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## THE ORGANIZATION OF EUROPEAN MULTINATIONALS

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## **ABSTRACT**

### **The Organization of European Multinationals\***

Recent literature on international trade has established that the most productive firms become multinationals. But our data reveal a startling variation in productivity levels of foreign affiliates across the countries in Eastern Europe of the same European multinational parent firms suggesting that not all multinationals transplant their home productivity advantage to the new EU Member States and Emerging Europe. One candidate for this startling difference in productivity levels among foreign affiliates is the ability of European multinationals to transport their business model abroad. This paper examines the conditions under which European multinationals give autonomy to their subsidiaries and delegate authority to them. We also analyse the conditions under which European multinationals transplant their business model to Eastern Europe. We collect original and unique matched parent and affiliate data on the internal organization of 660 German and Austrian parent firms and 2200 of their subsidiaries in Eastern Europe including the former Soviet Union. We test the hypothesis that the ability of European multinationals to transplant their business model to foreign affiliates is determined by the organization of European multinationals on the one hand and the market environment their affiliate firms face in Eastern Europe on the other hand. We show that the business culture of parent firms accounts for about 50 percent of the variation of the organization of subsidiaries, while the market environment of subsidiaries contributes the rest.

JEL Classification: D21, F23, L22, O1

Keywords: level of decentralisation, multinational firms with endogenous organisation, organisational transfer across countries, trust

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# 1 Introduction

Recent literature on international trade has established that the most productive firms of a country tend to become multinationals.<sup>1</sup> One reason is that more productive firms appear to be better able to cover the large fixed costs of entering a foreign country. How much, however, of this productivity advantage of multinational firms is translated to the host countries in which these firms invest? Marin (2004) finds that German multinationals increase the productivity level of their subsidiaries in Central Eastern Europe (including Russia, Ukraine and other former Soviet Union countries) to, on average, 60 percent of their parent firms in Germany compared with national firms in Central Eastern Europe which produce 23 percent of the productivity level of German firms during the late 1990s. Austrian multinationals in Eastern Europe reach 32 percent of the productivity level of parent firms in Austria. Similarly, Bloom, Sadun, and van Reenen (2007) find that US multinationals are more productive than non-US multinationals and national firms in the UK. They attribute this to the better management practices and the more decentralized internal organization of US firms (see Bloom, Sadun, and van Reenen, 2009).

Figure 1, however, reveals a surprisingly wide variation in productivity levels of German and Austrian subsidiaries in Eastern Europe relative to their parent firms in Germany and Austria, suggesting that the ability of multinational firms to transplant their home productivity advantage to other countries is by no means secure. The startling differences in productivity levels by the same firms across different host countries may be because of differences in the market and regulation environment that multinationals face in host countries, or because of sectoral differences, or differences in the ability of multinationals to transplant their business model to other countries. If organizational capital is key to understanding firms' productivity performance, as suggested by Bloom, Sadun, and van Reenen (2007) and Marin and Verdier (2008a), then the question arises as to what determines whether multinationals export their business model to the countries they invest in.<sup>2</sup>

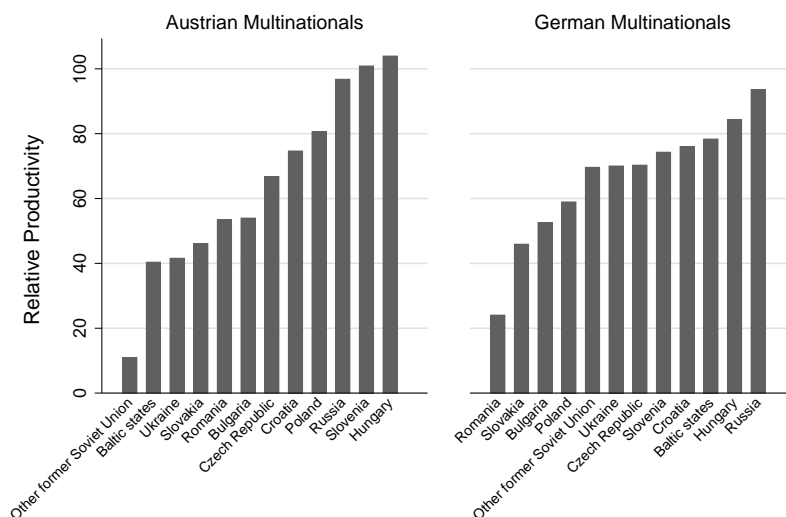
To answer this question we need detailed information on the internal organization of multinational parents and their subsidiaries. Therefore, we analyze unique matched data of 660 parent firms in Austria and Germany with 2200 subsidiaries in Eastern

