What can we learn from differences between UK parent multinationals and foreign affiliates located in the UK? The example of labour demand and skill intensity

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1 Abstract

Identifying relationships based on variations in a panel of 2500 firms that are all divisions of multinationals in the UK, we find that, UK located parent multi-national firms exhibit lower own wage constant output labour demand elasticity than UK located foreign affiliates. We argue that this difference in labour demand elasticities is the result of changes in the skill intensive range of activities that offset partially the higher wage elasticity induced by the availability of foreign factors of production. This effect characterizes only UK parent headquartered firms but not foreign affiliates. This suggest that the location of control, management and innovative activities is also central to the difference in labour demand elasticities between UK headquarter firms and foreign affiliates in the UK.

2 Introduction

It has been increasingly recognised that parent headquarter firms and foreign affiliates located in the same country have different characteristics, most notably in their production technology and the range of activities undertaken (Jensen et Dums, 1998 and Criscuolo et Martin 2004). While both types of firms are divisions of multinationals, it is still an open question if these different features may be reflected in their respective firm behaviour and labour demand.

This paper investigates the difference between parent domestic firms and foreign affiliates in labour demand elasticities adjusted for the skill range of activities undertaken, measured by a skill intensity proxy. Using a 10 years panel of more than 2400 firms composed only of divisions of multinational firms co-located in the same country, the UK, we explore empirically the relationship between labour demand and the skill intensity of their UK activities. We use a basic dynamic labour demand estimation grounded in the neoclassical labour demand theory and proxy skill intensity as the ratio of the total firm wage bill normalised by a hypothetical payroll, a payroll that would occur if labour markets would be spot markets. We take advantage of a system GMM specification that is particularly well suited for the subject at hand.

The analysis explores predictions by the Multinational Enterprises (MNE) and labour demand literature. Theories of the motives of multinationals that deal with labour demand, predict that parent firms and affiliates labour demand alike should be similarly exposed to own wage shocks because they have access, not only to internal but also to foreign factors of production. In this case, incumbent workers are more likely to be substituted for foreign inputs in response to a wage increase. Labour demand theories also do not predict differences between foreign affiliates and parent firms but provide a strong link between labour demand and skill intensity. Hamermesh (1993) reviews the literature and shows that higher skill endowment is related to lower wage elasticities of the labour demand.

In this context and given these labour demand predictions, foreign affiliates and parent firms

could be treated as a homogeneous group. However, this would be clearly misleading. One cornerstone of the multinational literature is that a parent firm control, manage and coordinate its multi-national activities while foreign affiliates are controlled, and managed by a foreign headquarter (Caves, 1995 Markusen, 2003). Based on this fact, the theory of multinationals makes clear predictions about skill intensity changes only for parent firms, albeit not directly linked to labour demand consequences. As parent firms expand abroad, they tend to change their composition of activities towards more skill intensive ones as argued by Hanson et Al. (2003) and which they call the "scope effect". Indeed, investment abroad may induce headquarter firms to increase their range of highly skilled activities to control, coordinate international activities or/and to invest in Research and Development, innovate or to train their international workforce. This argument may be extended to international outsourcing, outside of the boundaries of the multinational firms. Theoretical predictions relating foreign affiliate labour demand to skill intensity changes are less clear cut. While it has been demonstrated that foreign firms are likely to be more skill intensive than domestic firms (Jensen et Dums, 1998 and Feenstra and Hanson 1996), their skill intensity often rely on core technologies or knowledge capital produced, at high fixed costs, in the headquarter firm located abroad (Markusen, 1995). As a result, it makes changes in skill intensity in foreign affiliates difficult to predict.

The relationship we observe between parent firms labour demand and skill intensity on one hand, and foreign affiliate's labour demand and skill intensity on the other hand will indicate whether the scope effect described by Hanson et Al. (2003) is present in our data.

