female employees in total industry employment.

b) "Children" refers to the average number of children in a country multiplied by the average share of female employees in total industry employment.

c) "Education" refers to the average number of years of education of the female population aged 25 years and above in a country multiplied by the average share of female employees in total industry employment.

Table 5: Offshoring and the elasticity of labour demand, estimates based on 5-year differences

	All industries				Manufacturing industries			
	-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-
Log wage	-0.222	-0.348	-0.32	-0.459	-0.221	-0.368	-0.242	-0.376
	(0.125)	(0.123)	(0.142)	(0.147)	(0.189)	(0.182)	(0.178)	(0.171)
	*	***	**	***		**		**
Log capital stock	0.219	0.256	0.24	0.28	0.147	0.182	0.138	0.169
	(0.092)	(0.096)	(0.094)	(0.098)	(0.088)	(0.089)	(0.083)	(0.084)
	**	***	**	***	*	**	*	**
Log price of materials	0.458	0.221	0.397	0.233	0.466	0.421	0.394	0.328
	(0.151)	(0.195)	(0.113)	(0.190)	(0.196)	(0.321)	(0.132)	(0.310)
	***		***		**		***	
Log output	0.135		0.131		0.105		0.092	
	(0.033)		(0.033)		(0.032)		(0.033)	
	***		***		***		***	
Log price of output		0.303		0.215		0.106		0.098
		(0.239)		(0.229)		(0.349)		(0.343)
Log wage *	-0.254	-0.328			-0.26	-0.316		
Offshoring intensity (intra-industry)	(0.089)	(0.089)			(0.115)	(0.114)		
	***	***			**	***		
Log wage *			-0.099	-0.124			-0.108	-0.125
Offshoring intensity (total)			(0.014)	(0.011)			(0.015)	(0.011)
			***	***			***	***
Constant	-0.008	-0.003	-0.004	0.002	-0.009	-0.005	-0.006	-0.002
	(0.005)*	(0.005)	(0.005)	(0.005)	(0.007)	(0.006)	(0.006)	(0.005)
Observations	239	239	240	240	182	182	182	182
R-squared	0.45	0.4	0.48	0.43	0.42	0.38	0.48	0.44
Marginal effect wage	-0.306	-0.456	-0.382	-0.537	-0.331	-0.502	-0.328	-0.476
	(0.122)	(0.119)	(0.141)	(0.145)	(0.175)	(0.170)	(0.175)	(0.168)
	**	***	***	***	*	***	*	***

Robust standard errors in parentheses* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6: The elasticity of labour demand across strict and weak EPL regimes, estimates based on 5-year differences

	-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-
	Manufacturing sectors				All sectors			
	Strict	Weak	Strict	Weak	Strict	Weak	Strict	Weak
Log wage	-0.103	-0.893	-0.418	-1.206	-0.169	-0.601	-0.381	-0.900
	(0.243)	(0.325) ***	(0.228) *	(0.307) ***	(0.225)	(0.230) **	(0.215) *	(0.268) ***
Log capital stock	0.343	0.353	0.4	0.671	0.427	0.454	0.456	0.741
	(0.092) ***	(0.130) ***	(0.097) ***	(0.255) **	(0.105) ***	(0.106) ***	(0.108) ***	(0.156) ***
Log price of materials	0.088	0.357	0.054	-0.579	0.248	0.313	0.071	-0.283
	(0.265)	(0.136) **	(0.383)	(0.441)	(0.220)	(0.134) **	(0.205)	(0.339)
Log output	0.09	0.297			0.095	0.296		
	(0.042) **	(0.115) **			(0.035) ***	(0.105) ***		
Log price of output			0.100	0.774			0.241	0.473
			(0.296)	(0.354) **			(0.256)	(0.255) *
Constant	-0.013	0.007	-0.007	0.028	-0.014	-0.002	-0.009	0.018
	(0.011)	(0.012)	(0.010)	(0.010) ***	(0.008) *	(0.010)	(0.007)	(0.009) *
Observations	90	68	90	68	114	94	114	94
R-squared	0.38	0.66	0.33	0.55	0.44	0.67	0.41	0.57

Robust standard errors in parentheses* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7a: Offshoring, employment protection legislation and the elasticity of labour demand in manufacturing sectors, estimates based on 5-year differences

