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Headquarter services, skill intensity and labour demand elasticities in multinational firms[1]

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Abstract

Using information on a panel of multinational firms operating in the United Kingdom from 1996 to 2005, we find that labour demand in domestic multinationals is less sensitive to labour cost changes than in foreign multinationals. This difference in wage elasticity of labour demand persists even if we allow for a distinct labour demand elasticity in multinational firms according to their skill intensity or their level of intangible assets. This suggests that the provision of headquarter services in domestic multinational firms shields against strong fluctuations in labour demand. In terms of labour demand elasticity reduction, the estimated shielding role of headquarter services is about 40 percent.

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1 Introduction

A general complaint about domestic multinational firms in developed countries is that they export activities abroad and substitute employees even in response to small labour price changes (Horst, 1978; Barba-Navaretti et al., 2003). Such a link between multinational firms and highly wage elastic labour demand is said to contribute to labour market instability which might degenerate into social unrest (Rodrik, 1997; Scheve and Slaughter, 2004). This complaint, however, has been criticized because multinationals possess extensive skill intensive activities in domestic headquarters which shape multinationals' competitive advantage (Markusen et al., 1995; Hanson et al., 2003). Thus far, however no empirical analysis has highlighted the specific *shielding role* of headquarter activities for labour demand elasticity estimations. This is despite the evidence that skill intensity is strongly related to less sensitive own labour demand elasticity in the labour demand literature (Hamermesh, 1993).

This paper investigates empirically whether among the range of skill intensive activities in domestic multinationals, those associated with foreign investment –headquarter services– drive their labour demand elasticity. As introduced by Helpman (1984, 1985), headquarter services are intangible inputs which are characterized by tradeability and some aspects of public goods, and thus might be used by foreign affiliates without necessarily being generated by them. However, this notion encompasses not only that a potential would-be multinational possesses more of this sort of tradeable intangible inputs –and transfers them abroad within the boundaries of the multinational–, but also entails activities associated with control and management that contribute to define a multinational enterprise (Caves, 1996; Krugman, 1995).[2] Among the diversity of headquarter services that exists, examples may include patents or trademarks transferred abroad and sustained by research and development activities at home, organizational capabilities to plan and coordinate activities in

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[2]Caves (1996) writes: "The multinational enterprise (MNE) is defined here as an enterprise that controls and manages production establishments -plants- located in at least two countries."(p.1)

different markets, or more generally, any skill intensive activities that support production or distribution in different countries.

To quantify how headquarter services are linked to labour demand elasticity, we explore differences in labour demand elasticity coefficients between domestic and foreign multinationals located in the UK. The motivation for treating both types of multinationals separately, although in the same country, is that domestic multinational firms by definition have their headquarters in the UK, while foreign owned multinational firms are likely to be affiliates, with headquarters located abroad. Hence, looking at the difference in labour demand elasticity between domestic and foreign multinationals will allow us to consider the magnitude of the role of headquarter services on labour demand elasticity.

This paper contributes to a recent literature investigating the relationship between labour demand, skill intensity and multinational firms. Head and Ries (2002) for Japanese multinationals, and Blonigen and Slaughter (2001) for US industries, explore the relationship between foreign offshoring of activities and skill intensity upgrading in home activities. When skill intensity is approximated by the ratio of non-production over production workers and foreign offshoring by affiliates employment[3], the effects on skill intensity are small and seem to depend, at the firm level, on the host country of investment. A related literature asks whether within multinationals, an increase in the price of labour abroad affects labour demand at home (Brainard and Riker, 1997; Ekholm and Hakkala, 2006; Harrison and McMillan, 2006). They show that labour price changes abroad slightly affect employment at home. Thus, their results suggest the existence of transnational coordination of employment behaviours within multinationals, but these papers do not explore its connection to the skill intensity content of activities at home. Hanson et al. (2003) provide a partial solution to account for the effect of skill intensity on labour demand elasticity in domestic multinational firms. They find that the number of research and development employees

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[3]Both papers use a similar definition for the non productive- productive ratio although their skill intensity aggregation is different. Blonigen and Slaughter (2001) use industry-level data while Head and Ries (2002) use firm level data.

in some US domestic multinationals are unaffected by changes in their firms total labour costs.[4]

A final body of literature related to our work is introduced by Barba-Navaretti et al. (2003). They consider the contribution of foreign firms to labour demand volatility within different countries. If foreign firms are more volatile employers then they should be less rigid in their labour demand elasticity when compared to an average domestic firms. They find mixed results. In some countries the hypothesis holds but in others the opposite is true. They recognize that their results might be driven by skill intensity differences between the treated firms within each country.[5]

Our study adds to the existing literature in four ways: Firstly, our data allow to estimate separately labour demand elasticity coefficients in domestic and foreign multinationals located in the UK. Thus taking advantage of this specific sample of domestic and foreign multinational firms in the manufacturing sector from 1996 to 2005, enables us to explore differences in labour demand elasticity between foreign and domestic multinationals. Secondly, we investigate whether any significant difference in labour demand elasticity is independent of the general effect of skill intensive activities on labour demand elasticities.[6] Whereas we find that the more skill intensive are multinationals, the lower (in absolute terms) will be their wage elasticity, our paper also provides evidence that even if taking account of this skill intensity impact, labour demand in domestic multinationals is still statistically less wage sensitive than in foreign multinational firms. Thirdly, this difference in wage elasticity according to the nationality of multinationals is also robust to the inclusion of the share of intangible assets in total sales. This variable is by nature strongly related to

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[4]Note that information on research and development employees is often not reported for many firms in their dataset which reduces substantially their observation sample.

[5]Görg et al. (2009) provide a related study using firm level data for Ireland. They focus on the role of linkages between multinationals and domestic suppliers for their labour demand elasticities.

[6]As we will see in the data section, our proxy at the firm level for skill intensity is measured as the average firm payroll bill normalized by the gross wage paid to a representative employee of the 2-digit industry in which a multinational is active. It has an important advantage over alternative measures of skill intensity based on grouping according to occupations, tasks or educational achievements of workers. In particular, it considers the relative skill intensity position of a firm with respect to other firms in the same industry.

headquarter services and skill intensity. Finally, we are able to quantify indirectly the role of headquarter services for labour demand elasticity in UK domestic multinational firms using a wide range of specifications. Headquarter services shield the labour demand elasticity of UK domestic multinationals by about 40 percent. This finding is consistent with the view that investing abroad has consequences on employment behaviour in home activities. In particular, the presence of headquarter services reduces substantially the exposure of labour demand to own labour cost shocks.