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<sup>1</sup>See Helpman, Melitz, and Yeaple (2004); Antras and Helpman (2004).

<sup>2</sup>Marin and Rousová (2009) indeed find that subsidiaries tend to be more productive when they use the same business model as their parent firms.

**Figure 1: Productivity of Foreign Affiliates in Host Countries in Percentage of Parent Firms**



Notes: The figures plot the productivity of foreign affiliates in host countries relative to Austrian and German parent firms, respectively, in percentages. "Other former Soviet Union" refers to Azerbaijan, Armenia, Belarus, Georgia, Moldova, Kazakhstan, Tajikistan, Turkmenistan, and Uzbekistan; and "Baltic states" to Estonia, Latvia, and Lithuania. The aggregation achieves at least eight observations per bar.

Europe including Russia, Ukraine and other former Soviet Union countries. We designed and collected these data from a full population of firms in Austria and Germany investing in Eastern Europe in the years between 1990 and 2001. The sample represents 80 percent of German foreign direct investment and 100 percent of Austrian foreign direct investment in Eastern Europe between 1998 and 2000.

As a measure of internal organization of parent and subsidiary firms we use the level of decentralization of thirteen corporate decisions such as decisions on acquisitions, new strategy, transfer prices or budget (see Table 14 in Appendix B for a full list of corporate decisions for which we have information on the hierarchical level at which these decisions are taken). Furthermore, we use two proxies for the transportation of business culture of multinationals to their subsidiaries, one via taking the firm organization abroad and one via taking the CEO abroad. More specifically, we use a similarity measure counting the number of corporate decisions which are taken at the same hierarchical level in parent and subsidiary firms and we use the information whether or not parent firms send one or more managers from the home country to run the subsidiary.

Table 1 takes a first look at whether or not multinationals in Austria and Germany transplant their organization to the host countries. Some 50 per cent of multinationals do not transplant (the responsibility for five or more corporate decisions is allocated to different hierarchical levels in subsidiaries compared with parent firms), 27 percent of these firms transplant partially (the allocation of power differs for two to four corporate decisions between subsidiaries and parents) and 24 percent of firms transplant fully (all corporate decisions have the same allocation in subsidiaries as in parent firms or the allocation of one corporate decision differs).

**Table 1: Transplantation via Organization**

		Subsidiaries with Parents' Organization			All parent firms
		Not <sup>1</sup>	Partially <sup>1</sup>	Fully <sup>1</sup>	
<b>Decentralization of Parent Firm<sup>2</sup></b>	<b>Centralized<sup>3</sup></b>	290 66.5 %	69 15.8%	77 17.7%	436 32.7%
	<b>Cooperative<sup>3</sup></b>	260 43.0%	212 35.1%	132 21.9%	604 45.2%
	<b>Decentralized<sup>3</sup></b>	112 38.0 %	74 25.1%	109 36.9%	295 22.1%
<b>All subsidiary firms</b>		662 49.6%	355 26.6%	318 23.8%	1335 100%

Notes: The table reports absolute number of cases and row percentages, except for the column "All parent firms", where column percentages are given. The Person's  $\chi^2$  test rejects the null hypothesis that the transplantation of the business model is independent of the level of decentralization of parent firms at any conventional significance level ( $\chi^2(4) = 76.8$ , p-value = 0.000).

<sup>1</sup> The degree of transplantation via organization (full, partial and no transplantation) depends on the number of corporate decisions which are taken at the same hierarchical level in parent and subsidiary firms. For a listing of corporate decisions see Table 14 in Appendix B. The organization is fully transplanted if each corporate decision obtained the same hierarchical rank for the subsidiary firm as for the parent firm or if only one corporate decision differs. It is partially transplanted if two to four corporate decisions differ in hierarchical rank and the organization is not transplanted if five or more corporate decisions are different.

