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The substitutability between parent company and foreign affiliate employment in Europe

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Abstract This paper examines the substitution pattern between parent company and foreign affiliate employment of European multinationals. The data is drawn from the AMADEUS and BANKSCOPE firm-level databases and covers parent companies in 14 high-wage European countries (EUR14) and their affiliated companies in the wider Europe including locations in the low-wage Central and East European countries (CEEC) for the period 2000–2004. We find that the substitution elasticity between employment of the EUR14 parent companies and employment in their foreign affiliates in the CEEC is quite low. Furthermore, the substitution possibilities are higher between parent company and affiliate employment in other West European countries than those between parent company and affiliate employment in the CEEC. Finally, we find that the output change of the parent company and to a lesser extent that of the foreign affiliates is more important than changes in relative wages in determining the relative labour demand.

1 Introduction

There is an ongoing debate about the effects of outward FDI into emerging markets on employment in the home countries. Many workers in the former EU-15 countries are worrying about losing their jobs because lower labour costs will induce

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multinational firms to relocate more production activities to Central and Eastern European countries. Fears of job losses due to offshoring to low cost countries (i.e. Central and Eastern Europe, China, South-East Asia) may also force some governments to introduce policy measures that increase incentives to invest at home. For instance, the US government introduced the "Homeland Investment Act" in 2004 that creates a temporary tax holiday for dividends returned to the United States parent corporations from controlled foreign corporations (UNCTAD 2007). In Germany, the former chancellor Gerhard Schröder has criticized some multinational enterprises as unpatriotic after they announced further investment in Central and Eastern Europe at the expense of home country employment (see UNCTAD 2004).

So far, the empirical evidence is mixed at best. Many studies find that employment at home and employment of foreign affiliates in low-cost countries are substitutes (see for the US: Brainard and Riker 1997; Harrison et al. 2007; for EU countries, Braconier and Ekholm 2000; Cuyvers et al. 2005; Marin 2004; Konings and Murphy 2006; Becker et al. 2005; Mariotti et al. 2003). However, in summarizing the empirical work on the United States, Mankiw and Swagel (2006) conclude that "outsourcing (and offshoring) appears to be connected to increased US employment and investment rather than to overall job losses." Also, Desai et al. (2005, 2008) do not find evidence that FDI abroad causes job losses at home but, the authors do not distinguish between low cost and high cost destinations. For the OECD countries, Molnar et al. (2008) conclude that "previous studies fail to provide a clear picture across countries and industries of the relationship between the expansion of activities abroad and total production/employment at home". While much attention has been given to the impact of production offshoring to low cost countries, relatively little is known about the potential impact of service offshoring. Blinder (2007) suggests that 22–29% of US jobs are potentially offshorable including clerical occupations such as scientists, mathematicians, telephone operators, clerks and typists.

Hence, the paper aims at reconciling these contrasting views using data for parent companies located in 14 high-wage West-European countries (EUR14) and their foreign affiliates in the wider Europe, including locations in the Central and East European countries (CEEC). Indeed, a particular focus is to investigate empirically the substitution elasticity between parent company employment located in the EUR14 and foreign affiliate employment in the CEEC for the period 2000–2004.

Our contribution to the existing literature is twofold. Firstly, we investigate the substitutability between parent company and foreign affiliate employment for both the manufacturing and the service sector. Due to data availability, the majority of previous studies for European countries (notable exceptions include Konings and Murphy 2006; Marin 2004) have focused on the manufacturing sector only. Secondly, we distinguish between the employment effects of parent company turnover generated in the domestic market and that generated abroad, rather than using global output of multinational enterprises as the output variable. Few studies accounted for the impact of real foreign demand in the relative labour demand equation (see e.g. Pfaffermayr 2001). Thirdly, we add to the AMADEUS firm-level data, company data for EU banks from the Bureau Van Dijk's "BANKSCOPE" database.

The study is organized as follows. In Sect. 2, we provide a brief survey of the literature, Sect. 3 introduces the empirical model and the description of the data follows in Sect. 4. The empirical results are presented in part 5. Section 6 concludes.

