

The Home Bias in Locating Value-Driving Functions and Profits across Multinational Affiliates

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Abstract

This paper empirically explores the location of value-driving functions within a multinational group. Using a large panel of European firms, we show that highly profitable corporate units tend to be located at the headquarters firm which is reflected in a sizable profitability gap between the parent and its subsidiaries. We interpret this result to reflect positive agency costs faced by the central management if value-driving functions are not located at the parent firm. In line with falling communication and information costs over the last decade, the profitability gap between parents and subsidiaries is shown to have closed by around 30% over our sample period (1999 to 2006). Last, we link our results to multinational profit shifting activities and find that MNEs are reluctant to shift profits *away* from high-tax headquarters but are eager to shift profits *toward* headquarters located in a low-tax economy.

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1 Introduction

The globalization of economies over the last decades has led to a surge in the numbers and types of international transactions whereas few developments have been as pronounced as the rise in the activity of multinational enterprises (MNEs). Thus, it is well known that today more than one third of international trade is intra-firm trade and that foreign direct investment figures surge year by year, having sextupled since the early 1990ies (OECD, 2007).

Many multinational firms moreover do not only operate sales offices abroad but organize their whole set of activities across national borders "slicing up the value chain, breaking a production process in many geographically separated steps" (Krugman, 1995). Thus, MNEs are increasingly perceived to undertake a wide array of functions in foreign countries, from research and development activities, over production to distribution and marketing operations.

The different stages of the production process do however not necessarily contribute in equal shares to the MNE's ability to earn profits and create value. In the contrary, the profit potential of corporations is perceived to be more and more tied to a small number of value-driving functions and assets. Specifically, since the enhanced mobility of capital across borders has reduced the scarcity of capital inputs in the production process, the profit potential of corporations is less driven by a cost-efficient use of capital inputs but increasingly depends on firm-specific capabilities, especially knowledge and marketing related functions (see e.g. Zingales, 2000; Hall, 2001; Nocke and Yeaple, 2007). Consequently, in many firms the return earned on patents and trademarks dwarfs the profits which are generated with the actual production of the goods.¹

The purpose of this paper is to investigate at which affiliate within the multinational group these value-driving functions are located. Specifically, we will focus our analysis on the role of the multinational headquarters. While theories on the fragmentation of production across national borders suggest that value-driving functions may be located at any of the multinational affiliates, theories on "horizontal" and "vertical" FDI implicitly suggest that key value-driving ("headquarters-") functions remain at the parent firm and only standard operating functions are run by foreign subsidiaries. An alternative view on the same theme is that after accounting for standard operating functions,

¹Alternatively to the fragmentation of production functions across national borders, one may think about different product lines which require product-specific production plants that are mobile across countries and may differ in their expected profitability (see e.g. Nocke and Yeaple, 2008).

the residual of profits earned in the group are assigned to the corporate unit that bears the project risk which is the corporate headquarters in most cases. The business economics literature rationalizes this home bias in the location of profitable and risk-taking functions by positive control costs faced by the central management if it had to monitor value-driving operations at a foreign subsidiary (see Chang, 1999; Hamilton Kashlak, 1999; O'Donnell, 2000) since intra-firm communication becomes more cumbersome with physical separation. Surprisingly though, the economic literature has to the best of our knowledge so far neglected to test and quantify this home bias in a rigorous econometric framework.

The aim of our paper is to fill this gap. Based on a large panel data set on European multinational firms for the years 1999 to 2007, we show that functions located at the headquarters firm are significantly more profitable than functions located at subsidiaries of the same multinational group. Our estimates suggest headquarters units to be by around 60% more profitable than units at the subsidiary level. The results turn out to be robust against a number of specifications and against the inclusion of control variables capturing group fixed effects, industry fixed effects, country fixed effects, year fixed effects and time-varying country controls.

Moreover, in line with the perception of an accelerating tendency of MNEs to off-shore white-collar services (see e.g. Blinder, 2006) which comprises standard functions like book-keeping and customer services but also value-driving units like R&D and trademark management departments, we find that the profitability gap between parent firms and their subsidiaries has decreased substantially over time. Precisely, we find that within our sample period between 1999 and 2006 the profitability gap between parents and its subsidiaries has closed by around 30%. We interpret the latter finding to be driven by the technological advances in the past decade, especially the development of the internet and the mobile phone network, which led to a decline in communication and henceforth in monitoring costs as well as in the costs to trade services across national borders (see e.g. Freund and Weinhold, 2002). This provided MNEs with new opportunities to globalize their operations since value-driving service functions are more and more easily be operated in foreign multinational units. While the existing literature has mainly discussed the effects of enhanced offshoring tendencies on white collar workers (see e.g. Baghwati et al. 2004; Mankiw and Swagel, 2006), we are to the best of our knowledge, the first paper to address the interrelation between those tendencies and the profit distribution within multinational groups.

Our paper empirically underpins the special role of the headquarters within the multinational firm as the host of the firm's value-driving assets and functions. Although

the profitability gap between parents and subsidiaries has declined over recent years, we still find it to be sizable. This result has implications for several areas of research and policy making.

Since the pre-tax profits constitute the basis for corporate taxation, the fiscal authorities at the headquarters location thus tend to receive an over-proportional share of the multinational group's tax base. Moreover, since workers' wages are reported to be dependent on the profitability of their affiliate while evidence on the effect of the profitability of other affiliates is mixed at best (see Budd et al. 2006; Arulampalam et al. 2008), being employed at the headquarters firm implies also higher wages for the affiliate's workers, conditional on their skill level. Thus, countries tend to profit more from hosting the headquarters of a multinational firms than hosting its subsidiaries since they receive higher tax revenues and the domestic workers tend to earn higher wages. This may, for example, rationalize government policies to create national champions by intervening in international merger and acquisition activities, a point which has not yet been raised in the literature. These mechanisms may also have implications for recently reported cases of headquarters relocations (see Strauss-Kahn and Vives, 2005; Voget, 2008).