<sup>2</sup> Mean of ranking between one (centralized) and five (decentralized) of several corporate decisions depending on whether the headquarters of the parent firm (centralized) or the CEO (decentralized) takes the decision. The CEO is the subsidiary manager for *decentralization of subsidiary firm* or divisional manager for *decentralization of parent firm* (see 12 in Appendix A for more details). For a listing of corporate decisions see Table 14 in Appendix B.

<sup>3</sup> A firm is centralized when the level of decentralization is in the range of 1.0 to 2.5, it is cooperative in the range of 2.51 to 3.5 and decentralized in the range of 3.51 to 5.

Furthermore, the table looks at whether the organizational mode of multinational parent firms significantly affects their ability to transplant their organization to another country. It appears that decentralized parent firms transplant their organization significantly more often than centralized parent firms. Some 37 percent of foreign affiliates use the same business model as parent firms when their parent firms are decentralized compared with 24 percent of subsidiaries for all parent firms and 67 percent of subsidiaries use a different business model from parent firms when their parent firms are centralized compared with 50 percent of subsidiaries for all parent firms.

As a result the average levels of decentralization differ between parent firms and their subsidiaries as shown in Table 2, which looks at whether multinational parent firms and subsidiaries have a similar decision-making structure. On average parent firms are more centralized than subsidiary firms. The table also shows that the level of decentralization of parent firms has a strong influence on the way the level of command is organized in subsidiaries. Centralized parent firms tend to have significantly more centralized subsidiaries and decentralized parents have significantly more decentralized subsidiaries. Some 58 percent of subsidiaries have centralized decision-making when their parents are centralized compared with 27 percent of all subsidiaries and 42 percent of subsidiaries with decentralized parents are decentralized compared with 22 percent of subsidiaries for all parent firms.

**Table 2: The Level of Command of Parent and Subsidiary Firms**

		Decentralization of Subsidiary Firms <sup>1</sup>			All parent firms
		Centralized <sup>2</sup>	Cooperative <sup>2</sup>	Decentralized <sup>2</sup>	
<b>Decentralization of Parent Firms<sup>1</sup></b>	<b>Centralized<sup>2</sup></b>	251	156	29	436
		57.6 %	35.8%	6.7%	32.7%
	<b>Cooperative<sup>2</sup></b>	104	363	137	604
		17.2%	60.1%	22.7%	45.2%
	<b>Decentralized<sup>2</sup></b>	7	163	125	295
		2.4%	55.3%	42.4%	22.1%
<b>All subsidiary firms</b>		362	682	291	1335
		27.1%	51.1%	21.8%	100%

Notes: The table reports absolute number of cases and row percentages, except for the column "All parent firms", where column percentages are given. The Person's  $\chi^2$  test rejects the null hypothesis that the level of decentralization of subsidiary firms is independent of the level of decentralization of parent firms at any conventional significance level ( $\chi^2(4) = 371.5$ , p-value = 0.000).

<sup>1</sup> Mean of ranking between one (centralized) and five (decentralized) of several corporate decisions depending on whether the headquarters of the parent firm (centralized) or the CEO (decentralized) takes the decision. The CEO is the subsidiary manager for *decentralization of subsidiary firm* or divisional manager for *decentralization of parent firm* (see 12 in Appendix A for more details). For a listing of corporate decisions see Table 14 in Appendix B.