Existing labour demand studies on multinationals either compare labour demand parameters between domestic firms and firms under foreign control (Barba-Naveratti and Al., 2003 Goerg et Al. forthcoming) or cross input price changes between parent firms and their foreign affiliates. (, Harrison et McMillan, 2007). The former assess the role of nationality of the firms, domestics versus foreign, on labour demand. They find that foreign affiliates are more labour wage elastic than domestic firms. Unfortunately parent firms are included in the domestic firms group. The later asks the informal question, of whether foreign offshoring

activities and home parent activities are substitute or complementary. As such, they link wage changes in the foreign affiliates to observed employment changes in the home division of the multinational compagny. Complementary is often observable the higher the host country economic development. As a result, different divisions of a multinational appear to have coordinated labour demand decisions. Unfortunately both types of studies do not relate skill intensity changes to the magnitude of labour demand elasticities. Given that global firms like IBM have recently increased their research and development and headquarter activities in India (The Economist), and that firms like Toyota intend to share more control power and give more independence to their foreign affiliates (IHT, 2008), the links between labour demand and skill intensity deserve more attention.

Our study adds to the existing literature in four ways: First, our data separates parent firms and foreign affiliates located in the UK. Thus, using both groups of firms and by utilising the large firm variation in our 10 year sample period we are able to identify a strong relationship between firm-level labour demand adjustment to own wage shocks and the range of skill intensive activities in parent firms. Second, our firm level skill intensity proxy is a combination of firm level and household survey which permits to overcome some weaknesses of the production and non production classification, especially that any change in labour demand elasticities in a firm are not only the result of a labour composition effects. Third, we find a strong relationship between labour demand and skill intensity only in parent firms. As parent firms climb the ladder of value added activities, the higher substitutability of labour for foreign factors is offset partially by changes in the range of activities when measured in terms of skill intensity. This counter-balancing effect through the substitution effect is not observed for foreign affiliates. Finally, our results show that the own wage constant labour demand elasticities are significantly and statistically smaller (in absolute value) for parent firms than for foreign affiliates. This difference depends crucially on the wage offsetting effect of the scope effect. Own wage elasticity differences between foreign affiliates and parent firms vanishes statistically when we additionally allow for heterogeneity in the skill intensity. This information is thus consistent with the view that parent firms specialise in the highest

skill intensive tasks in their multinational activities which in turn reduces exposure to own wage shocks, at least compared to foreign affiliates located in the UK.

3 Empirical framework

Our empirical framework is designed to analyse the differences in labour demand elasticities between parent firms and foreign affiliates and to assess if the interaction with a skill intensity variable would influence the relationship. In this context, the 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. Hamermesh (1993) shows that it would mainly depend on 2 effects, the substitution effect and the scale effect. The substitution effect tells, for a given level of output, by how much firms substitute away from labour to other factors of production when wages rise. The scale effect tells how much labour demand falls after a wage increase thanks to the rise in firms costs and thus the fall in their output and so the fall in the demand for all inputs and in particular labour demand.

In order to formalise our estimation, we derive labour demand from a generalized cost function following Hamermesh (1993). Consider a firm using n factors of production $X1...Xn$ including foreign factors of production. Let the production function be:

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

It follows that the associated function, based on demand for X_1 to X_n is given by:

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

where w_i to w_n represents all inputs prices. Using Shepards lemma we derive:

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

(equation) 1

Taking logs on both sides of the former equation gives us a log-log relation that may be estimated.In its simplest form, with only labour as an input, the empirical specification looks as follow.

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

(equation 2)

Given that the labour demand is dynamic in nature, because for example of hiring and firing costs that makes the employment adjust only slowly, we introduce an ad-hoc lag structure in this specification following Naveratti et Al.(2003). Furthermore, given that firms may substitute labour with $n-1$ other inputs, we introduce a firm fixed effect and a time fixed effect in order to control for constant substitution relationships between inputs available for each firm and assume that if changes occur, they are all taken up account by our time dummy. Additionally, as argued before, an important channel through which the firm skill intensity may influence firms labour demand is by offsetting the substitution effect. Parent firms that climb the ladder of activities towards more skilled ones (the scope effect) have lower are less sensitive to wage shocks and have smaller labour demand elasticity. This offsetting force of the scope effect should only be observed for parent firms and not for foreign affiliates. However other forces could also counter balanced the substitution effect and be strongly correlated with our skill intensity measure. Divisions of multinationals may be become less wage elastic because of higher backward linkages as shown by Gorg et Al. (forthcoming)and Foreign affiliates may take advantage of better technologies produced in their foreign headquarter that will influence their skill intensity. For these reasons, we estimate equation (3) separately for parent firms and foreign affiliates which should give us an idea about the validity of these alternative interpretations.