In the following section, we present our methodology for identifying the means through which headquarter services shield labour demand elasticity of domestic multinational firms and why the difference in wage elasticity between domestic and foreign multinationals located in the UK, will permit to evaluate its economic strength. In section 3, we specify our empirical strategy and introduce our data. In section 4, our results are presented and in the last section, we provide a conclusion and discuss some implications of our findings.

2   Literature Background

We study the role of skill intensive headquarter services on labour demand elasticity. The work of Hamermesh (1993) has firmly established in the literature the idea that skill intensity is related to lower (in absolute terms) own wage elasticity of labour demand.[7] This is consistent with a more skill intensive production process in a firm that makes employment changes less prone to labour costs fluctuations. Barba-Navaretti and Venables (2006) write: " As labour demand for skilled workers is generally less elastic to changes in wages ..., average labour demand [in firms] will be more rigid ...". Thus accordingly, skill intensive firms should exhibit less elastic labour demand elasticities in response to a wage shock. We propose to coin this relationship the direct skill intensity effect on labour

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[7]Skill intensity is a multi-dimensional concept that is difficult to grasp (Hamermesh, 1993; Leamer, 1994). One difficulty is that it may be attributed to aggregated groups as well as specific individuals or firms.Hamermesh (1993) argues that any skill intensity proxy should be consistent with more rigid labour demand elasticity as the skill intensity increases.

demand elasticity because it is independent of the foreign involvement of firms.

In parallel, recent work focusing on what explains multinational production has emphasized that headquarter services are central to the setting up of a foreign affiliate in a general equilibrium international trade model (Helpman, 1985). In Helpman et al. (2004), headquarter services, modeled as fixed foreign investment costs, are only payed by the most productive firms which are, in turn, the only domestic firms to produce in multiple countries. Thus domestic multinationals devote important resources to headquarter services which contribute to their relative competitive strength. This idea is reinforced with regard to labour demand in headquarters of multinationals by Hanson et al. (2003). In their study, research and development activities contribute to the multinational-wide competitive advantage and are likely to translate into more rigid employment behaviour in response to labour cost shocks. They show that research and development employees are wage inelastic, but are unable to consider the role of headquarter services over and above those skill intensive activities. Indeed, they limit their study exclusively to domestic US multinationals and information on research and development employees is often missing.[8]

To quantify the role of headquarter services on labour demand elasticity over and above the *direct* skill intensity effect, we estimate labour demand elasticity coefficients in domestic and foreign multinationals operating in the UK. Our argument for considering only multinational firms is that both type of firms have foreign inputs they may substitute for their employees following a wage shock in their UK activities. As such, any observable difference in labour demand elasticity between foreign and domestic multinationals will unlikely be driven solely by the availability of foreign inputs. However, if the wage elasticity of labour demand is smaller (in absolute terms) in domestic than in foreign multinationals then headquarter services, which are by nature skill intensive activities, may have a substantial role

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[8]Considering only one type of multinationals (either domestic or foreign multinationals) in one country has also led to a questionable multi-usage for the word "multinational". Barba-Navaretti and Venables (2006) write in the glossary of their book: "In chapters strictly dealing with host countries we use the general term multinational as a synonym for foreign subsidiaries, in chapters strictly dealing with home countries, as a synonym for headquarters or parent firm ".(p.300)

to play for labour demand elasticity in domestic multinational firms.

There are however, reasons not to exaggerate the extent of our interpretation just by looking at a wage elasticity difference between domestic and foreign multinationals. First, note that in the horizontal FDI literature –where expansion abroad is mainly motivated by market access–, there is at least one theoretical case where foreign affiliates replicate abroad the whole range of activities with local factors of production (Head, 2007). In this setup, headquarter services lose their transferability feature and all intangible inputs are produced where they are used as inputs. Then, any difference in wage elasticity of labour demand found in our data would not only reflect the role of headquarter services for labour demand. Instead, it could be that labour demand elasticities are more rigid in domestic multinational firms because of a more skill intensive workplace. Despite this possibility, more often, in either the horizontal or the vertical FDI literature, it is common to assume that multinationals are composed of upstream and downstream units located in different countries. The downstream units reproduce most of the production activities of the upstream unit in the horizontal multinational case (Markusen, 2002) or specialize in less skill intensive stages of production in the vertical multinational case (Feenstra, 2003). On the whole, however, in both theoretical frameworks, downstream units import headquarter services from their respective upstream unit.[9]

In order to attenuate the potential influence of skill intensive production processes on labour demand elasticity, we will not only introduce a distinct wage elasticity of labour demand in domestic and foreign multinationals, but also include in the same specification the direct skill intensity impact on labour demand elasticity. This will have the advantage to turn wage elasticity differences between foreign and domestic multinationals into a more accurate measure of the shielding role of headquarters services in domestic multinational firms. Furthermore, as a way to capture the possible replication of headquarter services in foreign affiliates, we will also use information on each multinational firm's intangible

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[9]Note that Helpman (2006) suggests: "...the traditional classification of FDI into vertical and horizontal firms has become less meanfull in practise".

assets. This variable, among others, is closely linked to headquarter services and thus might affect the wage elasticity in domestic and foreign multinationals. It is, of course, difficult to measure intangible inputs, which is often thought to be a weakness in empirical studies related to MNEs (Lipsey, 2008). Intangible assets, as found in account books are unlikely to adequately measure the intangible nature of headquarter services that flow across borders. Still, allowing multinational firms to differ in their labour demand elasticity coefficients according to their share of intangible assets in total sales will provide an additional information on the role of headquarter services on labour demand elasticity.[10]

In summary, an interpretation of a statistically significant lower (in absolute terms) constant output wage elasticity for domestic multinationals than for foreign multinationals is that headquarters services have a quantitatively important shielding role on multinationals' labour demand. This interpretation is reinforced if this difference holds even when we control for the direct effect of skill intensity on labour demand elasticity in multinational firms. And finally, the robustness of this difference is further strengthened if it persists when we permit simultaneously a distinct effect of intangible assets on labour demand elasticity.