Another implication which we thoroughly discuss in the paper is the implication of our results for multinational profit shifting behavior in the presence of international differences in the corporate tax rate between an MNE's affiliates. A comprehensive literature has provided strong evidence in favor of profit shifting activities from high-tax to low-tax countries (see e.g. Hines and Rice, 1994 for early evidence, and Huizinga and Laeven, 2008 for more recent paper). This literature assumes that profit shifting activities are homogeneous across firms. The major contribution of our paper is to provide evidence that interaction between the home bias effect and profit shifting activities makes the intensity of profit shifting activities dependent on the location of the parent firm. If the parent firm is located in a low-tax country, MNEs are found to exploit tax rate differentials and to shift corporate profits from the high-tax subsidiaries *toward* the parent firm. However, if the headquarters reside in a high-tax country, MNEs are found to be reluctant to shift profits *out* of the parent country. In the latter case shifting activities between the parent and the subsidiary even become indistinguishable from zero.²

The paper is structured as follows: In section 2, we provide a theoretical motivation

²Note that a small number of papers links the MNEs' heterogeneity with respect to R&D activities to enhanced profit shifting activities (Grubert, 2003, Desai et al., 2006, Dischinger and Riedel, 2008).

for our analysis, section 3 describes our data set. In section 4, we present our estimation methodology. The estimation results are provided in section 5. Section 6 discusses the implications for corporate taxation and profit shifting and section 7 concludes.

2 Theoretical Considerations

This section sketches the theoretical idea underlying our empirical analysis. We consider a multinational firm whose production process is divided into a value chain with several functions, comprising for example logistics, manufacturing, marketing and the distribution of the products as well as general business services like R&D and administration activities. This notion of the production process as a value chain has been especially popular in the literature on business strategy following the influential work of Porter (1985). Moreover, our analysis implicitly follows the literature on the boundaries of the firm in assuming that business functions cannot be outsourced to third parties due to contracting problems.

Key idea to our paper is that the different corporate functions may not equally add to the value of the output and henceforth to the value of the firm. The distribution of the final product to the consumer might, for example, contribute less to the overall profit of a corporation than the corporate marketing activities. Moreover, there may not only be heterogeneity in the profit contribution of different corporate functions but analogously in the profit contribution of different product lines with some earning more profits than others. This notion of project selection to different multinational locations has been discussed for example in Becker et al. (2009).

There is a common notion that the drivers of corporate value have changed over the last decades (see e.g. Zingales, 2000). While traditionally firm value has been created by employing scarce capital resources cost-efficiently within the manufacturing process, the surge in the mobility of capital across national borders has reduced its scarcity and the value of a firm is perceived to be increasingly tied to knowledge and marketing functions like R&D and advertisement. An illustrative example for this type of corporation are pharmaceutical companies which create substantial corporate value through the development of new medicines and their successful placement in different consumer markets whereas the return to the manufacturing process is tiny.

Applying this notion of the production process to multinational firms which operate in several countries and may organize their production process across national borders, raises the question at which of the multinational locations the value-driving corporate

functions are located. The purpose of our paper is to shed some light on that issue.

In the theory on "horizontal" FDI, the notion is that production is undertaken in foreign markets to save on transport costs if the goods were manufactured in the home country and exported to the foreign markets. In contrast, the theory of "vertical" FDI suggests that the production function is undertaken in a foreign country to exploit factor price differences and reduce manufacturing costs. Both theories implicitly suggest that only *standard* operating functions are outsourced to foreign subsidiaries while the corporate value drivers, often for example the R&D and marketing departments, remain with the parent firm location.

The headquarters firm thus receives the residual profits of the multinational group while commonly only profits for standard operating functions are assigned to the subsidiaries. This mechanism is for example reflected in accounting practice where the good-will is assigned to the parent firm. Moreover, corporations and accounting firms in practice often operate a profit-split method and where the easily quantifiable return on standard operating functions is assigned to the specific operating departments while the residual profits are assigned to the "risk-bearing" corporate unit, and thus usually to the corporate headquarters.

In the business economics literature, the lack in the MNEs' willingness to offshore value-driving corporate functions or product lines abroad is usually explained with agency costs faced by the central management at the headquarters location if these functions were run abroad. The notion behind this is that physical distance hampers the communication within the multinational group and poses difficulties to monitoring activities (see e.g. Chang, 1999; Hamilton and Kashlak, 1999; O'Donell, 2000).

In recent years, the technological development, especially the rising importance of the internet and the mobile phone network, have however weakened this problem since communication costs have been reduced substantially (see e.g. Freund and Weinhold, 2002). In line with this development, the recent years have seen a rising number of anecdotal evidence suggesting an increasing trend to offshore white-collar services to foreign subsidiaries comprising both, standard operating functions like book-keeping or customer services as well as functions which are perceived to contribute more strongly to the corporate value of the firm like research and development. Examples? R and D to Switzerland or R and D headquarters respectively.

3 Data

We use the commercial database AMADEUS which is compiled by Bureau van Dijk. The version of the database available to us contains detailed information on firm structure and accounting of national and multinational corporations in European countries. We focus on 31 countries (Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, Ukraine) and on the time period of 1999 – 2006 as these countries and years are sufficiently represented by the database. Our data includes affiliates of multinational groups that observe capital investments in more than one country world wide.³ The country statistics of our sample are presented in Table 1.

One major advantage of the AMADEUS data is that it allows to link the subsidiary accounting information to information on its parent firm. A parent firm is thereby defined to be the global ultimate owner of the multinational group. In contrast, subsidiaries are included into the analysis if they belong to the lowest ownership-layer of a multinational group, i.e. if they do not own any dependent subsidiary themselves. Thus, our analysis focuses on extreme cases comparing the top company in the multinational ownership structure with companies in the lowest ownership layer. This, however, is not decisive for our qualitative results. As a sensitivity check, we reran our regressions including subsidiaries which are intermediate owners within the multinational group which did not alter our qualitative result and just slightly diminished the quantitative estimates.

Moreover, we restrict our analysis to firms with a positive pre-tax profit. This is partly justified by the strong skewness of the profit distribution which suggests to take the logarithm of the variable to mitigate the effect of outliers. Moreover, restricting the focus to firms with a positive profit avoids that we have to deal with legislations for loss offsets like loss carryforwards and loss carrybackwards legislation. However, as a robustness check we reran our analysis including firms with negative profits and did not find qualitatively different results which are available upon request.