2 Previous literature

The empirical evidence in the related literature yields no conclusive results. Using data for US multinationals in the manufacturing sector for the period 1983–1992, Brainard and Riker (1997) find weak but statistically significant substitution elasticity between parent company employment and their affiliates' employment. Their results also show that the substitutability in employment is much stronger among different affiliates of the same multinational enterprise that are located in different low cost host countries. Two more recent papers for the US, both based on BEA's (Bureau of Economic Analysis) firm level data find a complementary relationship between increases in affiliates' activities and employment in the parent companies: Hanson et al. (2003) examine data on multinationals for the two sub-periods 1989–1994 and 1994–1999 and find a significant positive association between higher sales in foreign affiliates and US parent employment, with stronger results for the period 1989–1994. Desai et al. (2008) look at data spanning the period 1982–1999 and find a significant positive relationship between employment growth in the foreign affiliates and employment in the parent companies. Both of the latter papers make no distinction between low-wage and high-wage countries. Yet another study for the US (Harrison et al. 2007) using BEA-firm level data for the manufacturing sector for the period 1977–1999, finds that US multinational employment at home and affiliate employment located in high-income countries are complements, while parent company employment and employment in affiliates in low-income countries are substitutes. The latter substitution effects are more pronounced in some of the key sectors such as computers, electronics and transportation.

On the basis of survey data on the international expansion of German and Austrian multinational enterprises including both manufacturing and non-manufacturing, Marin (2004) estimates that since the fall of the iron curtain, German multinationals have shed about 100,000 jobs in Germany in substitution for jobs in the CEEC. For Austria, Marin (2004) calculates that 24.000 jobs were lost due to Austrian FDI in the CEEC in the same period of time. A more recent study by Becker et al. (2005) also derives a substitutive relationship between employment at home and in foreign affiliates in the CEEC using individual data on German and Swedish multinationals and affiliates for the manufacturing sector. According to this study, a drop in wages in foreign affiliates located in the CEEC of 10%—with constant wages in the home-economy—leads to a reduction in home-country employment in the amount of 0.5% for Germany and 0.9% in Sweden. However, the authors additionally find that the relationship between home and foreign employment more strongly reacts to differences in relative wages within high-wage countries than between Germany and the CEEC. Furthermore, using data for 158 Swiss multinationals, Henneberger and Ziegler (1999) find that foreign employment does not affect employment at home. Using firm-level data for the manufacturing

sector for Germany, Döhrn (2003) finds that investment abroad has a negative impact on employment at home. Based on firm level data for the manufacturing sector including 12 EU countries for the years 1994–1998 extracted from the AMADEUS databank, Cuyvers et al. (2005) find that parent company employment and employment of foreign affiliates in the CEEC are substitutes. Using AMADEUS data for Belgium and France, a European Commission (2005) study also finds that parent company and affiliate employment in the CEEC are substitutes, while there is a neutral (Belgium), respectively a complementary (France) relationship between parent company employment and employment of their affiliates located in EU-15 countries.

These results for EU-15 countries stand in contrast to a study by Konings and Murphy (2006) or Murphy (2006), which use firm level data from the AMADEUS databank for European multinationals for the period 1993–1998 and find no evidence for substitutive effects between parent employment and employment of the affiliates located in the CEEC. For the manufacturing sector they find a significant negative correlation between parent employment and affiliate employment in the North-EU and EU15 based foreign affiliates, respectively. These substitution effects are nonexistent for multinationals in the non-manufacturing sector. These results resemble the findings for Austria in Pfaffermayr (2001), based on industry data. For the manufacturing sector and the period 1990–1996, the author finds that employment in Austrian affiliates located in West-European countries are substitutes for employment at home while there is no significant relationship with foreign employment in the CEEC subsidiaries. The study by Falzoni and Grasseni (2005) for Italian MNEs highlight the importance to account for different firm size. The authors find a general relocation of jobs in small firms, while for larger Italian firms it is only FDI in Asian countries that exerts a negative impact on home employment. Also for Italy, Barba-Navaretti and Castellani (2004) compare the employment performance of purely domestic firms and multinationals (with similar characteristics prior to FDI) and find no significant differences. Molnar et al. (2008) provide an excellent survey on these studies, and highlight this diversity of results which limits the possibility yet to draw firm conclusions on the issue of employment effects of FDI.