We can now rewrite our dynamic demand specification for labour as follows:

$$\ln(l_{itk}) = \lambda_k l_{it-s} + \beta_k w_{it} + \delta_k y_{it} + \theta_k(w_{it} \times Skill_{it}) + \rho_k(y_{it} \times Skill_{it}) + \nu_i + \phi_t + \sigma_{it}$$

for $k = 1, 2$.

(equation 3)

where $k = 1$ denotes the group of parent firms.

$k = 2$ denotes the group of foreign affiliates.

l_{it-s} denotes the employment level of firm i at time t and firm group k, s denotes the lag structure of our dependent variable according to our selection criteria (explained later in the text).

w_{it} denotes the average wage of firm i at time t in 1996 pounds.

y_{it} denotes total sales in 1996 pounds for firm i at time t.

$Skill_{it}$ is our measure of the skill intensity in firm i at time t that is calculated taking advantage of the British Household Panel Survey (BHPS) (explained in the data section).

$\nu_i$is a firm fixed effect the $\phi_t$is a time dummy σ_{it} is the white noise error term.

Estimating (3) with OLS would clearly result in an endogeneity bias because wages, output and skill intensity may well be affected by employment changes. Taking the first difference of equation (3) could provide a solution to this problem and we may obtain a consistent estimator. However one may be confronted to the well know Nickell bias because of the correlation of the fixed effects with the first differentiated error term. The general methods of moments (GMM) tackles these both problems by using all possible lags of the dependent variable to generate orthogonality conditions. While this estimator has been widely used in the literature, various authors have proposed additional moment conditions to further improve its efficiency because of weak instruments of the first lagged difference of the dependent variable. Most notably, Blundell and Bond (1998) show both asymptotically and in Monte Carlo simulations that using the lagged differenciated variables as instruments

for the equation (3) in levels offers dramatic efficiency gains in labour demand regressions. Thus in our specification it is possible to overcome endogeneity bias and control additionally for firm level fixed effects which will increase the number of potential instruments.

We take advantage of this two steps system GMM estimator and let the data generating process define our dynamic specification. Our selection criteria will be the Hansen test for overidentified restrictions and the Arellano bond test for second order autocorrelation. They will be presented in section.

According to the substitution effect and the scale effect we expect β_k to be negative and δ_k to be positive respectively. If the data are consistent with the labour demand impact of the scope effect then we would expect that the coefficient θ_1 of the interaction term $w_{it} \times Skill_{it}$ should be positive for parent firms and larger for than for the group of foreign affiliates which coefficient is θ_2. there is no reason to expect the scope effect to have an important role for this group of firms, but other determinant of skill intensity may contribute to offset the substitution effect.

If we find empirically that parent firms labour demand get less factor price sensitive as their skill intensity increase, $(\theta_1 > 0)$, but quantitatively more than foreign affiliates do $(\theta_1 > \theta_2)$, than we would presume that the scope effect makes the parent firm less wage elastic. However, this would be only a presumption because our specification in (3) is not intended to assess if θ_1 and θ_2 are significantly different. Remember that we separated both types of firms because we believe that the scope effect should only affect parent firms and that the group of foreign affiliates should be a reference group to see if other factors may induce a change in the skill intensity and affect the interpretation of θ_1. In pooling all firms in equation (4), we will get a magnitude of the constant output wage elasticity for foreign affiliates and parent firms for which we can assess significantly the differences.