3 Empirical framework and data

3.1 Empirical Framework

We study the effects of skills and headquarter services on multinational's labour demand elasticity using a standard labour demand framework. In this context, labour demand elasticity is defined as the percentage decrease in the quantity of labour demanded in response to a one percent increase in the price of labour. In order to formalize our estimation, we derive labour demand for a multinational firm based on a generalized cost function. The

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[10]Another issue could be that foreign affiliates have a larger share of labour in their variable costs when compared to domestic multinationals as proposed by Görg et al. (2009). Indeed, for a given wage shock, the magnitude of the employment changes would be proportional the labour share in variable costs. While this argument is plausible, regressing a productivity variable on labour and total assets measures does not provide any significant difference between domestic and foreign multinational firms. This argument is thus not appropriate in our data.

next steps follow Hamermesh (1993).[11]

Assume that a firm uses n factors of production, $X_1...X_n$ including all foreign factors of production. One can write a production function:

$$Y_i = f\left(X_{1i}, ..., X_{ni}\right), f_i \geq 0, f_{ii} \leq 0$$

Then, the related cost function, obtained from the demand for each X_1 to X_n is:

$$C_i = g\left(s_{1i}, ..., s_{ni}, Y\right), g_i \geq 0$$

where s_i to s_n represent all input prices. Applying Shepards' lemma we derive:

$$X_i = X_i^d\left(s_i, s_n, Y\right), i = 1, ..., N$$

(equation 1)

We assume that labour supply is perfectly elastic and that employment changes are small. Thus taking logs on both sides of the equation gives a log-log relationship that may be estimated and interpreted as a labour demand elasticity. In its simplest form, the empirical output constrained labour demand specification with two inputs labour and capital, w_{it} the wage rate and r_{it} the cost of capital would take the following form:

$$\ln(l_{it}) = \beta w_{it} + \delta y_{it} + \eta r_{it} + \sigma_{it}$$

(equation 2)

Given that labour demand is dynamic in nature, because for example of hiring and firing costs that make desired employment adjust only slowly, we introduce different ad-hoc lag structures in this specification following Görg et al. (2009). The resulting specification

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[11]Barba-Navaretti et al. (2003) and Harrison and McMillan (2006) follow a similar procedure.

is going to be applied to our sample of multinational firms located in the UK. We also introduce a firm fixed effect to accounts for any characteristic of the firm that is constant along the time dimension, in particular the availability of foreign inputs. Furthermore, we add a time fixed effect which accounts for the fact that capital costs are not trivial to measure at the firm level. Therefore, we assume that the capital market is nation-wide and changes in the cost of capital are captured by this time disturbance. Our resulting specification may be written in the following form:

$$\ln(l_{it}) = \lambda l_{it-s} + \beta w_{it} + \delta y_{it} + \nu_i + \phi_t + \sigma_{it}$$

(Equation 3)

Consider equation 3 as our starting point. Another three empirical specifications of labour demand are considered following this baseline specification. In the first specification conditional on output, we evaluate whether labour demand in domestic and foreign multinationals differ in the magnitude of their wage and output elasticity:

$$l_{it} = \lambda l_{it-s} + \beta_1 wage_{it} + \alpha_1 sales_{it} + \beta_2 \left(wage_{it} * DDMNE_i\right)$$
$$+ \alpha_2(sales_{it} * DDMNE_i) + \nu_i + \phi_t + \sigma_{it}$$

(Equation 4)

where, l_{it-s} denotes the employment level of firm i at time t and s is the number of lags of our dependent variable according to our selection criteria (Those are explained later in the text). w_{it} denotes the log of the average wage of firm i at time t. y_{it} denotes the log of total sales for firm i at time t. $(w_{it} \times DDMNE_i)$ and $(y_{it} \times DDMNE_i)$ are two linear interaction terms that permit the coefficients on wage elasticity and output elasticity to differ by the nationality of multinational firms. Specifically, $(DDMNE_i)$ is a dummy equal to 1 if the multinational is British owned. $(DDMNE_i)$ is time invariant due to the nature of the data. Hence, intercept differences between domestic and foreign multinationals are

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captured by ν_i, our firm fixed effect. ϕ_t is our time fixed effect while σ_{it} is a white noise error term.[12]

Unfortunately, theory gives us limited guidance here as there exists no refutable model that predicts how headquarter services should have a distinct effect through the *direct* skill intensive activities on labour demand elasticity. For this reason, we introduce a second estimation. In equation 5 we add two linear interaction terms to the baseline estimation 3, the sales and wage elasticity linearly interacted with the skill intensity variable ($wage_{it} \times Skill_{it}$) and ($sales_{it} \times Skill_{it}$). We write down the following specification:

$$l_{it} = \lambda l_{it-s} + \beta_1 wage_{it} + \alpha_1 sales_{it} + \beta_2 \left(wage_{it} * Skill_{it}\right)$$
$$+\alpha_2(sales_{it} * Skill_{it}) + \nu_i + \phi_t + \sigma_{it}$$

(Equation 5)

where $Skill_{it}$ is our measure of skill intensity in firm i at time t calculated as the wage bill over the median wage of an employee in the 2-digit industry (explained in the data section). This specification may be justified by firm level skill intensity resulting from strong complementarities between workers within the same firm as suggested by Kremer (1993).[13] Therefore, according to findings by Hamermesh (1993), we expect more skill intensive multinational firms to exhibit lower (in absolute terms) wage elasticity of labour demand.

In our final specification 6, we incorporate both, the interaction terms with the domestic

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[12]This specification has been often used to consider labour demand elasticity differences according to the nationality of firms (Barba-Navaretti et al., 2003). A similar approach is applied by Görg and Hanley (2005) in relating labour demand elasticity and international outsourcing.

[13]The traditional labour demand literature bundles skill intensity at the firm level to a common set of employees' characteristics (educational achievements, occupations, tasks etc...). Their intention is to inform on policies targeted at worker's skills. However at the firm level, the widely used decomposition by occupational groups of workers is rather convenient, because it is often ready available in firm level datasets as shown by Hamermesh (1993). Alternatively, the idea of complementarity between employees within firms for a skill intensity measure is supported by empirical findings. For example, Bresson et al. (1992) find that disaggregation according to production and non production workers within firms provide incoherent wage-employment relationship even when firms face similar employment expectations. Hence, while our specification is unable to guide policies targeted at different groups of workers, we are still able to find consistent wage-employment relationship at the firm level by using our measure of skill intensity.

multinational dummy variable as in equation 4 but also the interaction terms with the skill intensity variable as in equation 5. It enables us to quantify the differences in wage elasticity for domestic multinationals and foreign multinational firms over and above a *direct* effect of skill intensity on domestic and foreign multinationals' labour demand elasticity.

$$l_{it} = \lambda l_{it-s} + \alpha_1 wage_{it} + \beta_1 sales_{it} + \alpha_2 (wage_{it} * DDMNE_{it})$$
$$+\beta_2(sales_{it} * DDMNE_i) + \alpha_3(wage_{it} * Skill_{it})$$
$$+\beta_3(sales_{it} * Skill_{it}) + \nu_i + \phi_t + \sigma_{it}$$

(Equation (6))

If the data are consistent with the labour demand impact of headquarter services then we might expect the coefficient of ($wage_{it}$) to be negative and the coefficient of the interaction term ($w_{it} \times DDMNE_i$) to be positive. In short, domestic multinational firms would have a smaller (in absolute terms) wage elasticity of labour demand than foreign multinational firms.