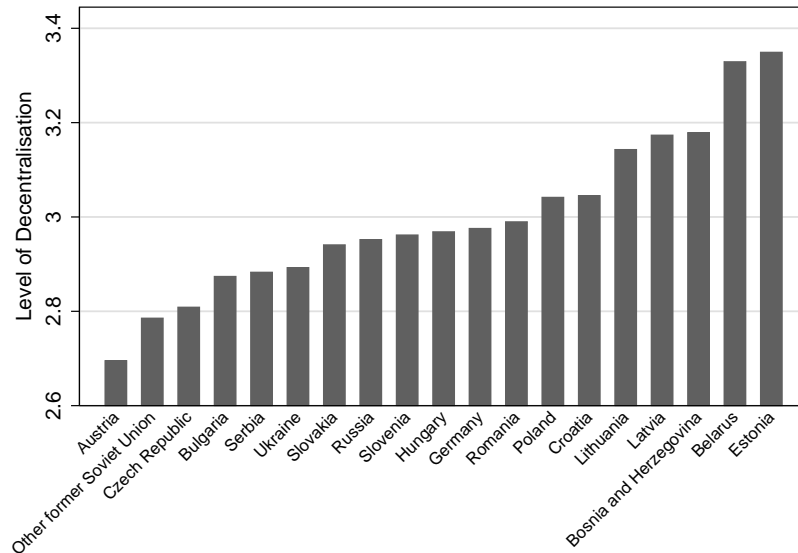
<sup>2</sup> A firm is centralized when the level of decentralization is in the range of 1.0 to 2.5, it is cooperative in the range of 2.51 to 3.5 and decentralized in the range of 3.51 to 5.

These numbers suggest that multinationals are quite often able to imprint their business culture on foreign affiliates. Nevertheless, Figures 2 and 3 reveal a startling variation in the organization of subsidiaries across host countries. Foreign affiliates of Austrian and German firms differ substantially with respect to their level of decentralization as well as in the degree to which they implement the business model of their parent firms. This suggests that home countries differ with respect to how attractive the conditions in their markets are to firms with a foreign business culture wishing to operate in their markets.

In this paper, we examine the factors that determine whether or not multinationals



**Figure 2: Level of Decentralization of Parent Firms and their Affiliates in Host Countries**



Notes: Level of decentralization is a mean of ranking between one (centralized) and five (decentralized) of several corporate decisions depending on whether the headquarters of the parent firm (centralized) or the subsidiary manager (in host countries)/divisional manager (in Austria or Germany) (decentralized) takes the decision (see Table 12 in Appendix A for more details). For a listing of corporate decisions see Table 14 in Appendix B. "Other former Soviet Union" refers to Azerbaijan, Armenia, Georgia, Moldova, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. The aggregation achieves at least eight observations per bar.

export their business culture to other countries. So far this has been little understood. Previous research on organizations in international trade has focused on how firms' home productivity advantage determines the mode of organization firms choose abroad (Helpman, Melitz, and Yeaple, 2004; Antras and Helpman, 2004) and how a greater exposure to international trade influences the business model firms choose at home (Marin and Verdier, 2004, 2007, 2008b). The research on the transportation of culture across countries has so far not focused on firm organization but rather on whether the fertility rates of second-generation immigrants in the US reflect the culture in the US or that of their parents in their home country (Fernández and Fogli, 2009) or on parking fine behavior of diplomats (Fisman and Miguel, 2008).

More recently, empirical literature on firm decentralization has emerged with a focus on national firms. The literature examines the trend of decentralization of US firms (Rajan and Wulf, 2006) and how information technology (Acemoglu, Aghion, Lelarge, Reenen, and Zilibotti, 2007), international trade and competition (Marin and Verdier, 2004, 2007; Guadalupe and Wulf, 2008), and trust and hierarchical religion (Bloom, Sadun, and van Reenen, 2009) affect the level of decentralization of firms. The paper by Bloom, Sadun, and van Reenen (2009) is the