3 Empirical model

In the literature different empirical approaches have been used for investigating the impact of outward FDI on employment at home. One strand of the literature estimates the elasticity of substitution between employment in the mother company and foreign affiliate employment. This approach involves estimating a system of cost share equations derived from a flexible cost function in case of three or more variable production factors. In the case of two variable production factors one can derive a relative employment equation. This approach is employed by the majority of studies (Brainard and Riker 1997; Becker et al. 2005; Harrison et al. 2007; Konings and Murphy 2006). The other way to investigate the relationship between parent company employment and foreign affiliates' employment is to regress parent company employment on the number of employees in foreign affiliates (Mariotti

et al. [2003]). However, in order to investigate the substitution possibilities it is necessary to have both, information on quantities and wages rather than on quantities only. Therefore we follow the first strand of the literature. The starting point is the cost function specified as a non-homothetic CES cost function of the following form (subscripts i and t are suppressed for convenience)[1]:

$$C(W_1, W_2, Y_1, Y_2) = \left(A_1 W_1^{\rho} Y_1^{\alpha_1} Y_2^{\beta_1} + A_2 W_2^{\rho} Y_1^{\alpha_2} Y_2^{\beta_2}\right)^{\frac{1}{\rho}}.$$

W_1 is the average wage rate of the parent company in the home country, and W_2 is the average wage rate of the foreign affiliate. ρ is the substitution parameter and σ is the elasticity of substitution between the two types of labour with $\sigma = 1 - \rho$. Values of σ approaching zero indicate very limited substitution while values of σ approaching infinity imply a high degree of substitutability. Y_1 stands for output of the parent company generated in the home country, and Y_2 for that of the foreign affiliates. Note that the production technology is non-homothetic, so that total costs are a function of output. In addition, foreign and domestic demand could have different impacts on relative labour demand. Previous studies often employed a single output measure, i.e. global output of the multinational firm.

The labour demand functions can be obtained by applying Shephard's lemma, i.e.:

$$L_1^* = \frac{\partial C}{\partial W_1} = C^{1-\rho} A_1 W_1^{\rho-1} Y_1^{\alpha_1} Y_2^{\beta_1}, L_2^* = \frac{\partial C}{\partial W_2} = C^{1-\rho} A_2 W_2^{\rho-1} Y_1^{\alpha_2} Y_2^{\beta_2},$$

where the left-hand side variables, L_1^*, and L_2^* are parent company and foreign affiliate employment, respectively.

The relative labour demand function can be obtained by dividing the labour demand equation for the parent company by the labour demand equation of the foreign affiliates:

$$\frac{L_1^*}{L_2^*} = \frac{A_1}{A_2} \left(\frac{W_1}{W_2}\right)^{\rho-1} Y_1^{\alpha_1 - \alpha_2} Y_2^{\beta_1 - \beta_2}.$$

Taking the natural logarithm on both sides, substituting $(\rho - 1)$ by $-\sigma$ and adding an error term leads to the following estimation equation:

$$\ln \frac{L_1}{L_2} = \ln \frac{A_1}{A_2} - \sigma \ln \left(\frac{W_1}{W_2}\right) + (\alpha_1 - \alpha_2) \ln Y_1 + (\beta_1 - \beta_2) \ln Y_2 + \varepsilon.$$

The elasticity of substitution between parent company and foreign affiliate employment is equal to σ. Additional parameter restrictions can be imposed on the relative employment equation corresponding to further restrictions on the underlying production technology. Imposing the restriction that the output of the parent company and that of the foreign affiliate have opposite effects on relative labour demand leads to the following specification:

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[1] See Chambers ([1988]) for an overview.

$$\ln \frac{L_1}{L_2} = \ln \frac{A_1}{A_2} - \sigma \ln\left(\frac{W_1}{W_2}\right) + \beta \ln\left(\frac{Y_1}{Y_2}\right) + \varepsilon,$$

where $\beta = (\alpha_1 - \alpha_2) = -(\beta_1 - \beta_2)$. In addition the production technology is homothetic when $\beta = 0$. In the empirical section of the paper F-tests will be used to test the restriction on the parameters in the relative labour demand equation. In order to remove unobserved firm level fixed effects we estimate the equation in long differences, but add a set of sector and country dummy variables referring to the parent company.

The substitution elasticity σ indicates the degree of substitutability between parent company employment and foreign affiliate employment. In order to test whether the substitution elasticity differs between destinations and regions we run separate regressions for parent companies and affiliates both located within the high-wage EUR14 and parent companies located in the high-wage EUR14 operating affiliates in the low-wage CEEC. We also test if the relationship between home and foreign employment differs between manufacturing industries and non-manufacturing. The specification in long differences can be estimated by OLS where standard errors are clustered on each multinational enterprise. However, in order to control for extreme observations influencing the mean, we apply the median regression method with bootstrapped standard errors.