The observational unit in our analysis is the multinational affiliate per year. In total, our sample comprises 114,230 observations from XY affiliates for the years 1999 to

³Note that although the AMADEUS data contains accounting information for European affiliates only, it nevertheless provides detailed information on the worldwide structure of multinational groups.

2006 belonging to 19,490 multinational groups. Hence, we observe each affiliate for 4.3 years on average. 48.4% of the observations in our sample are for parent firms. This number may seem surprisingly high but it simply reflects the fact that our data does not only comprise corporate groups for which we observe both, the parent firm as well as one or several subsidiaries. In contrast, our data equally includes multinational groups for which we observe either the parent firm or the subsidiary in our data set. Since many firms in our data are multinational parents with subsidiaries outside Europe, the fraction of parent firms in our sample is quite large.

Obviously, the calculation of the parent tax effect is identified via groups only for which accounting information on the parent firm as well as on at least one subsidiary is available. This is the case for a substantial fraction of observations in our sample, precisely 18,203 coming from 2,236 affiliates. The rationale for keeping the other observations in the sample is that the coefficient estimates are predicted to be more precise if we keep this information in our sample. In the subsample of groups with information on both types of subsidiaries, the fraction of parent observations drops to 38%. As a robustness check, we reran our regressions on this subsample and found our results to be confirmed. Moreover, to control for time-varying country characteristics we merge data on GDP, GDP per capita, a country's corruption index and the statutory corporate tax rate.⁴

Table 2 displays basic sample statistics. The affiliates in our sample observe an average pre-tax profit of 19.9 million US dollars and fixed asset investments of 170.9 million US dollars on average. The average firm employs 579 workers. The median of the distribution is substantially smaller for all three variables. The average profit margin and ebit margin is estimated with 2.32 and 0.11 respectively, whereas again the median of the distributions is substantially smaller (0.06 in both cases). Moreover, the sample characteristics substantially differ between parent firms and subsidiaries. First, parent firms are on average larger than their subsidiaries with an average of 979 employees and a median of 81 (versus an average of 80 and a median of 22 at the subsidiary level). Moreover, the descriptive statistics already indicate parent firms to be more profitable than their subsidiaries since they observe an average profit and ebit margin of 3.96 and 0.12 while the average profit and ebit margin at the subsidiary level is calculated with 0.32 and 0.09 only. The same is true with respect to the median estimates which are 0.065 and 0.061 for the profit and ebit margin at the parent level

⁴The statutory tax rate data for the EU-25 is taken from the European Commission (2006), while the rates for affiliates outside the EU are based on data of the tax consultancy firm KPMG (2006). Country data for GDP per capita and population are obtained from the OECD.

and 0.054 and 0.056 at the subsidiary level. In the next sections, we will assess whether this descriptive result prevails if we control for other profitability determinants.

4 Estimation Approach

To test this theoretical hypothesis, we estimate an empirical model of the following form

$$\log \pi_{i,j,t} = \beta_0 + \beta_1 P_{i,j,t} + \beta_2 X_{i,j,t} + \rho_t + \phi_j + \epsilon_{i,j,t} \quad (1)$$

whereas $\pi_{i,j,t}$ represents a the pre-tax profit of affiliate i belonging to multinational group j at time t . Since the pre-tax-profit variable exhibits a rather skewed distribution, we employ the logarithm of pre-tax profits as a dependent variable. To avoid results that are affected by scale economies, we normalize the pre-tax profit measure by the subsidiary's sales. $P_{i,j,t}$ is a dummy variable that takes on the value 1 if the considered subsidiary is an independent headquarters firm and the value 0 if it is a dependent subsidiary. $X_{i,j,t}$ comprises time-varying affiliate and country control characteristics like the logarithm of the subsidiary's fixed assets stock (per sales), the logarithm of the subsidiary's number of employees (per sales), GDP per capita and the population size. Furthermore, year dummies ρ_t are included to capture shocks over time common to all affiliates. $\epsilon_{i,j,t}$ describes the error term. As our micro data has a panel dimension, we are able to add fixed effects for the multinational group to control for non-observable, time-constant firm specific characteristics ϕ_j . While the use of a fixed-effects model is suggestive while dealing with micro data, it is also preferred to a random-effects model suggested by a Hausman-Test.

Moreover, our theoretical considerations predict that the profitability bias in favor of the headquarters location declines over time. To integrate this effect in our empirical estimation model, we modify equation (3) to

$$\log \pi_{i,j,t} = \beta_0 + \beta_1 P_{i,j,t} + \beta_2 INT P_{i,j,t} + \beta_3 X_{i,j,t} + \rho_t + \phi_j + \epsilon_{i,j,t}. \quad (2)$$

The variables $\pi_{i,j,t}$, $P_{i,j,t}$, $X_{i,j,t}$, ρ_t , ϕ_j and $\epsilon_{i,j,t}$ are analogously defined to section 4. We introduce $INT P_{i,j,t}$ as a new determinant in the estimation model which is defined as the interaction between the dummy variable $P_{i,j,t}$ and a time trend for the 12 sample years which takes on the value 0 for the year 1995 and the value 12 for the year 2007. Since communication and travel costs substantially declined over this time period, we presume that the bias of locating valuable assets at the headquarters diminishes over time as suggested and thus, we expect $\beta_2 < 0$.

5 Estimation Results

The results of our baseline regression are presented in Table 3. The observational unit is the multinational affiliate per year. The Table displays the coefficient estimates and heteroscedasticity robust standard errors which are adjusted for clustering at the level of the multinational group.

5.1 Baseline Regressions

In Specification (1), we estimate the profit function described by equation (3) employing the logarithm of pre-tax profits as dependent variable. As determinants, we account for the logarithm of fixed asset investment and the number of employees.⁵ To capture the profitability gap between parent firms and subsidiaries, we moreover include a dummy variable indicating whether the considered affiliate is a parent firm. Moreover, the regression includes fixed effects for the multinational group.