Hence in section 5.2, we will link the results found in equation (3) with an additional

equation like (4).

$$\ln(l_{it}) = \omega_0 l_{it-s} + \beta_1 w_{it} + \beta_2 y_{it} + \alpha_1 (w_{it} \times DummyParent_i) + \alpha_2 (y_{it} \times DummyParent_i) + \nu_i + \phi_t + \sigma_{it}$$

,

(Equation 4)

We pool all firms in the same estimation and allow the wage elasticity to differ between foreign affiliates and parent firms through both interactions terms, $w_{it} \times DummyParent_i$ and $y_{it} \times DummyParent_i$. While this specification do not allow to assess the magnitude of the offsetting force of the scope effect , it is intended to add additional evidence and strengthen the predictions that parent firms labour demand elasticities is influenced by the scope effect. If the own wage elasticity labour elasticity in parent firms is less sensitive to own wage chocks than in foreign affiliates, than it is very likely that parent firms have lower wage elasticities because the offseting impact of the scope effect. We thus expect α_1 to be positive.

4 data

The FAME (Financial Analysis Made Easy) dataset is a company information product published by Bureau van Djik (BvDEP) in Brussels which reports yearly firm level information on profit and loss account items, cash flow and financial items and finally on profitability ratios which allows to separate UK parent firms from foreign affiliates located in the UK. A UK headquartered multinational is a firm that have controlling power over at least 1 foreign affiliate abroad. A foreign affiliate located in the UK is defined as majority owned UK firms by a unique foreign investor [1]. Unfortunately, we are unable to contribute to 2 important issue when using the FAME data. first, foreign affiliate firms and parent firms are defined on the date of extraction may not be traced during the period of analysis and we may not

[1] given this definition our foreign affiliates are in fact more precisely foreign subsidiaries

assess the impact of a switch in ownership could affect labour demand. in the same vein, we do not consider entry and exit of firms, but our framework which our framework is not adapted to look for.

We may also note that FAME gives precise information over a sample of firms only if it has fixed assets, current assets, current liabilities or long term liabilities that are at least greater than $£150,000$. This should result in an underestimation of small sized firms. From this dataset we also extract information on total sales that we deflate by a 2-digit production price index provided by the Office of National Statistics (ONS). Total labour remunerations are also deflated by a 2-digit consumer price index provided by the ONS. It is to note that we use unconsolidated and consolidated accounts of firms in our analysis. We believe that the gains in information are higher than the costs in our analysis of labour demand that includes skill intensity heterogeneity between firms. However, the results we present should than be considered as the lower bound of a potential scope effect on labour demand elasticities.

We measure our skill intensity variable as the ratio of total firm labour costs over a hypothetical payroll that would occur if labour markets would be spot markets. The numerator accounts for the fact that labour markets are far from spot markets and firms may find it difficult for example, to substitute incumbent trained and skilled workers. The firm may provide firm specific or general training but also any supplementary skills that command a higher compensation. The denominator, on the contrary is a proxy for a hypothetical payroll if labour markets were spot markets. It is calculated by multiplying the number of employees of each firm by a hypothetical wage that would be the same for each worker of each 2-digit industry. We approximate this wage rate using the British Household Panel Survey (BHPS).In the BHPS, we classify all employees according to their 2-digit SIC92 industry of activity and than calculate the mean yearly wage by industry. We observe industry-year cells for this hypothetical spot market wage rate. Our skill intensity measure has advantages when compared for example to a skill intensity based on the production non production worker groups: It does not suffer from overlap in "*real*" skills and allow change in their skill intensity without necessarily labour composition effects.