Estimating equations 3 to 6 with OLS would clearly result in endogeneity bias because wages, output and skill intensity may well be affected by employment changes. Therefore, we use the general methods of moments (GMM) technique. GMM uses all existing lags of the dependent variable to generate additional orthogonality conditions. It has the merit to improve in a significant way the estimation efficiency in the presence of weak instruments of the first lagged difference of the dependent variable. This has been shown asymptotically and in Monte Carlo simulations by Blundell and Bond (1998) who find that the use of the lagged differenced variables as instruments in levels offers important efficiency gains in labour demand estimations. For this reason, we follow their estimation technique and thus take account of endogeneity issues and include additionally controls for firm level fixed effects to increase the number of available instruments. Each equation from 3 to 6 will therefore be estimated by two step system GMM estimations. Furthermore, as argued before, the dynamic structure of our labour demand function will be determined by the data

generating process and s, the number of lagged dependent variable to be included have to satisfy our selection criteria, i.e. the Hansen-J test for overidentification restrictions and the Arellano-Bond test for second order autocorrelation $AR(2)$.

3.2 Data

The FAME (Financial Analysis Made Easy) dataset provides unique information on UK operations of domestic and foreign multinational firms. It is published by Bureau van Djik (BvDEP) and reports longitudinal firm-level information on profit and loss account items, financial items or profitability ratios. A UK domestic multinational is defined as a firm that has controlling power over at least 1 affiliate abroad and a foreign subsidiary located in the UK is defined as a UK based firm owned by a foreign investor. Given that data about small firms may be unreliable, we drop observations on firms that report less than 10 employees. [14] We thus extract 18,010 observations on foreign multinational firms and 1,590 observations on domestic multinationals. Unfortunately, our dataset does not allow studying exit and entry behaviour of firms. The role of headquarter services in relation to exit or entry of firms is thus not considered. Instead, our framework is well adapted to studying small changes in employment and to quantify the role of headquarter services on labour demand elasticity in continuously active firms. One final advantage of studying multinationals located in just one country is that any difference in labour demand elasticity between foreign and domestic multinational firms should not be the result of different labour market institutions when incorporating a firm level fixed effect.

Some data work is needed. Total sales by each multinational firm are directly extracted from the FAME dataset, but we deflate these raw values using a 2-digit SIC level production price index provided by the Office of National Statistics (ONS). Total labour remunerations in each multinational firm are also deflated by a 2-digit consumer price index provided by

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[14]This procedure reduces the sample only slightly because FAME reports information over firms only if they have fixed assets, current assets, current liabilities or long term liabilities that are greater than £150,000.

the ONS. Note that labour remunerations in each multinational consist of all salary costs including social security and pension costs.

Turning to our skill intensity variable, it is defined as follow:

$$(SkillIntensity)_{it} = \frac{TotalLabourCosts_{it}}{Median(Wage_{jt}) \times Employees_{it}}$$

The numerator is the total labour costs in firm i at time t while the denominator is the median yearly gross wage payed to a full time worker of each 2-digit SIC manufacturing industry j at time t. The variable $Median(Wage_{jt})$ is calculated using the British Household Panel Survey (BHPS) and then multiplied by the number of employees in firm i at time t. Thus the denominator might be considered as a "hypothetical" wage bill which shows firm level costs of labour as if labour markets were spot markets. By contrast, the numerator accounts for the fact that labour markets are far from spot markets and that firms pay a skill premium to the average employee. As a whole, our skill intensity measure reflects firms total labour costs normalized by a hypothetical total labour costs that would occur if all employees where homogenous within each 2-digit industry. This skill intensity proxy has two important advantages: first, it is at the firm level. Second, it does not rely on grouping of employees according to their occupations, tasks or educational level to proxy a firm level skill intensity measure.[15]

Nonetheless, we propose a second skill intensity variable which is complementary to our first measure mentioned above. However, it differs in the construction of the $Median(Wage_{jt})$ variable. It is now extracted from the FAME database. It uses the median 2-digit industry wage per employee from a large sample of solely national firms.[16] We prefer our first proxy because the BHPS is a representative sample of the UK population, but use the second as

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[15]Winchester et al. (2006) show recurrent misfit between educational and occupational measures of skill intensity. Hijzen et al. (2005) show that the determinants of wage inequality depend strongly on its construction. The same message in another context is provided by Becker et al. (2005). Our measure takes account of the skill intensity relative to other firms in each 2-digit industry and captures strong complementarities between workers across the whole set of activities within each firm as suggested by Kremer (1993).

[16]Solely national firms are neither domestic multinationals nor foreign multinationals.

robust check in the estimations. Table 1 compares both average skill intensity measures for each 2-digit SIC 2003 industry in 1996 and in 2005. We observe first that the median skill intensity in our whole sample of multinationals slightly increased during the time period of study. Furthermore, domestic multinational firms seem in general to be more skill intensive, but not in all industries. For example in both years, according to our measures, foreign multinationals are in average more skill intensive than domestic multinationals in "chemicals, basic metals or other none metallic mineral products".

Our summary statistics are presented in table 2. Domestic multinational firms in our sample do not seem to pay higher average wages than foreign firms. This is in line with findings by Criscuolo and Martin (2009) which show no empirical evidence on payment policy differences between domestic and foreign multinationals. It is also close to the mean wage found in UK firms in 1996 by Griffith and Simpson (2003).[17] Furthermore, we observe some differences in the size of the respective firms in terms of average total sales and number of employees at this aggregated level. Domestic multinationals are slightly larger in our sample. Furthermore, the intangible assets share in total sales is characterized by much fewer observations. This is probably due to the difficulty of evaluating the real value of intangible assets and especially how to take account for the rate of depreciation of these assets. Nonetheless, the mean this variable reveals that domestic multinationals have much higher values (0.19) for the share of intangible assets in their total sales than foreign multinational firms (0.04). Additionally, it also shows that some domestic and foreign firms have no intangible assets included in their account data. Hence, these statistics suggest that headquarter services in domestic multinationals are not easy to measure precisely. However, using differences in wage elasticities between domestic and foreign firms seem to be a reasonable alternative way to evaluate adequately the role of headquarter services on labour demand elasticity.

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[17]The study of Griffith and Simpson (2003) ends in 1996 so no possible comparison can be made for subsequent years.