As predicted by our theoretical model, the coefficient estimate for the parent dummy exhibits a positive sign and is statistically significant. Thus, controlling for capital and labor input into the production process, multinational parent firms earn significantly larger profits than their subsidiaries. Precisely, the estimate suggests that after controlling for the input factors, parents firms accumulate twice as much pre-tax profit as their subsidiaries. This result is robust against the inclusion of country fixed effects as well as the time-varying country characteristics (GDP per capita, GDP, corruption index and the statutory tax rate) in Specification (2), the affiliate's leverage ratio in Specification (3) and a full set of two-digit industry dummies in Specification (4). Note, moreover, that the input factors capital and labor exhibit decreasing returns to scale as the coefficient estimates for the input factors add up to less than 1.

However, the pre-tax profit variable subsumes an affiliate's operating profit as well as its financial profit. To pin down whether the higher profitability of parent firms is driven by its financial investments or its operating business, we reestimate the regressions presented in Specifications (1) to (4) using earnings before interest and tax as the dependent variable which stands for an affiliate's operating earnings. The results are presented in Specifications (5) to (8) and qualitatively resemble the results of the pre-tax profit regressions although the point estimates are quantitatively slightly smaller.

⁵Since accounting information on wage payments is missing for a rather large number of observations, we use the number of employees to proxy for labor input. However, we reran our regressions using wage payments and find comparable results.

Specification (8) suggests that after controlling for the input factors, parent firms are by 70% more profitable than their subsidiaries.

Table 4 investigates the difference in the profitability of parent firms and their subsidiaries based on two standard profitability measures: the profit margin (i.e. pre-tax profits per sales) and the EBIT margin (i.e. EBIT per sales). In line with previous papers, we include the amount of fixed asset investment per sales and the number of employees per sales as explanatory variables as well as a size control and fixed effects for the multinational groups. The explanatory variable of central interest is again the dummy variable indicating parent firms in our sample. In line with the baseline regressions, Specification (1) that the profit margin at the parent firms is around twice as high as the profit margin at the subsidiaries. Again, Specifications (2) to (4) indicate that this effect is robust against the inclusion of control variables for country fixed effects, time-varying country characteristics, the leverage ratio and two-digit industry fixed effects. In Specifications (5) to (8), we determine the home bias effect for the EBIT margin and find comparable, although somewhat smaller, coefficient estimates.

5.2 Development over Time

Moreover, our theoretical considerations predicted that the profitability gap between parents and their subsidiaries has declined over time with the rise of new technologies that facilitate communication. The empirical results for the estimation of equation (2) are presented in Table 5. In specifications (1) and (2), we employ the affiliate's profit and loss as endogeneous variable. In line with our presumption, the coefficient estimate for the parent dummy exhibits a positive sign and is statistically significant suggesting that in the base year 1999 parent firms on average observe pre-tax profit levels which are on average by 89% larger than the profits at the subsidiary firms. However, the interaction with a linear time trend suggests that this effect has since then constantly diminished over time as the coefficient estimate for the interaction term between the parent dummy and a linear time trend exhibits a negative sign and is statistically significant. Quantitatively, the effect is predicted to fall by 18% within the time span of only 7 years.

In Specifications (3) to (4), we reestimate the first two specifications using EBIT as dependent variable. The results do not change qualitatively although they are somewhat larger in quantitative terms suggesting that the profitability bias in favor of the parent firm has declined by 25% over our seven sample years. Specifications (5) to (8) finally repeat the estimation analysis using the profit and the EBIT margin as depen-

dent variable. Qualitatively, the results are confirmed and somewhat larger than the previous estimates. In terms of the EBIT margin, the decline in the profitability gap is reported to be a pronounced and large 40%.⁶

5.3 Robustness Checks

Finally we ran a set of sensitivity checks which are not reported in the paper for space reasons but are available from the authors upon request.

First, we repeated all presented regressions for alternative profitability measures like the return on assets and the return on employees and found comparable results. Taken together, we find very consistent and robust evidence for a home bias in the location of pre-tax profits and profitable functions within a multinational group irrespective of the profitability measure used. In all regressions, the profitability of input factors at the headquarters location is found to substantially outweigh the profitability of the group's corporate subsidiaries.

One objection, one might have against this analysis, is that the observed profitability pattern may be generated by mergers and acquisitions (M&A). If in an average merger and acquisition, the more profitable firm takes over the less profitable firm, our results may be driven by this M&A effect and may (at least not directly) reflect the location of valuable functions and assets across multinational affiliates. To account for this possibility, we ran a robustness check identifying corporate affiliates which were acquired by the corporate group through M&A using the Zephyr data base which is equally provided by Bureau van Dijk. Excluding these subsidiaries from the data, did neither qualitatively nor quantitatively change our results.

Moreover, we calculated the geographic distance between the location of the parent firm and the corporate subsidiary to determine whether the reported profitability gap is affected by the physical distance between the entity. Our regression results indeed report a very consistent and coherent picture that suggest that subsidiary firms which are geographically closer to the parent firm report a higher profitability of their input factors which we interpret to reflect that they have a higher probability to host value-driving functions of the corporate group. Assuming that communication and monitoring costs for the central management increase in physical distance between the entities as suggested by several authors, this evidence equally supports the notion of a bias in the

⁶As a sensitivity check, we also experimented with an interaction of year fixed effects with the dummy variable indicating a parent firm. These coefficient estimate suggest a smooth and steady decline of the profitability gap over our sample period.

location of value-driving assets close to the parent location.

6 Extension: Implications for Corporate Taxation and Multinational Profit Shifting

The previous chapters provided theoretical reasoning and empirical evidence for a home bias in the location of profitable assets. This mechanism may affect another hotly debated topic: the shifting of profits from high-tax to low-tax countries to reduce the MNE's overall tax burden.

The literature on corporate taxation and multinational profit shifting has identified several channels through which MNEs are found to shift profits from high-tax to low-tax economies: the manipulation of transfer prices paid for goods traded within the firm, distortions of the multinational debt-equity structure and the selection of profitable projects toward low-tax countries (see e.g. Devereux, 2007; Becker et al., 2009).