	Intra-industry offshoring				Broad offshoring			
	Strict	Weak	Strict	Weak	Strict	Weak	Strict	Weak
Log wage	-0.292	-0.698	-0.579	-0.793	-0.420	-0.715	-0.654	-0.8
	(0.342)	(0.256)	(0.253)	(0.252)	(0.340)	(0.252)	(0.249)	(0.250)
		***	**	***		***	**	***
Log capital stock	0.354	0.202	0.394	0.278	0.341	0.23	0.37	0.286
	(0.094)	(0.097)	(0.086)	(0.104)	(0.083)	(0.079)	(0.078)	(0.087)
	***	**	***	***	***	***	***	***
Log price of materials	0.048	0.665	0.021	0.174	0.010	0.506	-0.090	0.046
	(0.262)	(0.158)	(0.347)	(0.308)	(0.245)	(0.056)	(0.325)	(0.251)
		***				***		
Log output	0.066	0.164			0.055	0.117		
	(0.050)	(0.069)			(0.047)	(0.051)		
		**				**		
Log price of output			0.049	0.500			0.098	0.427
			(0.276)	(0.277)			(0.246)	(0.240)
				*				*
Log wage *	0.445	-0.278	0.676	-0.353				
Offshoring intensity (intra-industry)	(0.404)	(0.083)	(0.371)	(0.078)				
		***	*	***				
Log wage *					0.505	-0.104	0.634	-0.119
Offshoring intensity (total)					(0.340)	(0.013)	(0.320)	(0.009)
						***	*	***
Constant	-0.010	0.001	-0.005	0.01	-0.009	0.007	-0.005	0.016
	(0.012)	(0.009)	(0.009)	(0.009)	(0.011)	(0.008)	(0.009)	(0.009)
								*
Observations	90	68	90	68	90	68	90	68
R-squared	0.39	0.74	0.37	0.72	0.42	0.8	0.41	0.79
Marginal effect wage	-0.146	-0.816	-0.356	-0.959	-0.118	-0.813	-0.275	-0.911
	(0.256)	(0.254)	(0.201)	(0.247)	(0.241)	(0.249)	(0.211)	(0.247)
		***	*	***		***		***

Robust standard errors in parentheses* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7b: Offshoring, employment protection legislation and the elasticity of labour demand in all sectors, estimates based on 5-year differences

	Intra-industry offshoring				Total offshoring			
	Strict	Weak	Strict	Weak	Strict	Weak	Strict	Weak
Log wage	-0.122	-0.529	-0.374	-0.636	-0.147	-0.511	-0.394	-0.604
	(0.240)	(0.200)	-0.23	(0.202)	-0.244	(0.200)	(0.232)	(0.203)
		***		***		**	*	***
Log capital stock	0.425	0.435	0.456	0.562	0.428	0.444	0.454	0.548
	(0.105)	(0.105)	(0.109)	(0.108)	(0.105)	(0.104)	(0.109)	(0.105)
	***	***	***	***	***	***	***	***
Log price of materials	0.249	0.465	0.069	0.209	0.249	0.406	0.07	0.128
	(0.223)	(0.156)	(0.211)	(0.224)	(0.223)	(0.105)	(0.205)	(0.198)
		***				***		
Log output	0.103	0.205			0.098	0.159		
	(0.038)	(0.092)			(0.037)	(0.083)		
	***	**			***	*		
Log price of output			0.245	0.290			0.238	0.257
			(0.270)	(0.182)			(0.262)	(0.188)
Log wage *	-0.215	-0.162	-0.051	-0.266				
Offshoring intensity (intra-industry)	(0.275)	(0.093)	(0.298)	(0.083)				
		*		***				
Log wage *					-0.060	-0.076	0.054	-0.100
Offshoring intensity (total)					(0.198)	(0.019)	(0.207)	(0.012)
						***		***
Constant	-0.014	-0.004	-0.009	0.005	-0.014	0.000	-0.009	0.008
	(0.008)	(0.009)	(0.007)	(0.008)	(0.008)	(0.008)	(0.007)	(0.008)
	*				*			
Observations	114	94	114	94	114	94	114	94
R-squared	0.44	0.69	0.41	0.66	0.44	0.72	0.41	0.71
Marginal effect wage	-0.177	-0.588	-0.387	-0.732	-0.176	-0.567	-0.368	-0.678
	(0.223)	(0.203)	(0.210)	(0.196)	(0.224)	(0.200)	(0.210)	(0.200)
		***	*	***		***	*	***

Robust standard errors in parentheses* significant at 10%; ** significant at 5%; *** significant at 1%