Figure 3: Multinationals' Transplantation of Business Model

Figure 3a: Transplantation via Organization

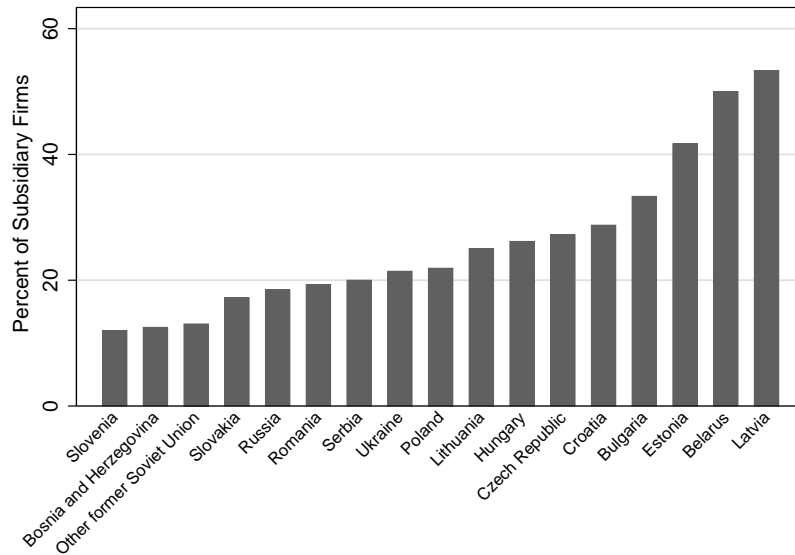
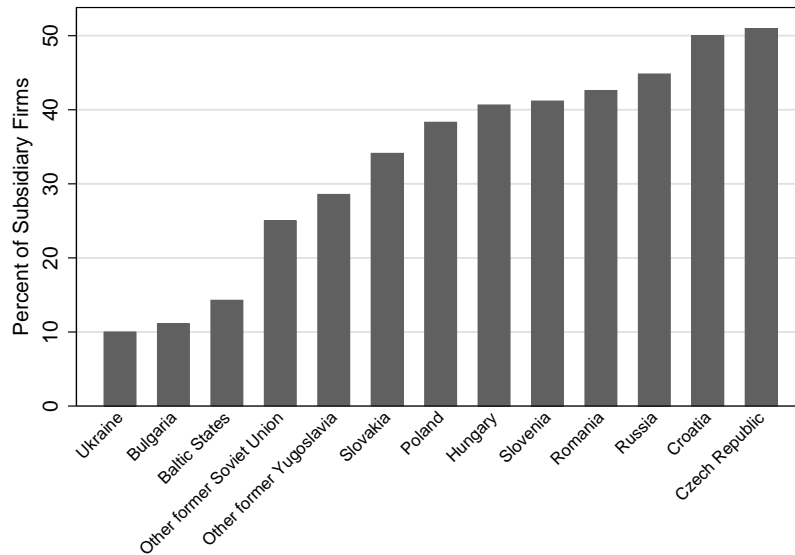


Figure 3b: Transplantation via CEO



Notes to Figure 3a: Figures are given for full *transplantation via organization* in which either each corporate decision in subsidiaries has the same rank as in parent firms or only one corporate decision differs. For a listing of corporate decisions see Table 14 in Appendix B. "Other former Soviet Union" refers to Azerbaijan, Armenia, Georgia, Moldova, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. The aggregation achieves at least eight observations per bar.  
 Notes to Figure 3b: Figures are given for subsidiary firms to which at least one manager has been sent by the parent firm. "Other Eastern Europe" refers to Albania, Macedonia, Turkmenistan and Uzbekistan; "other former Soviet Union" to Moldova, Turkmenistan, and Uzbekistan; "other former Yugoslavia" to Bosnia and Herzegovina, Macedonia, and Serbia; and "Baltic states" to Estonia, Latvia, and Lithuania. The aggregation achieves at least eight observations per bar.

closest to ours, since their firm sample includes information on multinational firms. Their data on multinationals, however, do not include matched parent and foreign affiliate information, which is what we use in this paper. Therefore, they are not able to answer how the characteristics of parent firms and their country of origin are influencing the ability of multinational firms to transport their business culture abroad. Our matched parent and affiliate data sample allows us to quantify to what extent affiliates' organizations reflect the cultural traits of their parents and to what extent they are a response to the market environment subsidiary firms face in host countries.

The rest of the paper is organized as follows. Section 2 introduces the various data used. In particular, it describes how we measure organization of multinational firms and transplantation of their business culture to foreign affiliates. Section 3 examines the determinants of these two measures and their estimated effects. Section 4 concludes.