However, as argued above, the location of profitable functions and projects away from the headquarters firm may be costly for the central management since this involves to monitor functions across physical distances. Moreover, the central management may have an incentive to locate profits at the parent firm to exert direct control over their use. For example, a comprehensive literature on the funding of corporate investment activities documents a pecking order with respect to financing modes for new investment projects which is led by funding via retained earnings (e.g. Stein, 1991). Last, several papers report a positive causal effect of affiliate profitability and the wage level of workers. Consequently, the central management may have an incentive to locate a high fraction of profits at the headquarters to justify high wages for themselves and their coworkers.

These arguments predict that the profit shifting activities are not homogeneous across firms but decisively depend on the location of the multinational headquarters. Precisely, MNEs are predicted to be reluctant to shift profits and profitable assets away from the corporate headquarters if they are located in a high-tax economy and henceforth profit shifting out of the parent country would be optimal. In contrast, if the headquarters are located in a low-tax economy, these considerations predict that MNEs are eager to shift profits toward the headquarters firm. In the following sections, we will investigate this notion.

6.1 Econometric Approach

In line with the existing literature, we provide indirect evidence for profit shifting activities, i.e. we determine a relation between the tax rate differential between a parent firm and its subsidiary and investigate to what extent this determines the profitability of the affiliates. If the tax rate of the parent firm is larger than the tax rate of the subsidiary, it is optimal for the MNE to shift pre-tax profits from the parent to the subsidiary and vice versa (for a theoretical analysis, see e.g. Haufler and Schjelderup, 2000). While the existing empirical literature assumes this effect to be homogeneous and independent from the organization of the multinational firm (see e.g. Huizinga and Laeven, 2008), our above argumentation would imply that profit shifting activities react less sensitive to changes in the tax rate differential if the tax rate of the parent firm is larger than the tax rate of the subsidiary and henceforth it would be optimal to transfer pre-tax profits from the parent to the subsidiary.

In the following, we will restrict our sample to the subsidiaries in our data and define two subsamples which comprise subsidiaries with a lower (sample ℓ) and higher corporate tax rate (sample h) than their parent firm respectively. Following Hypothesis 3, we presume that profit shifting activities are larger in the sample h since here the parent's tax rate falls short from the subsidiary tax and henceforth profit shifting activities are not restricted by potential control costs.⁷ Formally, this is captured by

$$\log \pi_{itm} = \beta_{0m} + \beta_{1m} TAXDIFF_{itm} + \beta_{2m} X_{itm} + \rho_{tm} + \phi_{im} + \epsilon_{itm}, \quad \forall m = \{\ell, h\} \quad (3)$$

whereas π_{itm} , X_{itm} and ρ_{tm} analogously to the preceding sections represents the pre-tax profit of subsidiary i at time t , a set of firm specific control variables and a set of time dummies. However, in contrast to the preceding model, we employ firm fixed effects ϕ_i as suggested by a Hausman-Test.

The explanatory variable of central interest is $TAXDIFF_{itm}$ which is defined as the considered subsidiary's tax rate minus the tax rate of the parent firm. As suggested by our theoretical model, the tax rate difference between these two affiliates deter-

⁷Note, that the same pattern is presumed to show up in the subsample of parent firms. However, since the parents in our data usually observe several affiliates which may be located in countries with a larger or smaller corporate tax rate, the construction of a measure determining whether the parent resides in a high-tax or low-tax location with respect to its subsidiaries is less straight forward. Nevertheless, we equally experimented with testing for such a profit shifting pattern in the parent sample and found qualitatively comparable results to the ones presented below.

mines the marginal gains from profit shifting activities and consequently the shifting incentive. Since MNEs observe an incentive to transfer profits from high-tax to low-tax countries, we expect $\beta_{1m} < 0$. However, if our presumption is correct and shifting profits away from the headquarters incurs control costs, we would presume that the coefficient estimate β_{1m} in the subsample h falls short from the coefficient estimate in the subsample ℓ .

6.2 Empirical Results

In Table 3, we present the results of our regression analysis. In line with previous studies, we give indirect evidence for profit shifting behavior by regressing subsidiary profitability on the tax rate differential between the subsidiary and the headquarter firm. However, in contrast to existing work we account for a potentially heterogeneity in profit shifting activities between parent and subsidiary firm depending on the profit shifting direction and henceforth on whether the parent is located in a country with a higher or lower tax rate than the subsidiary. To investigate this effect, we define a dummy variable which takes on the value 1 if the parent firm is located in a country with a lower tax rate than its subsidiary and the value 0 otherwise. Interacting this dummy variable with the tax rate differential between the parent and the subsidiary firm should capture the potential heterogeneity in the effect.

The results are presented in Specifications (1) and (2) of Table 6. In line with our theoretical model, we find that the coefficient estimate for the tax rate differential is negative but small and not statistically significant while the coefficient estimate for the interaction term for the high-tax subsidiary dummy with the tax rate differential suggests a large and significant negative effect. The regression result thus suggests that the profitability of profit shifting volumes is very sensitive to tax rate differentials if profit is shifted from the subsidiary toward the headquarters location but is not sensitive to the tax rate differential if profit shifting flows point away from the multinational headquarters location. This effect is in line with our described home bias effect. This effect turns out to be robust against the inclusion of year industry effects in Specification (2).

As a further sensitivity check, we split the sample into the two subgroups of subsidiaries that belong to parent firms with a larger and smaller corporate tax rate than the subsidiary respectively, and estimate equation (3) separately for the two subgroups as described in the previous section. This allows for differing coefficient estimates for the control variables in the two subgroups and should improve our estimates.

The results are presented in Specifications (3) to (6) whereas Specifications (3) and (4) report the regression results for the subgroup of high-tax subsidiaries and Specifications (5) and (6) report the regression results for the subgroup of low-tax subsidiaries. In line with the pooled Specifications, we again find evidence for substantial profit shifting activities from subsidiaries in high-tax countries toward the parent location while not much profit shifting seems to take place in the other direction from high-tax parents toward their low-tax subsidiaries. Note, that the coefficient estimates for the two subgroups are statistically different from each other at the 5% level.