4 Empirical Results

4.1 Labour demand elasticity and the nationality of multinational firms

The first step of our econometric analysis is to let the data generation process define which lag dependent variable satisfies best our selection criteria in estimating equation 3. Column 1 of table 3 presents the regression results of equation 3 with s equal to 1, i.e. the dependent variable enters the specification with one lag. The Arellano Bond AR(2) test (p-value=0.020) can be rejected and the Hansen test of overidentification of the instruments can also be rejected by our data generation process. In column 2, we add one lag of the wage and output variable, but at the same time, we keep s equal to 1. As before, our selection criteria are still not satisfied. In particular, the AR(2) test can be rejected by the data. In column 3, we turn to a specification with s equal to 2. The $AR(2)$ test can be rejected at the 5 percent level ($pvalue = 0.217$). Furthermore, we can reject the hypothesis of overidentification restrictions at the standard level of significance ($p - value = 0.59$). Hence, according to our selection criterion the dependent variable enters our equation with two lags. The coefficients found in column 3 represent our baseline specification.[18]

Concerning our coefficients, the expected signs of the variables of labour demand equations are obtained. The coefficient of the logarithm of wages ($wage_t$) is negative and significant at the 1 per cent level. The variable of the logarithm of sales, ($sales_t$), is also highly significant and positive. Turning to our variables of interest, the interaction term ($sales_{it} \times DDMNE_i$) is significant and negative and the coefficient of the interaction term ($wage_{it} \times DDMNE_i$) is also highly significant and positive. Thus, domestic multinationals seem to be on average less wage elastic (in absolute terms) than foreign multinational

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[18]In table 8, we also compare different estimators (OLS, fixed effect and difference GMM) to our system GMM estimator. This comparison reinforces the superiority of our specification methodology. In particular, the magnitude of the first lag of the dependent variable is bounded between the coefficient of the fixed effect and OLS specifications. Roodman (2006) suggests that such a specificity is a sign of efficiency of the estimator.

firms in the UK over the time period of our analysis. A one percent increase in labour costs decreases demand for labour by 0.839 percent in all multinationals, while a one percent increase in the wage induces a 0.184 percent (calculated as $-0.839 + 0.655$) decrease in the labour force demanded by domestic multinational. The results reported in table 3 thus appear very supportive of our hypothesis that domestic multinationals have lower (in absolute terms) wage elasticity of labour demand. Headquarter services might contribute significantly to explain the extent of this difference.

4.2 Labour demand elasticity, skill intensity and the nationality of multinational firms

If domestic multinationals have a lower wage elasticity (in absolute terms) of labour demand than foreign multinationals in their UK operations, our interpretation that domestic multinationals skill intensive headquarter services drive their employment behaviour in response to labour cost changes would be consistent with this finding. However, it may also be that domestic multinationals are on average more skill intensive than foreign multinational firms although unrelated to headquarter services. In this case, it would be misleading to interpret the difference between foreign and domestic multinationals in wage elasticity as an evaluation for headquarter services of domestic multinational labour demand. Instead it would just pick up a skill intensity production process that affects the firm level wage elasticity of labour demand.

Therefore, we estimate equations 5 and 6. Equation 5 allows multinational firms labour demand elasticity to be heterogeneous according to their skill intensity. As explained in the former section, we expect multinationals to have lower wage elasticities (in absolute terms) as their skill intensity increases. Results of these estimations are presented in columns 1 and 2 of table 4. The first column shows that the coefficient ($wage_{it}$) is still negative and highly significant, while the interaction term ($w_{it} \times Skill_{it}$) is positive and significant at the standard level of significance. Hence, more skill intensive multinationals have lower (in

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absolute terms) labour demand elasticities. The median skill intensive firm of our sample in 2005 in log terms is 0.265. Multiplying this number by the coefficient of the interaction term, 0.524, and adding the coefficient of wage elasticity, -0.99, yields -0.851. Ceteris paribus, a 1 percent increase in wages induces a 0.851 percent decrease in the labour demand of the median multinational firm. For the multinational firm at the $90th$ quintile, the direct effect of skill intensity on wage elasticity is even stronger with a wage elasticity of -0.634 percent. Thus, the sign and the magnitude of the coefficient of the interaction term support the idea that higher skill intensive firms have on average lower (in absolute value) labour demand elasticities.

Now the crucial question becomes whether domestic multinationals still have a significantly different wage elasticity than foreign multinationals over and above this observed skill intensity effect on labour demand elasticities. In short, is the difference in wage elasticity between domestic and foreign firms specifically due to headquarter services? To answer this question, we estimate equation 6. It includes both the interaction terms for skill intensity and for domestic multinationals. Results are shown in columns 2 and 3 of table 4. We first observe that our selection criteria are still satisfied even if there is a slightly decrease in the Hansen J statistic. ($wage_t \times DDMNE$) is still positive and significant while ($wage_t$) is still significant and negative. On the other hand, the interaction term ($w_{it} \times Skill_{it}$) is still positive but becomes insignificant at the 5 percent level. Comparing these results with those found in column 2 of table 3 provides, however some interesting information. Indeed, first, both multinational types′ labour demand becomes more wage elastic. Now, ($wage_{it}$) is equal to 1.18. Furthermore, a one percentage point increase in labour costs decreases labour demand by 0.64 percent for domestic multinationals. We may understand these larger (in absolute terms) wage elasticity coefficients as ”raw” wage elasticities of labour demand, i.e. the elasticity that does control for differences in skill intensity. Thus it is not a surprise that ”raw” wage elasticities exhibit larger coefficients than the ones found in constant output wage elasticity of labour demand.

We now consider some robustness checks, and start with our alternative measure of skill intensity using the FAME data instead of the BHPS data. Results are presented in column 4 of table 4. Although we prefer the skill intensity measure used so far, the alternative firm level skill intensity provides very similar labour demand coefficients and strongly supports the role of headquarter services on labour demand elasticity.

To check further for robustness of our results, we split up our sample according to the size of the multinational firms. It may be that foreign firms have more foreign inputs to substitute from and in turn have more sensitive labour demand elasticity than domestic multinational firms. Results that take account of this possibility are presented in table 5. Column 1 restricts our sample to multinational firms with more than 100 employees. In column 2, we consider only the sample of multinational firms with less than 500 employees and finally in column 3 we show results solely for multinational firms that employ between 100 and 500 employees. None of the sample size restrictions change our results in a significant way. However the magnitude of our main coefficients differ slightly as shown in table 5. Most importantly, size differences between domestic and foreign multinationals do not drive our results.[19]

4.3 Labour demand elasticity, intangible assets, and the nationality of multinational firms

As proposed above, intangible assets are also related to skill intensity and headquarter services. Therefore we replace our skill intensity variable by a measure of intangible assets. We might expect that introducing this variable and its interaction terms would influence the wage elasticity difference between foreign and domestic multinationals. Recall that one important feature of headquarter services is their intangible characteristic. In addition,

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[19]In an additional robustness check, we allowed a distinct effect of skill intensity for domestic and foreign multinationals by introducing a triple interaction term ($wage_{it} * DDMNE_i * Skill_{it}$). This specification does not fit our data well and confirm our presumption that skill intensity and headquarter services are intertwined in domestic multinationals. We therefore favour our specifications without the triple interaction term to assess adequately the shielding role of headquarter services on labour demand elasticity.

including intangible assets provides an added benefit to our estimations. It checks on the possibility that the effect of headquarter services on labour demand elasticity is not only limited to the book value of those assets, like patents or trademarks, but also include intangible inputs like management and control, assuming they are correlated with the book values.