4 Data and descriptive statistics

The firm level data on European multinationals and its affiliates used in the paper is derived from the "AMADEUS" database of company accounts which is provided by the Bureau Van Dijk. AMADEUS covers only European firms and thus also limits the information on European affiliates of the multinationals. The database has also been used by Cuyvers et al. (2005) and Konings and Murphy (2006) for a panel of European firms to analyze a similar question. In contrast to these papers we add to the AMADEUS based data, company data from the Bureau Van Dijk's "BANKSCOPE" database. This second data source includes balance sheet and income and loss statements of EU banks that are not included in the AMADEUS database.

From these two databases we extracted data for all European companies located in the 14 selected high-wage European countries (EUR14) holding a minimum share of 10% in a foreign (European) subsidiary. On the basis of information on the parent-affiliate ownership structure all European foreign affiliates were identified and linked to the data of the parent company. For the sample of selected parent and affiliate companies we extracted data on the number of employees, the turnover, the cost of employees, the 4-digit industry Nace-code, and the nationality of the subsidiary for the period 1993–2005. Wages are calculated by dividing total compensation by the number of employees. Note that the output of the parent company refers to domestic turnover that is not consolidated with turnover abroad.

Unfortunately, we found only limited coverage of the relevant variables for the years 1996–1999 and also 2005, so that in the empirical analysis we had to stick to the period 2000–2004. Table 1 shows summary statistics for the annual change in

Table 1 Descriptive statistics: West-European parent companies and their affiliates (Median average annual change of the variables between 2000 and 2004)

	(1)		(2)		(3)	
	West-European parents and affiliates total		West-European parents with affiliates in the CEEC		West-European parents with affiliates in the EUR14	
	Parents	Affiliates	Parents	Affiliates	Parents	Affiliates
All industries						
Number of observations	34,415	34,415	813	813	33,602	33,602
Employment growth in %	1.7	1.5	0.5	3.4	1.7	1.5
Turnover growth in %	4.5	4.5	3.0	13.6	4.5	4.4
Wage costs growth in %	3.6	3.5	3.5	7.0	3.6	3.5
Manufacturing						
Number of observations	9,284	9,284	347	347	8,936	8,936
Employment growth in %	−0.2	0.3	−1.2	4.7	−0.2	0.2
Turnover growth in %	2.5	3.7	2.0	15.2	2.5	3.4
Wage costs growth in %	3.2	3.7	3.6	7.9	3.2	3.7
Non-manufacturing						
Number of observations	25,130	25,130	465	465	24,665	24,665
Employment growth in %	2.7	1.9	2.0	2.7	2.7	1.9
Turnover growth in %	5.7	4.8	4.2	11.4	5.7	4.7
Wage costs growth in %	3.8	3.4	3.2	6.2	3.8	3.4

Notes: The EUR14 region includes affiliates in following countries: AT, BE, CH, DE, DK, ES, FI, FR, GB, IT, NL, NO, PT and SE. The CEEC includes affiliates in following countries: BG, CZ, EE, HR, LV, PL, RO, RS, SI, SK and UA. The parent companies are located in following West-European countries: AT, BE, CH, DE, DK, ES, FI, FR, GB, IT, NL, NO, PT and SE

Source: Own calculations based on AMADEUS

parent companies' employment, turnover and wage costs and the corresponding changes for their European foreign affiliates.

Overall, affiliate employment has been growing at a yearly rate of 1.5%, slightly below the rate of the median employment growth in the EUR14 parent companies. However, the picture is quite different for CEEC affiliates. Affiliate employment growth in the CEEC increased at an annual rate of 3.4% on average, clearly outpacing the development of parent company employment growth in manufacturing and less so in the service sector. Additionally, CEEC affiliates' turnover grew very dynamically at a yearly rate of 13.6%.