7 Conclusions

This paper provides evidence for a home bias in the location of profitable functions and assets toward the multinational headquarters firm. Using a large panel of European firms and conditioning on input factors employed, we find that headquarters on average earn by 60% larger profits than their corporate subsidiaries. We interpret this finding to support anecdotal evidence for a MNEs to keep their value-driving functions at the headquarters firm and to offshore standard operating functions to foreign subsidiaries only. This pattern may for example be rationalized by enhanced monitoring and control costs faced by the central management if decisive corporate functions are located physically distant to the headquarters.

However, we also find evidence for some cracks in the notion and status of the parent company as profit center of the multinational group. Thus, our results simultaneously suggests that the profitability gap between the parent firm and its subsidiaries has decreased substantially over our 7-year sample period between 1999 and 2006. Quantitatively, the decrease is sizable, pointing to a closure of the gap by 25%. This result is in line with the widespread perception of an increased fragmentation of the production process across international borders which today does not only comprise standard operating functions like manufacturing and sales but equally includes value-driving units like R&D and licensing departments.

This finding of a home bias effect has a number of implications, for example for our understanding of the interaction between corporate taxes and multinational behavior. Thus, our paper shows that the home bias effect impacts on the well-documented multinational profit shifting activities in the wake of tax rate differentials. Precisely, we show that in line with the home bias effect, multinationals are reluctant to shift profits out of headquarters which are located in high-tax economies but are in contrast

eager to shift profits toward headquarters located in low-tax countries.

Thus, since headquarters earn substantially larger pre-tax profits than their subsidiaries, countries which host a high number of headquarters firm can collect substantially more tax revenues than their counterparts which host multinational subsidiaries foremost. Moreover, they are less likely to lose tax revenues through profit shifting behaviour. Given the still small but growing number of headquarters relocations across countries (see e.g. Strauss-Kahn and Vives, 2005; Voget, 2008), our finding may be relevant for researchers and policy makers alike since they suggest that the attraction of a multinational headquarters firm may be substantially more attractive from a revenue point of view than the attraction of a mere subsidiary. This may have important implications for the tax competition between countries in different fiscal instruments, like e.g. CFC legislation and the withholding tax treaty network which affect a country's attractiveness as a headquarters location. But it is not only the fisc which is likely to benefit from the location of a multinational parent but also the domestic workers since the affiliate's pre-tax profitability is reported to positively affect the bargained wage level.

Given the described benefits from hosting a multinational headquarter, our results may also have important implications for the literature on M&A and the observed interference of nation states in international mergers. Precisely, the profitability bias in favor of headquarters locations provides a new argument for the observed creation of national champions and government actions to avoid the take-over of national firms by foreign companies. In general, we think the paper opens up interesting areas for future research.

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9 Appendix

Table 1: Country Statistics			
<i>Country</i>	<i>All Affiliates</i>	<i>Parent Firms</i>	<i>Subsidiaries</i>
Austria	276	137	139
Belgium	2,093	1,124	969
Bulgaria	79	5	74
Croatia	186	57	129
Czech Republic	524	77	447
Denmark	1,758	856	902
Estonia	304	36	268
Finland	574	17	557
France	2,860	1,293	1,567
Germany	1,415	736	679
Great Britain	3,223	972	2,251
Greece	144	69	75
Hungary	35	9	26
Iceland	8	7	1
Ireland	222	125	97
Italy	2,369	1,442	927
Latvia	126	0	126
Lithuania	100	11	89
Luxembourg	25	16	9
Netherlands	2,563	1,602	961
Norway	1,128	373	755
Poland	902	73	829
Portugal	274	83	191
Romania	521	12	509
Russia	103	14	89
Serbia	69	2	67
Slovakia	83	5	78
Spain	2,645	1,231	1,414
Sweden	2,242	1,407	835
Switzerland	142	142	0
Ukraine	40	2	38
<i>Sum</i>	27,033	11,935	15,098

Table 2: Descriptive Statistics

<i>Variable</i>	<i>Obs.</i>	<i>Mean</i>	<i>Median</i>	<i>Min.</i>	<i>Max.</i>
Dummy Parent Firm	114,230	.4841	0	0	1
Profit before Tax (PBT)★	114,230	19,178	886	1	1.95e+07
Earnings before Interest&Tax (EBIT)★	114,230	15,317	848	1	1.97e+07
Profit Margin (PBT per Sales)	105,396	2.72	.0592	1.73e-05	26,393
EBIT Margin (EBIT per Sales)	105,396	.1041	.0583	1.73e-05	295
Sales★	105,396	190,392	15,885	1	1.46e+08
Fixed Assets★	114,230	163,496	2,505	1	1.38e+08
Number of Employees	114,230	553	44	1	99,837
Financial Leverage Ratio◆	108,090	.5907	.6180	0	1
GDP▲	114,164	901.2	609.6	5.63	2,915
GDP per Capita◄	114,164	28,318	27,736	633	74,471
Corruption Index►	114,164	7.28	7.4	1.5	10
Statutory Corporate Tax Rate	114,164	.3226	.3383	.1	.523
<i>Parent firms only:</i>					
Profit before Tax (PBT)★	55,303	33,992	1,691	1	1.95e+07
Earnings before Interest&Tax (EBIT)★	55,303	27,858	1,547	1	1.97e+07
Profit Margin (PBT per Sales)	50,434	3.96	.0649	1.73e-05	26,393
EBIT Margin (EBIT per Sales)	50,434	.1237	.0614	3.22e-05	295
Fixed Assets★	55,303	298,167	8,712	1	1.38e+08
Number of Employees	55,303	979	81	1	99,837
<i>Subsidiary firms only:</i>					
Profit before Tax (PBT)★	58,927	5,274	526	1	8.06e+06
Earnings before Interest&Tax (EBIT)★	58,927	4,009	530	1	5.64e+06
Profit Margin (PBT per Sales)	54,962	1.58	.0548	2.71e-05	23,304
EBIT Margin (EBIT per Sales)	54,962	.0868	.0555	1.73e-05	64.7
Fixed Assets★	58,927	37,108	630	1	4.81e+07
Number of Employees	58,927	153	29	1	80,146

Notes:

★ Unconsolidated value, in thousand US dollars, current prices.