Our summary statistics are presented in table (1). We first note that our sample is mostly composed of foreign affiliates. However parent firms do not seem to pay higher wages or to be more skill intensive that foreign affiliates. The main difference seems to be in the size of the respective firms when measured in term of total sales or number of employees. Parent firms seem to be bigger in average. It is also observable that some firms have very small skill intensity. One reason is that our hypothetical payroll uses the median full time yearly gross wage of employees thus some firms may just have very small skill intensity value. This should not hurt our analysis because the important propriety of this skill intensity proxy is the normalization by an industry and not so much the nominal value.Finally, the wage per employee variable is very similar and consistent with results found for the UK by Griffith (2001).

table 1 summary statistics with all observations

		Number of Obs	mean	median	min	max
Foreign Affiliates	Employees	20690	412	163	31	30300
Parent firms	Employees	3090	2603	626	62	46600
Foreign Affiliates	wage per head	19745	24922	23382	3957	113943
Parent firms	wage per head	2897	25751	24435	3405	108123
Foreign Affiliates	Skill Intensity	19745	1.34	1.27	0.28	5.82
Parent firms	Skill Intensity	2897	1.35	1.27	0.25	4.11
Foreign Affiliates	UK Output (in 1000,Pounds 1996)	20616	63846	16626	1048	8416288
Parent firms	UK Output (in 1000,Pounds 1996)	3085	307246	66320	4154	6271556
Foreign Affiliates	Output per Head (in Pounds,1996)	20616	131738	94543	13756	2667653
Parent firms	Output per Head (in Pounds,1996)	3085	131119	95571	17530	5046993

5 Results

5.1 labour wage elasticties and skill intensity changes

The first columns of table 2 give estimates of equation (4) for parent firms. Column 1 and 2 show respectively the group of parent affiliates and the group of foreign affiliates separately. According to our selection criteria concerning the dynamic structure of the estimation, the dependent variable enters our equation with two lags and as such the error term follows an $AR(2)$ process. This dynamic structure is confirmed by the Arellano Bond test

for autocorrelation that we can not reject at the 5 percent level. Furthermore, we can not reject the hypothesis of overidentified restrictions at the standard level of significance.

We see that for both groups the coefficient on the logarithm are negative and we can not reject, at the 5 per cent level, the hypothesis that as wage increase by one percent it reduces the labour demanded through the substitution effect. The scale effect is also highly significant and as expected positive. Turning to the coefficient of interest, we first note that the coefficient on $(w_{it} \times Skill_{it})$ is highly significant and positif, while it is positive and only significant for the foreign affiliate group at the 10 percent level. table 2: labour demand and skill intensity separately for foreign affiliates and parent firms

(dependent variable $employment_t$)

	(1) Parent firms	(2) foreign affiliates
$employment_{t-1}$	0.656***	0.839***
	(0.000)	(0.000)
$employment_{t-2}$	-0.174	-0.121
	(0.106)	(0.194)
$sales_t$	0.491***	0.309***
	(0.000)	(0.008)
$wage_t$	-0.904**	-0.785***
	(0.041)	(0.009)
$wage_t \times skill_t$	0.654***	0.457*
	(0.003)	(0.095)
$sales_t \times skill_t$	-0.127**	0.0370
	(0.016)	(0.289)
$Skill_t$	-4.910**	-5.044*
	(0.027)	(0.066)
Time dummies	yes	yes
Nb of Obs	2472	16539
Nb of groups	309	2069
$AR(1)$ p-value	(0.003)***	(0.000)***
$AR(2)$ p-value	(0.358)	(0.092)*
Hansen p-value	(0.625)	(0.576)

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

The results reported in table (2) thus appear very supportive of our hypothesis that parent with higher skill intensity will have lower wage elasticity of labour demand. First as

expected β_k is highly significant and negative. Through the substitution effect, given the level of output, an 1 percent increase in wage induce a contraction of the labour force by 0.9 percent. The scale effect represented by δ_1, coefficient for the sales of parent firms is positive and highly significant. Thus at a given wage rate, a one percent increase in sales induce the labour demand to increase by 0.4 percent. turning to our variable of interest, we find as expected that the coefficient θ_1 is positive and highly significant. The median skill intensity of our sample of parent firms in 2005 in log terms is 0.3 . Multiplying this number by the coefficient of the interaction term, 0.654, and adding the coefficient of wage elasticity, $-.9$, yields -0.75. This means that the skill intensity of the median parent firm in our sample resulted in reducing the labour demand sensitivity to a wage shock by around 20 percent. A 1 percent increase in the wage induces a 0.75 percent decrease in the labour demand of the median parent firm, ceteris paribus. For the parent firm at the $90th$ quintile, the counterbalance is even stronger with a wage elasticity of -0.477. Thus, the sign of the coefficients on the interaction term supports the idea that parent firms not only increase their labour wage elasticity with the possibility to substitute labour for foreign factors of production but also specialize on the highest value added activities that counter-balance partially the sensitivity to a own wage shock.