Results including the intangible assets variable, measured as the share of total sales are presented in table 6. In column 1, we observe that the variable $(wage_{it})$ is negative and significant. Its magnitude is similar to the one found in the specification with our skill intensity proxy. Thus this new specification seems to catch some aspects of the raw wage labour demand elasticities observed in column 1 of table 3. However, an important difference now is that the elasticity of domestic multinational firms is even more reduced than in the skill intensity case. Domestic multinational firms have now an elasticity of -0.21. Perhaps it suggests that intangible assets, evaluated at book prices, have an important influence on the average labour demand by reducing the magnitude of the wage elasticity in domestic multinationals. However, other aspects of headquarter services, not captured by our intangible assets proxy, like organizational capacities to manage and control foreign affiliates are still driving a persistent significant difference in labour demand elasticity in domestic and foreign multinationals.

4.4 The shielding role of Headquarter services in terms of labour demand elasticity

We are now ready to compute the quantitative importance of headquarter services with respect to labour demand elasticity in domestic multinationals. We term it the shielding role of headquarter services. It is calculated as the ratio of the wage elasticity in domestic multinationals over the wage elasticity in all multinational firms. Results of this calculation are presented in table 7 relying on results extracted from tables 3 to 6. Using coefficient results in table 3, column 3 to attribute the importance of headquarters services to domestic

multinational firms would be biased by differences in skill intensity that lead to lower wage elasticity of labour demand. It would give 22 percent which is reported in column 1 of table 7. For this reason, we use the wage elasticities obtained from tables 4 and 5, where the direct skill intensity effect on labour demand elasticity is accounted for. In table 4, column 3, the wage elasticity for all multinationals was -1.183 and it was -0.693 for domestic multinationals. Thus the share attributed to headquarter services for domestic multinationals labour demand elasticity would be about 54 percent. The difference (22 versus 54 percent) shows clearly that omitting the direct role of skill intensity on labour demand elasticity underestimates the real contribution of headquarter services on labour demand elasticity. Perhaps foreign multinational firms import some headquarter services to the UK or have a highly skill intensive production process.

In column 4 of table 4 we presented some labour demand elasticities using our alternative measure of skill intensity. Using these results, we find that the shielding role of headquarter services becomes equal to 51 percent. Furthermore, in columns 3 to 6 of the same table, we calculated labour demand elasticities for the reduced sample by the size of the multinational firms. Using these coefficients, we find that the shielding role of headquarter services is the smallest for firms with less than 500 employees (19 percent). This is consistent with the idea that smaller domestic multinationals generate less headquarter services and therefore have a lower shielding role for their labour demand elasticity. In an additional step, we also compute the role of headquarter services using our regression results when accounting for the intangible assets variable. As expected, the role of headquarter services is reduced because intangible assets capture partially some headquarter services. Finally, the computation of the role of headquarter services accounting for both, the direct skill intensity effect and the intangible assets effect provides a value of 39 percent. It lies comfortably between the magnitude when accounting for the skill intensity and intangible assets separately. As a result, the quantitative reduction in labour demand elasticity attributable to headquarter services is in a range between 19 and 54 percent. A reasonable idea about this magnitude

can be given by the average of all seven "shielding" calculations: this is 38 percent.

5   Conclusions

We have found that domestic multinationals' labour demand is statistically less sensitive to wage shocks than foreign multinationals'. Our results are based on labour demand elasticities of domestic and foreign UK operations of multinationals from 1996 to 2005. These results hold even when we allow for different skill intensities of the operations of the two types of firms. They are also robust to taking account of intangible assets in the calculation of the role of headquarter services on labour demand elasticity. Together our findings suggest that the economic and quantitative role of skill intensive activities required by foreign direct investment –headquarter services– is important in shaping domestic multinational's labour demand response to own wage shocks. Headquarter services shield labour demand elasticity by about 40 percent in UK domestic multinationals in our data sample.

Our results point to two areas of concern for policy makers regarding the relationship between labour demand and multinational firms. On the one hand, anecdotal evidence suggests that global firms like IBM have recently increased their research and development and headquarter activities in India (Economist, 2007). Toyota intends to share more control power and give more independence to its foreign affiliates (IHT, 2008). More formally, Marin and Verdier (2009) show that headquarter firms have managerial incentives to transfer some power to their foreign affiliates. On the other hand, Klapwijk (1996) advocates that domestic multinationals "...concentrate their efforts on their core competencies..." and are "...'supra' companies, that is on a level of integration above companies". Global firms are perhaps not representative of multinationals, but the location of headquarter services, ultimate control of management and firm's competitive advantage have consequences for labour demand behaviour in multinational firms. Finally, developing countries witness the emergence of home based new domestic multinationals in addition to foreign affiliates. Given that heterogeneous labour demand responses in multinationals depend partially on

the content of their skill intensive activities, it would be misleading to argue that these firms react less to labour cost changes without scrutinizing to which extent their operations encompass headquarter services.

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Annexes

Table 1: Multinationals and skill intensity by 2-digit SIC(2003) industry classification in the UK

SIC	Skill intensity (BHPS)				Skill intensity (FAME)			
	1996		2005		1996		2005	
	FMNE	DMNE	FMNE	DMNE	FMNE	DMNE	FMNE	DMNE
15 – 16 Manufacturing of food products and beverages	1.51	2.17	1.38	1.83	1.01	1.37	0.99	1.26
17 Textile	1.20	1.57	1.63	1.67	1.05	1.01	0.82	0.82
18 Wearing apparel	1.97	1.98	1.93	2.47	0.98	0.86	0.97	1.26
20 Wood and wood products	1.37	1.39	1.11	1.31	1.04	1.04	0.95	1.13
21 Pulp and paper and paper products	1.12	1.15	1.64	1.73	1.12	1.17	1.07	1.12
22 Publishing and printing	1.41	1.57	1.72	2.43	0.99	1.25	0.93	1.29
24 Chemicals	1.40	1.32	1.45	1.41	1.10	1.05	1.06	1.02
25 Ruber and Plastic	1.21	1.24	1.43	1.60	1.05	1.14	1.10	1.22
26 Other non metallic mineral products	1.41	1.24	1.47	1.25	1.10	0.95	1.06	0.91
27 Basic Metal	1.40	1.26	1.27	1.13	0.78	0.72	1.11	0.99
28 Fabricated metal products	1.26	1.41	1.34	1.62	1.07	1.18	1.04	1.27
29 Machines and other equipment	1.41	1.52	1.31	1.47	1.08	1.15	1.00	1.14
30 Office machinery and computers	1.84	1.95	1.50	1.78	1.00	1.13	0.95	1.09
31 Electrical machinery and apparatus n.e.c.	1.29	1.28	1.77	2.15	0.97	0.98	1.00	1.22
32 Radio, television	1.12	1.13	1.38	1.31	1.06	1.04	1.12	1.05
33 Medical, precision and optical instruments	1.21	1.20	1.25	1.24	1.00	1.11	1.00	1.03
34 Motor vehicles and trailers	1.08	1.02	1.30	1.01	1.02	0.83	1.03	0.78
35 Other transport equipment	1.26	1.39	1.14	1.63	0.92	1.21	0.93	1.32
36 furniture and manufacture n.e.c.	1.59	1.49	1.44	1.25	1.07	0.94	0.89	0.77
total	1.37	1.46	1.45	1.66	1.05	1.19	1.03	1.31