## 2 Data

We collected survey data for 660 multinational corporations in Austria (200) and Germany (460) with 2200 subsidiaries in Eastern Europe including the former Soviet Union countries during the period 1990 to 2001. The survey questions refer typically to the years 1998 and 1999, when the data represented 100 percent of Austrian and 80 percent of German direct investment in Eastern Europe. This dataset is unique, since it includes matched information on the organization of 600 parent firms in Austria and Germany and 2200 of their subsidiaries in Eastern Europe.<sup>3</sup> In particular, we have information about the level of decentralization of parent firms and their subsidiaries which is measured by the level of decision-making within the corporation. This in turn enables us to study when the business model of parent firms is transplanted to their subsidiaries.

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<sup>3</sup>For a detailed overview of all variables and their descriptive statistics see Table 12 and 13, respectively, in Appendix A.

## 2.1 Measuring Organization

### Measuring Decentralization

Our measure of decentralization of parent firms is based on the survey question: "Who decides on the following issues concerning your corporation: the headquarters or the divisional manager?" The issues involve thirteen corporate decisions for Austrian and German parent firms, i.e. decisions on acquisitions, finances, new strategy, wage increase, R&D expenditure, budget, transfer and product prices, introducing a new product, changing a supplier, hiring two and 20 new workers as well as a new secretary. See also Table 14 in Appendix B for the listing of the decisions. Responses ranged between one and five with one as a centralized decision, taken entirely at headquarters, and 5 as a decentralized decision, taken at the divisional level. We use a simple mean of the available ranking to measure the overall level of decentralization of the firm and call it the *decentralization of parent firm*. A counterpart, *decentralization of subsidiary firm*, is obtained from answers to the question "Who decides on the following issues concerning your corporation: the headquarters of the parent firm or the manager of the subsidiary firm in the host country?"

Table 14 in Appendix B shows that the most centralized decision is the decision on acquisitions with a mean ranking of 1.34 and 1.41 for parent and subsidiary firms, respectively, followed by the decision on a new strategy (with a respective mean ranking of 1.90 and 1.88). Not surprisingly, the most decentralized decisions tend to be the decision on hiring a secretary (mean ranking of 4.15 and 4.65) and the decision on hiring two new workers, whereas the decision on R&D and the decision to introduce a new product tend to be taken cooperatively between headquarters and subsidiary managers in the host country (with a respective mean ranking of 2.58 and 2.80).

### Measuring Transplantation

We use two indicators to proxy for the transplantation of the business model from parent firms to foreign affiliates. The first proxy is a dummy variable *transplantation via organization* which indicates whether or not the organization of the parent firm is fully transplanted to the subsidiary. It takes a value of one if each individual corporate

decision has the same hierarchical rank or if one of the decisions differs in hierarchical rank between parent and subsidiary firms.

Table 15 in Appendix B looks at the similarity in the hierarchical levels of corporate decisions in parent and subsidiary firms. The hierarchical level ranges between one (centralized) and five (decentralized) in subsidiaries and parent firms for each of the corporate decisions individually. When parent and subsidiaries allocate an individual decision at the same hierarchical level, we consider the decision to be fully transplanted to the subsidiary and the similarity index in Panel A becomes zero, otherwise it takes values in the interval  $(-4,4)$ . We obtain this measure by subtracting the hierarchical level of the subsidiary firm from that of the parent firm.

Panel A gives a quantitative measure of transplantation by providing the percentages of subsidiaries where a particular decision is taken at the same hierarchical level as in parent firms ( $= 0$ ) and at different hierarchical levels ( $\neq 0$ ). It shows that the most centralized and the most decentralized corporate decisions tend to be transplanted most often to foreign affiliates (compare Tables 14 and 15 in Appendix B). In 78 percent, 70 percent, and 64 percent of the affiliates the decision on acquisitions, hiring a secretary, and hiring two new workers, respectively, are taken at the same hierarchical level in foreign affiliates as in parent firms. The least often transplanted decisions tend to be in the middle of the corporate ladder such as the decision on finances and R&D. Only in about half of the affiliates are these two decisions at the same hierarchical level in subsidiaries as in parent firms.