Another interesting result is that the interaction term $y_{it} \times Skill_{it}$ is also highly significant and negative. This suggest that as firms get more skill intensive, there is less immediate adjustment in output which is in line with headquarter services upgrade that are shared among all division of the multinationals, like research and development, financing activities that do not result in immediate higher output.// Column 2 presents the results for the group of foreign affiliates. The first point that is worth noticing is that our estimation is exactly the same as for parent firms and that according to the Hansen test for overidentified restrictions and Arellano Bond test for second order autocorrelation, our estimates are robust. We find that the coefficient on the wage variable β_k is negative and highly significant which is in line with the substitution effect because our estimation controls for output changes. However, θ_2 the coefficient of the linear interaction $w_{it} \times Skill_{it}$ is now positive but only significant at the 10 percent level. As such an increase in skill intensity does not induce a counter balancing

impact on the substitution effect. One reason why it might be only significant at the 10 percent level is that the skill intensity of foreign affiliates may strongly depend on the origin of the foreign investment. There are some evidence that in the UK, foreign affiliates from the US are more productive and skill intensive than foreign affiliates form other OECD countries which could affect the relationship between skill endowment and labour demand elasticities (Criscuolo et Martin 2004 and Girma et Gorg, 2007). Unfortunately we can not follow this argument with the data at hand because we can not distinguish foreign affiliates by their origin.// Comparing column 1 and column 2 is rich in information on the interpretation of the coefficients. Hamermesh (1993) argues that the coefficient of the constant output wage elasticity lies between .2 and .75. We find in our regression a coefficient for β_1 of $-.9$ and for β_2 in column 2 of $-.7$. However, Our coefficient is not the constant output wage elasticity. Without our linear interaction term, we would get a constant output wage elasticity for parent firms in column 1 and for foreign affiliates in column 2. However with the introduction of the interaction term, β_k becomes what we may call a '*raw* constant output wage elasticity, ie the constant output wage elasticity adjusted for the effect of change in the skill intensity. Given that this coefficient is positive and significant in column 1, there are good reasons to expect that the 'raw constant output wage elasticity is even higher in absolute value than in estimations that omit to consider the impact of heterogeneity in skill intensity on labour demand elasticities.

Finally, it seems that the coefficient β_2 is higher in absolute value than β_1, however our specification can not say anything about this difference. On the contrary we expect the constant output wage elasticity to be significantly lower (in absolute value) in parent firms because the scope effect should reduce the sensibility to own wage shocks for parent firms and not for foreign affiliates.

5.2 parent firms and foreign affiliates: differences in constant output wage elasticity

For reasons stated in last section, we estimate equation 5. We now pool our firm database

and will allow foreign firms and parent firms to have a differentiated impact on labour demand through output and wages. The results are presented in table 3.

table 3: dynamic labour demand with differences between parent firms and foreign affiliates

dependent variable: log $employment_t$

	(1)	(2)	(3)
$employment_{t-1}$	0.863***	0.951***	0.784***
	(0.000)	(0.000)	(0.000)
$employment_{t-2}$	-0.160***	-0.178***	-0.091
	(0.042)	(0.016)	(0.26)
$sales_t$	0.307***	0.281***	0.415**
	(0.008)	(0.008)	(0.015)
$wage_t$	-0.526***	-0.518***	-1.001***
	(0.004)	(0.002)	(0.002)
$wage_t \times DummyParent$	-	0.247***	0.272
		(0.008)	(0.159)
$sales_t \times DummyParent$	-	-0.229**	-0.278
		(0.011)	(0.125)
$wage_t \times skill_t$	-	-	0.645*
			(0.055)
$sales_t \times skill_t$	-	-	-0.119
			(0.165)
$Skill_t$	-	-	-5.267*
		(0.279)	(0.085)
$skill_t \times Parent$	-	-	0.959
			(0.172)
time dummies	yes	yes	yes
constant	yes	yes	yes
Nb of obs	19011	19011	19011
Nb of groups	2378	2378	2378
AR(1) p-value	(0.000)	(0.000)	(0.000)
AR(2) p-value	(0.615)	(0.592)	(0.201)
Hansen p-value	(0.112)	(0.123)	(0.773)