DMNE are Domestic Multinationals, while FMNE are foreign multinationals. The column skill intensity (BHPS) uses information from the British Household Panel Survey to calculate the skill intensity variable while the column skill intensity (FAME) relies on the FAME data (see text for details on the construction of both skill intensity variables)

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Table 2: Summary statistics on multinationals active in the UK

		Nb. of Obs.	mean	Std. Dev.	median	min	max
FMNE	Employees	18010	354	1053	121	10	30300
DMNE	Employees	1590	978	4245	275	16	65300
FMNE	wage per head in (£, 1996)	17165	28169	9481	25784	6426	96103
DMNE	wage per head in (£, 1996)	1530	25784	10325	28169	7985	88041
FMNE	Skill Intensity	17165	1.37	6.49	1.30	0.43	7.54
DMNE	Skill Intensity	1530	1.49	6.55	1.39	0.44	4.53
FMNE	UK Output (£1000, 1996)	17938	60309	299	13446	1022	8416288
DMNE	UK Output (£1000, 1996)	1586	157283	798	31932	1374	9544555
FMNE	Share of intangible assets in total sales	13457	0.04	0.56	0	0	50.9
DMNE	Share of intangible assets in total sales	1253	0.192	1.68	0.01	0	30.6

DMNE are Domestic Multinationals, while FMNE are foreign multinationals.

Table 3: Labour demand elasticity and the nationality of the multinational 1997-2006, 2-step System GMM estimation with different lag structures

dep. var.	$Employment_t$ (in log.)			
specification	*(1)*	*(2)*	*(3)*	*(4)*
nb. of firms	1960	1960	1960	1960
$employment_{t-1}$	0.309***	0.349***	0.746***	0.960***
	(0.097)	(0.144)	(0.162)	(0.146)
$employment_{t-2}$	-	-	0.015	-0.086
	-	-	(0.098)	(0.102)
$sales_t$	0.687***	0.706***	0.303***	0.147**
	(0124)	(0.148)	(0.103)	(0.063)
$sales_{t-1}$	-	-0.095	-	-
	-	(0.236)	-	-
$wage_t$	-1.57***	-1.238**	-0.839***	-0.335**
	(0.189)	(0.270)	(0.323)	(0.159)
$wage_{t-1}$	-	-0.535*	-	-
	-	(0.308)	-	-
$(wage_t \times \text{DDMNE})$	0.841**	0.836**	0.655**	-
	(0.214)	(0.276)	(0.293)	-
$(sales_t \times \text{DDMNE})$	-0.733**	-0.705**	-0.619**	-
	(0.215)	(0.266)	(0.283)	-
time dummies	yes	yes	yes	yes
Nb of obs	17590	16665	15667	15667
AR(1) p-value	-5.55***	-1.09	-2.92***	-3.39***
p-value	(0.00)	(0.278)	(0.004)	(0.001)
AR(2)	-2.33**	-2.87***	-1.23	-0.46
p-value	(0.02)	(0.004)	(0.217)	(0.644)
Hansen test	50.14**	41.21	20.85	36.04
p-value	(0.047)	(0.292)	(0.590)	(0.114)

Robust standard errors in brackets; significant at the 1 percent level:(∗ ∗ ∗), significant at the 5 percent level: (∗∗), significant at the 10 percent level: (∗). Dummy Domestic Multinational: DDMNE

Table 4: Labour demand elasticity, skill intensity and the nationality of multinational firms 1997-2006, 2-step System GMM estimation

dep. var.	$Employment_t$ (in log.)			
specification	*(1)*	*(2)*	*(3)*	*(4)*
nb. of firms	1960	1960	1960	1960
$employment_{t-1}$	0.922***	0.745***	0.708***	0.665***
	(0.128)	(0.162)	(0.156)	(0.160)
$employment_{t-2}$	-0.022	0.016	0.036	0.005
	(0.097)	(0.099)	(0.093)	(0.103)
$sales_t$	0.142	0.303***	0.302**	0.400**
	(0.088)	(0.103)	(0.126)	(0.189)
$wage_t$	-0.990***	-0.839***	-1.183**	-1.06**
	(0.307)	(0.323)	(0.500)	(0.543)
($wage_t \times$ DDMNE)	-	0.656**	0.541**	0.524**
	-	(0.293)	(0.236)	(0.216)
($sales_t \times$ DDMNE)	-	-0.619**	-0.490**	-0.467**
	-	(0.283)	(0.232)	(0.208)
($wage_t \times skill_t$)	0.524***	-	0.043	0.131
	(0.255)	-	(0.270)	(0.251)
($sales_t \times skill_t$)	0.036	-	0.028	-0.007
	(0.049)	-	(0.050)	(0.138)
$Skill_t$	-5.258**	-	-0.436	-1.384
	(2.69)	-	(2.688)	(3.35)
time dummies	yes	yes	yes	yes
Nb of obs	15667	15667	15667	15667
AR(1)	-3.57***	-2.92***	-3.07***	-3.21***
AR(1) p-value	(0.000)	(0.004)	(0.002)	(0.001)
AR(2)	-1.46	-1.23	-1.60	-1.18
AR(2) p-value	(0.145)	(0.217)	(0.110)	(0.237)
Hansen J	25.50	20.85	16.65	19.37
Hansen J p-value	(0.435)	(0.590)	(0.675)	(0.624)

Robust standard errors in brackets; significant at the 1 percent level:($***$), significant at the 5 percent level: ($**$),
significant at the 10 percent level: ($*$). Dummy Domestic Multinational: DDMNE