◆ = (total liabilities / total assets).

▲ In billion US dollars, current prices, IMF WEO Database Oct08.

◄ In US dollars, current prices, IMF WEO Database Oct08.

► Corruption Perceptions Index (CPI) from Transparency International (TI), ranks from 0 (extrem level of corruption) to 10 (free of corruption).

Table 3: Baseline Estimation I – Higher Parent Profits
OLS Group–Fixed–Effects, Panel 1999–2006

Depend. Var.	Log (Profit before Tax)				Log EBIT			
<i>Explanat. Var.:</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Parent Dummy	1.03*** (.043)	.985*** (.044)	.843*** (.045)	.800*** (.046)	.777*** (.043)	.698*** (.043)	.609*** (.045)	.623*** (.045)
Log FixedAssets	.305*** (.008)	.285*** (.008)	.278*** (.008)	.274*** (.008)	.212*** (.007)	.196*** (.007)	.194*** (.008)	.197*** (.008)
Log Employees	.316*** (.011)	.310*** (.011)	.335*** (.011)	.357*** (.011)	.477*** (.011)	.466*** (.011)	.474*** (.011)	.480*** (.011)
Leverage Ratio			-1.16*** (.042)	-1.17*** (.042)			-.665*** (.040)	-.672*** (.039)
Log GDP		-.221 (.146)	-.214 (.143)	-.173 (.184)		-.210*** (.072)	-.209*** (.065)	-.215** (.098)
Log GDPp.Cap.		.855*** (.163)	.715*** (.160)	.663*** (.197)		.739*** (.100)	.680*** (.097)	.681*** (.121)
Log Corruption		.152** (.078)	.222*** (.078)	.216*** (.078)		.019 (.068)	.062 (.068)	.053 (.068)
Stat. Tax Rate		-1.02*** (.230)	-.869*** (.229)	-.923*** (.230)		-.777*** (.209)	-.612*** (.215)	-.637*** (.215)
Year Dummies	✓	✓	✓	✓	✓	✓	✓	✓
Country Dumm.		✓	✓	✓		✓	✓	✓
Industry Dumm.				✓				✓
# Observations	114,230	114,164	108,090	107,324	112,914	112,854	106,347	105,565
# MNE–Groups	19,490	19,490	18,914	18,796	18,884	18,883	18,288	18,169
Adjusted R^2	.780	.784	.792	.793	.799	.803	.808	.809

Notes:

Heteroscedasticity robust standard errors adjusted for group clusters in parentheses.
*, **, *** indicates significance at the 10%, 5%, 1% level. The observational units are profit-making *multinational parent firms* and *multinational subsidiaries*. A group–fixed–effect is set for belonging to a MNE–group. *Parent Dummy* is a dummy variable set to 1 if an observational unit is a *parent firm* and set to 0 if it is a *subsidiary*. *Log Employees* is the natural logarithm (Log) of the number of employees. 60 industry dummies (NACE Rev.1 2–digit level) and 31 country dummies are included where indicated.

Table 4: Baseline Estimation II – Higher Parent Profitability
OLS Group–Fixed–Effects, Panel 1999–2006

Depend. Var.	Log (Profit b. Tax per Sales)				Log (EBIT per Sales)			
<i>Explanat. Var.:</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Parent Dummy	.914*** (.044)	.899*** (.045)	.705*** (.056)	.614*** (.045)	.448*** (.036)	.430*** (.038)	.275*** (.038)	.264*** (.038)
Log(FixedAssets per Sales)	.485*** (.015)	.496*** (.015)	.445*** (.015)	.404*** (.014)	.188*** (.010)	.190*** (.010)	.147*** (.010)	.137*** (.010)
Log(Employees per Sales)	-.045*** (.013)	-.051*** (.013)	-.061*** (.013)	-.046*** (.013)	-.002 (.011)	-.032*** (.012)	-.044*** (.012)	-.046*** (.012)
Log FixedAssets	-.262*** (.009)	-.276*** (.010)	-.241*** (.010)	-.217*** (.010)	-.115*** (.007)	-.113*** (.008)	-.084*** (.007)	-.085*** (.008)
Leverage Ratio			-1.57*** (.041)	-1.57*** (.041)			-1.14*** (.034)	-1.12*** (.034)
Log GDP		-.230 (.151)	-.214 (.146)	-.178 (.193)		-.216*** (.072)	-.206*** (.068)	-.197** (.086)
Log GDPp.Cap.		.537*** (.164)	.318** (.160)	.249 (.203)		.220** (.094)	.064 (.091)	.042 (.106)
Log Corruption		.199*** (.076)	.309*** (.074)	.309*** (.075)		.145** (.063)	.240*** (.061)	.233*** (.062)
Stat. Tax Rate		-.609*** (.220)	-.299 (.215)	-.333 (.217)		-.258 (.188)	.099 (.190)	.072 (.191)
Year Dummies	✓	✓	✓	✓	✓	✓	✓	✓
Country Dumm.		✓	✓	✓		✓	✓	✓
Industry Dumm.				✓				✓
# Observations	105,396	105,332	99,757	99,027	105,124	105,064	99,028	98,278
# MNE–Groups	17,950	17,950	17,424	17,313	17,606	17,605	17,052	16,938
Adjusted R^2	.601	.603	.633	.637	.465	.469	.497	.500

Notes:

Heteroscedasticity robust standard errors adjusted for group clusters in parentheses. *, **, *** indicates significance at the 10%, 5%, 1% level. The observational units are profit-making *multinational parent firms* and *multinational subsidiaries*. A group–fixed–effect is set for belonging to a MNE–group. *Parent Dummy* is a dummy variable set to 1 if an observational unit is a *parent firm* and set to 0 if it is a *subsidiary*. *Log(Employees per Sales)* is the natural logarithm (Log) of the number of employees per sales. 60 industry dummies (NACE Rev.1 2–digit level) and 31 country dummies are included where indicated.