2 step system GMM estimation from 1996 to 2005; all variables in log; significant at the 1 percent level($***$), 5 percent level ($**$), significant at the 10 percent level ($*$)

Table 3 is composed of 3 columns. The first column provides estimates of the constant output wage elasticity assuming that our both divisions of multinational firms are homogeneous. As before, our specification with two lags of the dependent variables tends to suggest

that our error term follows an $AR(2)$ process. Again, it satisfies our selection criteria with a significant second lag of the dependent variable. We find a negative and statistically significant coefficient on the constant output wage elasticity and a positive and significant effect on the output coefficient. The estimates of -.5 of the wage coefficient fits within the limits defined by Hamermesh (1993). In column 2 we allow the wage elasticity and the output elasticity to differ according to the firms respective groups, either parent firm or foreign affiliate. We introduce a dummy equal to 1 when the firm is a parent firms and 0 when it is a foreign affiliate. So the introduction of the dummy will compare the significance of parent firms as compared to foreign affiliates.

As expected the constant output wage elasticity is lower for parent firms than for foreign affiliates. A one percent increase in the wage of the firm increases the parent firm wage elasticity by 0.27 percent. In foreign firms, when the wage increases by one percent , the labour demand elasticity increases by 0.52 percent. Together with the results of table 2 it seems to confirm that when looking at parent firms labour demand, one should consider the counter-balancing impact of the scope effect on the labour demand elasticity. The coefficient of the interaction term ($y_{it} \times DummyParent_i$) is very high in (absolute value), so that the adjustment in output on labour demand is very different. It may be plausible that foreign affiliates may be much more sensitive to wage changes because their labour costs are an important share of their total functioning costs as compared to parent firms.

In column 3 we basically reproduce equation 4 but this time for the whole sample of firms. However pooling the two groups of firms, we do not find any statistically significant effect of the interaction of wages and the skill intensity. Given that in table 1 column 2 we do find an interaction rate only significant at the 10 percent level, it is not of a surprise to see that this interaction term is positive but not significant. However, we may now understand a bit better why there is no significant effects: Together, results of table 2 and column 2 in table 3 provide strong evidence that only parent firms present a measurable smaller own wage elasticity when they skill upgrade and foreign firms output seems to influence strongly labour demand elasticity.

In column 4 we introduce simultaneously the interaction effect between wages and skill intensity and also the interaction term between the parent dummy variable and the wage. We find that the difference between foreign affiliates and firms vanishes. The coefficient of the interaction term , is not significant anymore. This confirm the idea that climbing the quality ladder of the range of tasks is an important stabilizer for wage elasticity in parent firms and that other differences with foreign affiliates do not emerge in our labour demand estimation.

6 conclusion

In this paper we wanted to see whether differences between parent firms and foreign affiliates both located in the UK may translate in different labour behaviour and in particular labour demand elasticities. Using a panel of more than 2400 firms located in the UK that have in common to be a division of a multinational, we computed their labour demand elasticties within their own groups and then pooled both types of firms in the same specification using consistent 2 step system GMM estimators. We found that parent firms are less sensitive to wage shocks than foreign affiliates. Our results show that this is due to the changing range of activities often observed in parent firms Hanson et Al. (2003).The scope effect reduces the substituability of labour for other inputs in offsetting making the parent firm less reactive to wage changes. Parent firms are often specialized on activities central to coordination and technological advantages over incumbent firms in one or more countries. These activities run from innovation to multinational wide management. They are often indivisible and are a source of intangible assets of the firm (Markusen, 2002).

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