5 Empirical results

In a first step we estimate the substitutability between parent company and foreign affiliate employment excluding the influence of relative turnover growth. This corresponds to the case of a homothetic production technology and makes our results

Table 2 Regression results for the elasticity of substitution between parent and foreign affiliate employment excluding relative output changes

	Homothetic specification								
	Total			Manufacturing			Non-manufacturing		
	Total	CEEC	Non-CEEC	Total	CEEC	Non-CEEC	Total	CEEC	Non-CEEC
OLS estimates									
Δ Log relative wages	−0.34***	−0.10***	−0.37***	−0.57***	−0.19**	−0.63***	−0.30***	−0.09***	−0.33***
	(−6.96)	(−3.49)	(−6.77)	(−5.78)	(−2.15)	(−6.23)	(−6.13)	(−3.40)	(−5.90)
R^2	0.06	0.07	0.06	0.08	0.08	0.09	0.05	0.08	0.06
Median regression estimates									
Δ Log relative wages	−0.30***	−0.06	−0.31***	−0.51***	−0.21*	−0.53***	−0.27***	−0.06**	−0.27***
	(−30.55)	(−1.22)	(−31.06)	(−22.42)	(−1.86)	(−24.24)	(−14.93)	(−1.20)	(−14.94)
No. of obs.	36,499	845	35,654	9,635	358	9,277	26,863	484	26,377

Notes: *t*-values in parenthesis. ***, **, * denotes significance at the 1, 5 and 10 percent respectively. Δ Denotes average annual changes in the respective variables between 2000 and 2004. The dependent variable is the annual average change of the ratio of parent company to foreign affiliate employment. All regressions contain industry dummy variables and dummy variables for the parents' country of origin. In the OLS regression, standard errors are adjusted for clustering on replicated groups (i.e. at the multinational enterprise level). The number of clusters ranges between 230 and 11,245. In the median regression *t*-values are calculated based on bootstrapped standard errors with 500 replications

more easily comparable to those of related studies. Table 2 shows the estimation results of the elasticity of substitution and the corresponding *t*-values (in parentheses) for the total sample and for subsamples excluding relative turnover growth. In particular we estimate separately the elasticity of substitution for manufacturing and non-manufacturing and/or also distinguish between EUR14 parent companies operating affiliates in the CEEC and mother companies with affiliates in the high-wage EUR14 only. The regressions are performed using OLS with clustered standard errors to account for clustering on replicated observations at the multinational enterprise level. In addition, we apply the median regression method which calculates the *t*-values based on bootstrapped standard errors with 500 replications.

The Wald-test indicates that parent country and sector effects are jointly significant. These results are not reported because of space limitations, but they are available from the authors upon request.

The results can be summarised as follows. Based on OLS for the pooled sample including all industries and affiliates in all host countries the estimated coefficient on relative wages is −0.34 and highly significant. This implies an elasticity of substitution between parent company employment and foreign affiliate employment of 0.34. Thus, a 1% decrease in the relative wage of the workers in foreign affiliates reduces the relative demand of workers in the parent company by 0.34%. However, the size of the elasticity of substitution is quite small. For the manufacturing sector we obtain a quite larger substitution elasticity of 0.57. The corresponding elasticity for non-manufacturing is 0.30. This indicates that parent company workers are more easily substituted for workers in their affiliates in manufacturing firms than in service firms.

More importantly, we find that the elasticity of substitution between parent company employment and foreign affiliate employment is lower with respect to affiliates in the CEEC than with respect to EUR14 affiliates (i.e. affiliates in 14 Western European countries). This holds for both the manufacturing and non-manufacturing sector (with coefficients of −0.19 and −0.09 based on the OLS estimates, respectively). The results for the manufacturing sector are consistent with that of Becker et al. (2005) who find that the relative labour demand of home and foreign employment more strongly reacts to differences in relative wages within high-wage countries than that between differences in relative wages between high-wage countries and the CEEC. According to our results, a reduction of wages in foreign affiliates located in the CEEC of 1%—with constant wages in the home-economy—leads to a reduction of home-country employment by 0.19%.

The estimated elasticity of substitution obtained from the median regression model is quite similar in most of the cases although slightly smaller in absolute terms. However, for the non-manufacturing sector, we find that the estimated elasticity of substitution between employment in the CEEC and employment at home is not significantly different from zero. This indicates that for this region, parent company and foreign affiliate employment are neutral to each other.