Table 5: Extension I – Development over Time
OLS Group–Fixed–Effects, Panel 1999–2006

Depend. Var.	Log PBT	Log PBT	Log EBIT	Log EBIT	LogPBT p.Sales	LogPBT p.Sales	LogEBIT p.Sales	LogEBIT p.Sales
<i>Explanat. Var.:</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Parent Dummy	1.15*** (.045)	.883*** (.049)	.889*** (.044)	.714*** (.047)	1.02*** (.046)	.678*** (.047)	.540*** (.038)	.334*** (.039)
Parent×Time	-.031*** (.004)	-.023*** (.004)	-.030*** (.004)	-.025*** (.004)	-.028*** (.004)	-.017*** (.004)	-.025*** (.003)	-.019*** (.003)
Time	.100*** (.003)	.054*** (.007)	.087*** (.003)	.051*** (.006)	.059*** (.003)	.033*** (.006)	.025*** (.003)	.022*** (.006)
Log FixedAssets	.308*** (.008)	.277*** (.008)	.215*** (.007)	.200*** (.008)	-.262*** (.009)	-.217*** (.010)	-.114*** (.007)	-.083*** (.008)
Log Employees	.315*** (.011)	.356*** (.011)	.475*** (.011)	.479*** (.011)				
Log(FixedAssets per Sales)					.487*** (.015)	.405*** (.014)	.190*** (.010)	.138*** (.010)
Log(Employees per Sales)					-.046*** (.013)	-.049*** (.013)	-.003 (.011)	-.047*** (.012)
Leverage Ratio		-1.16*** (.042)		-.666*** (.039)		-1.57*** (.041)		-1.12*** (.034)
Log GDP		-.163 (.182)		-.197** (.090)		-.170 (.191)		-.181** (.082)
Log GDPp.Cap.		.569*** (.196)		.570*** (.116)		.177 (.202)		-.044 (.103)
Log Corruption		.220*** (.078)		.056 (.068)		.309*** (.075)		.232*** (.062)
Stat. Tax Rate		-.907*** (.230)		-.620*** (.215)		-.311 (.217)		.096 (.191)
Year Dummies	✓	✓	✓	✓	✓	✓	✓	✓
Country Dumm.		✓		✓		✓		✓
Industry Dumm.		✓		✓		✓		✓
# Observations	114,230	107,324	112,914	105,565	105,396	99,027	105,124	98,278
# MNE–Groups	19,490	18,796	18,884	18,169	17,950	17,313	17,606	16,938
Adjusted R ²	.780	.793	.800	.809	.602	.637	.465	.500

Notes:

Heteroscedasticity robust standard errors adjusted for group clusters in parentheses.

*, **, *** indicates significance at the 10%, 5%, 1% level. The observational units are profit-making *multinational parent firms* and *multinational subsidiaries*. A group–fixed–effect is set for belonging to a MNE–group. The abbreviation *PBT* stands for *Profit before Tax*. *Parent Dummy* is a dummy variable set to 1 if an observational unit is a *parent firm* and set to 0 if it is a *subsidiary*. *Time* is set to 0 for the year 1999, 1 for 2000, 2 for 2001,..., and 7 for 2006, with a mean of 3.5. *Parent×Time* is the interaction term between *Parent Dummy* and *Time*. *Log(Employees per Sales)* is the natural logarithm (Log) of the number of employees per sales. 60 industry dummies (NACE Rev.1 2–digit level) and 31 country dummies are included where indicated.

Table 6: Extension II – Effect on Profit Shifting**OLS Firm–Fixed–Effects, Panel 1999–2006**

Dependent Variable: Log (Profit before Tax)

Sample	All Subsidiaries		High–Tax–Subs.		Low–Tax–Subs.	
<i>Explanatory Variables:</i>	(1)	(2)	(3)	(4)	(5)	(6)
Tax Difference to Parent	-.036 (.186)	-.168 (.190)	-1.23** (.583)	-1.31** (.588)	.208 (.210)	.149 (.219)
TaxDiff×HighTaxSubs	-.905* (.538)	-.885* (.542)				
HighTaxSubs Dummy	.061** (.025)	.049** (.025)				
Log FixedAssets	.098*** (.009)	.115*** (.009)	.091*** (.019)	.100*** (.019)	.106*** (.011)	.130*** (.012)
Log Employees	.375*** (.016)	.396*** (.017)	.355*** (.035)	.371*** (.036)	.366*** (.020)	.388*** (.021)
Leverage Ratio		-1.09*** (.045)		-.872*** (.095)		-1.16*** (.055)
Log GDP	-3.73*** (.680)	-3.84*** (.717)	-3.54*** (1.29)	-3.59*** (1.32)	-5.96*** (.969)	-6.21*** (1.04)
Log GDPp.Cap.	3.83*** (.643)	3.72*** (.681)	4.04*** (1.29)	4.03*** (1.32)	5.86*** (.913)	5.84*** (.982)
Log Corruption	-.142 (.099)	-.122 (.103)	.144 (.179)	.111 (.183)	-.262* (.147)	-.195 (.155)
Year Dummies	✓	✓	✓	✓	✓	✓
Industry–Year Dummies		✓		✓		✓
# Observations	61,535	55,254	17,682	16,280	39,608	35,024
# Firms	17,482	15,979	5,963	5,533	12,664	11,472
Adjusted R^2	.818	.828	.796	.804	.830	.841

Notes:

Heteroscedasticity robust standard errors adjusted for firm clusters in parentheses.

*, **, *** indicates significance at the 10%, 5%, 1% level. The observational units are profit-making *multinational subsidiaries* that have no further subsidiaries (to catch the unambiguous profit shifting incentive). A fixed-effect is set for each observational unit. The sub-sample *High(Low)–Tax–Subsidiaries* consists solely of subsidiaries that exhibit a higher (lower) statutory corporate tax rate than their parent firm. *Tax Difference to Parent* equals the subsidiary tax rate minus the parent tax rate. *HighTaxSubs Dummy* is a dummy variable set to 1 if an observational unit exhibit a higher tax rate than their parent and set to 0 otherwise. *TaxDiff×HighTaxSubs* is the interaction term between *Tax Difference to Parent* and *HighTaxSubs Dummy*. *Log Employees* is the natural logarithm (Log) of the number of employees. 130 industry–year dummies (NACE Rev.1 1–digit level) are included where indicated.