Table 5: Labour demand elasticity, skill nationality of multinational firms 1997-2006, 2-step System GMM estimation by size groups

dep. var.	$Employment_t$ (in log.)			
specification	*(1)*	*(2)*	*(3)*	*(4)*
nb. of firms	1362	1410	1166	1960
nb. of employees: n	n>100	n<500	100<n<500	All
$employment_{t-1}$	0.764***	0.586***	0.704***	0.708***
	(0.190)	(0.178)	(0.180)	(0.156)
$employment_{t-2}$	-0.019	-0.012	0.004	0.036
	(0.102)	(0.093)	(0.102)	(0.093)
$sales_t$	0.320**	0.474**	0.322**	0.302**
	(0.137)	(0.196)	(0.144)	(0.126)
$wage_t$	-1.086**	-1.030**	-1.169**	-1.183**
	(0.531)	(0.512)	(0.505)	(0.500)
($wage_t \times$ DDMNE)	0.525**	0.625**	0.644**	0.541**
	(0.259)	(0.263)	(0.257)	(0.236)
($sales_t \times$ DDMNE)	-0.473*	-0.531*	-0563**	-0.490**
	(0.261)	(0.302)	(0.267)	(0.232)
($wage_t \times skill_t$)	0.233	-0.141	-0.206	0.043
	(0.339)	(0.338)	(0.270)	(0.270)
($sales_t \times skill_t$)	0.078*	-0.082	-0.030	0.028
	(0.042)	(0.111)	(0.137)	(0.050)
$Skill_t$	-3.079	2.102	2.514	-0.436
	(3.434)	(3.948)	(3.240)	(2.688)
time dummies	yes	yes	yes	yes
Nb of obs	10889	14100	9322	15667
AR(1)	-2.93***	-3.40***	-3.06***	-3.07***
AR(1) p-value	(0.003)	(0.001)	(0.002)	(0.002)
AR(2)	-1.25	-0.71	-0.92	-1.60
AR(2) p-value	(0.21)	(0.476)	(0.355)	(0.110)
Hansen J	21.85	15.99	14.50	16.65
Hansen J p-value	(0.530)	(0.816)	(0.804)	(0.675)

Robust standard errors in brackets; significant at the 1 percent level:(∗∗∗), significant at the 5 percent level: (∗∗), significant at the 10 percent level: (∗). Dummy Domestic Multinational: DDMNE

Table 6: Labour demand elasticity, intangible assets and the nationality of multinationals 1997-2006, 2-step System GMM estimation

dep. var.	$Employment_t$ (in log.)		
specification	(1)	(2)	(3)
nb. of firms	1866	1960	1866
$employment_{t-1}$	0.564***	0.708***	0.607***
	(0.188)	(0.128)	(0.219)
$employment_{t-2}$	0.038	0.036	0.012
	(0.098)	(0.093)	(0.111)
$sales_t$	0.442***	0.302**	0.410**
	(0.155)	(0.126)	(0.187)
$wage_t$	-1.265***	-1.183**	-1.574**
	(0.419)	(0.500)	(0.730)
$(wage_t \times$ DDMNE$)$	1.054**	0.541**	0.963**
	(0.455)	(0.236)	(0.463)
$(sales_t \times$ DDMNE$)$	-0.990**	-0.490**	-0.891*
	(0.447)	(0.232)	(0.461)
$(Intang_t)$	-0.151	-	-1.052
	(1.228)		(1.276)
$(wage_t \times Intang_t)$	-0.008	-	0.092
	(0.129)		(0.117)
$(sales_t \times Intang_t)$	0.024	-	-
	(0.039)		
$(skill_t)$	-	-0.436	-0.833
		(2.688)	(3.087)
$(wage_t \times skill_t)$	-	0.043	0.054
		(0.270)	(0.322)
$(sales_t \times skill_t)$	-	0.028	0.061
		(0.050)	(0.070)
time dummies	yes	yes	yes
Nb of obs	14536	15667	14536
AR(1) p-value	-3.00***	-3.07***	-2.74***
p-value	(0.003)	(0.002)	(0.006)
AR(2)	-1.33	-1.60	-0.89
p-value	(0.185)	(0.110)	(0.373)
Hansen test	11.69	16.65	9.63
p-value	(0.702)	(0.675)	(0.724)

Robust standard errors in brackets; significant at the 1 percent level:(***), significant at the 5 percent level: (**), significant at the 10 percent level: (*). Dummy Domestic Multinational: DDMNE

Table 7: Percentage reduction in labour demand elasticity attributed to headquarter services

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
calculated from table (t) and column (c)	t3c3	t4c3	t4c4	t5c1	t5c2	t5c3	t6c3	t6c5	Average
control for skill intensity	no	yes	yes	yes	yes	yes	no	yes	-
control for intangible assets	no	no	no	no	no	no	yes	yes	-
size of the multinational (n)	All	All	All	n>100	n<500	100<n<500	All	All	-
shielding role of headquarters services	22	54	51	52	39	45	19	39	38
(in percent)									

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Table 8: Labour demand elasticity with different estimators (dependent variable $employment_t$))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	Fix.Ef.	Dif.GMM	Sys.GMM	OLS	Fix.Ef.	Dif.GMM	Sys.GMM
$employment_{t-1}$	0.891***	0.541***	0.175**	0.544***	1.054***	0.584***	0.566**	0.960***
	(0.006)	(0.015)	(0.070)	(0.101)	(0.016)	(0.022)	(0.285)	(0.146)
$employment_{t-2}$	-	-	-	-	-0.163***	-0.10***	0.083	-0.086
					(0.015)	(0.013)	(0.094)	(0.102)
$sales_t$	0.508***	0.370***	0.653***	0.424***	0.098***	0.386***	0.174	0.147**
	(0.019)	(0.018)	(0.141)	(0.102)	(0.005)	(0.020)	(0.306)	(0.063)
$wage_t$	-0.539***	-0.483***	-0.647**	-0.933***	-0.169***	-0.500***	-0.819**	-0.335**
	(0.020)	(0.024)	(0.271)	(0.137)	(0.011)	(0.024)	(0.301)	(0.159)
time dummies	yes	yes	yes	yes	yes	yes	yes	yes
Nb of obs	17590	17590	15620	17590	15667	15667	13702	15667
Nb of groups	-	-	1960	1960	-	-	1960	1960
AR(1)	-	-	-2.48**	-5.74***	-	-	-1.50	-3.39***
AR(1) p-value			(0.013)	(0.000)			(0.134)	(0.001)
AR(2)	-	-	-2.17**	-4.38***	-	-	-1.84*	-0.46
AR(2) p-value			(0.03)	(0.000)			(0.065)	(0.644)
Hansen J	-	-	27.62	103.41***	-	-	16.38	36.04
Hansen J p-value			(0.189)	(0.000)			(0.291)	(0.114)

2 step system GMM regressions with all variables in log; significant at the 1 percent level($***$), significant at the 5 percent level ($**$), significant at the 10 percent level ($*$).