In Table 3, we provide OLS estimation results of the relative employment equation augmented by the change in the relative output levels of the parent company and the foreign affiliates (restricted non-homothetic specification in the

Table 3 OLS results for the relative labour demand equation including output change

	All industries			Manufacturing			Non-manufacturing		
	Total	CEEC	EUR14	Total	CEEC	EUR14	Total	CEEC	EUR14
Restricted non-homothetic specification									
Δ Log relative wages	−0.45***	−0.20**	−0.48***	−0.72***	−0.56***	−0.76***	−0.40***	−0.15***	−0.44***
	(−7.62)	(−2.38)	(−8.18)	(−8.11)	(−9.94)	(−7.72)	(−6.75)	(−2.79)	(−7.15)
Δ Log relative turnover	0.40***	0.46***	0.39***	0.54***	0.72***	0.53***	0.35***	0.42***	0.35***
	(7.90)	(6.17)	(7.81)	(15.35)	(16.80)	(15.04)	(6.68)	(4.52)	(6.61)
R^2	0.38	0.40	0.39	0.62	0.69	0.62	0.33	0.36	0.33
No. of obs.	34,415	813	33,602	9,284	347	8,936	25,130	465	24,665
General non-homothetic specification									
Δ Log relative wages	−0.43***	−0.13**	−0.47***	−0.71***	−0.27**	−0.78***	−0.39***	−0.11**	−0.42***
	(−7.29)	(−2.32)	(−7.79)	(−6.82)	(−2.24)	(−7.73)	(−6.48)	(−2.26)	(−6.78)
Δ Log turnover of the parent companies	0.34***	0.45***	0.34***	0.52***	0.52***	0.52***	0.28***	0.43***	0.28***
	(6.08)	(6.12)	(6.03)	(13.02)	(10.70)	(12.66)	(5.12)	(3.89)	(5.09)
Δ Log turnover of the foreign affiliates	−0.17***	−0.13*	−0.17***	−0.26***	−0.30***	−0.26***	−0.16***	−0.09	−0.17***
	(−6.40)	(−1.96)	(−6.26)	(−9.66)	(−5.28)	(−9.44)	(−5.60)	(−1.51)	(−6.40)
R^2	0.29	0.38	0.29	0.57	0.56	0.58	0.22	0.34	0.23
F-test general versus restricted specification (*p*-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.05
No. of obs.	34,415	813	33,602	9,284	347	8,936	25,130	465	24,665

Notes: *t*-values in parenthesis. ***, **, * denotes significance at the 1, 5 and 10 percent respectively. Δ Denotes average annual changes in the respective variables between 2000 and 2004. The dependent variable is the annual average change of the ratio of parent company to foreign affiliate employment. All regressions contain industry dummy variables and dummy variables for the parents' country of origin. In the OLS regression, standard errors are adjusted for clustering on replicated groups (i.e. at the multinational enterprise level). The number of clusters range between 230 and 11,245

upper panel of Table 3). In addition we include both, the turnover of the parent company and the foreign affiliate separately (lower panel of Table 3; general non-homothetic specification) using OLS. Table 4 in appendix presents the respective results using the median regression method.

The inclusion of the relative output change as well as both types of turnover changes separately improves the goodness of fit substantially. The R-squared is now ranging between 0.33 and 0.69 compared to 0.09 and lower in the regressions excluding output changes. Relative output elasticities range between 0.35 and 0.72. Moreover, the output elasticities are significantly higher with respect to CEEC affiliates than with respect to the EUR14 affiliates. In addition, the ratio of parent company employment to foreign affiliate employment reacts more strongly to changes in relative turnover than to changes in relative wages regarding CEEC affiliates. This is consistent with Pfaffermayr (2001) who also finds relative output to play an important role in determining relative employment.

As one would expect, the growth of turnover of the parent company is more important than that of their foreign affiliates in determining relative labour demand (lower panel of Table 3). Specifically, the difference in both output elasticities is more pronounced for parent companies engaged in the CEEC than for those operating affiliates solely in the EUR14. In addition, the F-test rejects the null hypothesis of no difference in the two output elasticities.

For the pooled sample we again find a significant elasticity of substitution between parent company employment and foreign affiliate employment of about 0.43 based on the general specification (see the lower panel in Table 3). When the sample is split between manufacturing and non-manufacturing it again becomes apparent that the substitution possibilities are higher in the manufacturing sector than in the non-manufacturing sector. The estimated values of the elasticity of substitution are 0.71 for manufacturing and 0.39 for non-manufacturing. Turning to the subsample of multinationals and their affiliates in the CEEC we find that relative employment is much less sensitive to changes in relative wages than it is with respect to affiliates in the EUR14 countries with an elasticity of substitution of about 0.27 in manufacturing and 0.11 in non-manufacturing. Since the elasticity of substitution of the parent companies operating affiliates in the CEEC is smaller than that of parents with affiliates in the EUR14 we conclude that the negative home market effects of outward FDI to the CEEC is quite limited. Finally, coefficient estimates from the median regression model are quite similar to those from the OLS model (compare Tables 3, 4 in appendix). Again, the estimated elasticity of substitution is highly significant in all cases with lower elasticities for parent companies operating subsidiaries in the CEEC.

6 Conclusions

The main contribution of this study was to provide new estimates of the elasticity of substitution between parent company and foreign affiliate

employment. The database was drawn from the AMADEUS and BANKSCOPE firm-level databases covering parent companies in 14 (Western) European countries (EUR14) and foreign affiliates in 25 European countries including destinations in Central and Eastern Europe countries (CEEC) for the period 2000–2004. Special attention was directed to the substitution possibilities between employment of parent companies and employment in subsidiaries located in the CEEC. In addition, we distinguished between the manufacturing and the non-manufacturing sector.

The estimates of the elasticity of substitution between parent company employment and foreign affiliate employment range between 0.13 and 0.78. The preferred estimate of the elasticity of substitution between affiliate employment in the CEEC and the parent company employment is 0.13, whereas the corresponding elasticity of substitution between affiliate employment in the EUR14 countries and parent company employment is 0.47. This indicates that workers in EUR14 based parent companies and workers in their CEEC affiliates are not as easily substitutable as workers in affiliates located in the EUR14. Furthermore, we find that the estimates of the elasticity of substitution are robust to the specification and the estimation method. Additionally, we find that output growth of the parent company and to a lesser degree that of the foreign affiliate are the dominant factors explaining the increase in the ratio of parent company to foreign affiliate employment in the CEEC. Thus, it appears that the activities of the multinational enterprises in that region are mainly driven by market access considerations.

Future work should also investigate the determinants of the location decision of multinational enterprises. It is well known that the location decision occurs in multiple stages. First, multinationals decide whether to invest domestically or abroad and then they choose the location, given the firm invests abroad and finally the amount of investment (measured as FDI stock or foreign affiliate employment). However, this work requires the access to historical data of the AMADEUS database (e.g. for the early 1990s) since the average age of the CEE affiliates is steadily increasing and already amounts to 15 years on average.

Appendix

See Table 4.

Table 4 Median regression estimates results for the relative labour demand equation including output change

	All industries			Manufacturing			Non-Manufacturing		
	Total	CEEC	Non-CEEC	Total	CEEC	Non-CEEC	Total	CEEC	Non-CEEC
Δ Log relative wages	−0.45***	−0.25**	−0.45***	−0.64***	−0.39	−0.66***	−0.39***	−0.23**	−0.40***
	(−40.55)	(−2.44)	(−40.88)	(−25.31)	(−1.90)	(−26.00)	(−35.45)	(−2.20)	(−39.00)
Δ Log turnover of the parent company	0.34***	0.43***	0.34***	0.53***	0.59***	0.53***	0.26***	0.37***	0.26***
	(32.82)	(9.46)	(29.29)	(40.18)	(8.00)	(40.59)	(18.21)	(5.96)	(21.36)
Δ Log turnover of the foreign affiliate	−0.30***	−0.28***	−0.30***	−0.36***	−0.28***	−0.36***	−0.28***	−0.28***	−0.28***
	(−29.57)	(−5.67)	(−29.64)	(−22.65)	(−3.69)	(−21.06)	(−22.18)	(−3.64)	(−24.39)
R^2	0.18	0.25	0.18	0.31	0.31	0.31	0.16	0.24	0.16
No. of obs.	34,417	814	33,603	9,285	348	8,937	25,132	466	24,666

Notes: t-values in parenthesis. ***, **, * denotes significance at the 1, 5 and 10 percent respectively. Δ Denotes average annual changes in the respective variables between 2000 and 2004. The dependent variable is the annual average change of the ratio of parent company to foreign affiliate employment. All regressions contain industry dummy variables and dummy variables for the parents' country of origin. *t*-values are calculated based on bootstrapped standard errors with 500 replications

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