Panel B gives a qualitative measure of transplantation by listing in addition which corporate decisions in the subsidiary are more ( $> 0$ ) or less decentralized ( $< 0$ ) than in the parent firm. As can be seen from Panel B, when subsidiaries deviate in the allocation of decision power from their parent firms they tend to decentralize more than their parent firms. One exception is the decision on R&D which is more decentralized in parent firms than in subsidiary firms. Of the 49 percent of foreign affiliates which differ in their allocation of decision power over R&D from their parent firms, 30 percent of subsidiaries are more centralized compared with parent firms ( $< 0$ ) and 19 percent are more decentralized ( $> 0$ ).

Finally, Panel C reports the degree of transplantation by listing the degree to which the decisions in foreign affiliates deviate from their parent firms. When affiliates differ in their decision-making from their parent firms they do not choose a radical departure

from their parent firms. Mostly, they tend to decentralize or to centralize by one or two hierarchical levels more compared with their parent firms.

As a second proxy for the transplantation of parent firms' business model we use a dummy variable *transplantation via CEO*. It takes a value of one if at least one manager is sent from the parent firm to the subsidiary in the host country. The idea here is that parent firms use their own managers to implement the corporation's business culture in the subsidiary abroad. The dummy is constructed from the survey question "How many of your managers from the parent firm are sent to the subsidiary firm?" In more than 40 percent of foreign affiliates the parent firm has sent at least one manager to run the subsidiary and to transfer the organizational knowledge. This high frequency of *transplantation via CEO* suggests that the two proxies for the transplantation of the business model are complements rather than substitutes. We indeed find that the two measures are weakly positively correlated (see Table 3).

**Table 3: Multinationals' Transplantation of Business Model**

		Transplantation via CEO <sup>1</sup>		All subsidiary firms
		= 0	= 1	
Transplantation via Organization <sup>2</sup>	= 0	348	232	580
		60.0%	40.0%	80.8%
	= 1	73	65	138
		52.9%	47.1%	19.2%
<b>All subsidiary firms</b>		421	297	718
		58.6%	41.4%	100%

Notes: The table reports absolute number of cases and row percentages, except for the column "All subsidiary firms", where column percentages are given. The Person's  $\chi^2$  test rejects the null hypothesis that the transplantation via organization is independent of transplantation via CEO at 15 percent significance level ( $\chi^2(1) = 2.32$ , p-value = 0.13).

<sup>1</sup> A dummy that takes a value of one if at least one manager is sent from the parent firm to the subsidiary and zero otherwise.

<sup>2</sup> A dummy that takes a value of one if the organization is fully transplanted from the parent firm to its subsidiary and zero otherwise. The organization is fully transplanted if each corporate decision obtained the same rank for the subsidiary firm as for the parent firm or if only one corporate decision differs.

## Other Organizational Information

Our sample provides additional information on the organizational structure of the multinational corporation. We construct dummy variables to distinguish four different categories of the *parent firms' organization*: when the parent firm is a family firm (*parent is a family firm*), a domestic multinational (*parent is a domestic MNE*) or a subsidiary of a larger foreign multinational enterprise (*parent is a subsidiary of foreign MNE*) or of a domestic multinational firm (*parent is a subsidiary of domestic MNE*).

In addition, a dummy *parent is a subsidiary* captures the two latter cases together and takes a value of one if the parent firm is a subsidiary of either a foreign or a domestic multinational. Some 16 percent of parent firms are family firms, 36 percent are domestic multinationals and 48 percent are a subsidiary of a domestic or foreign multinational (see Table 13 in Appendix A for the descriptive statistics).

The survey includes further information on the organization of subsidiary firms. The variable *horizontal investment* is calculated as the share of output of the subsidiary firm which is sold at the local market. It ranges between 0 and 100 percent with a mean of 82 percent. Two indicators of how tightly foreign affiliates are linked to their parent firms are the variables parent firms' ownership share in the subsidiary and the importance of intra-firm trade. *Parent's ownership share* measures the parent firms' stakes in the foreign venture with a mean ownership share of 86 percent. Hence, Austrian and German firms tend to have a high involvement in their subsidiaries in Eastern Europe. The variable *intra-firm trade* gives the share of imports from the subsidiary firm to the parent firm in percentage of parent firm's sales. On average, parent firms import two percent of sales from each of their subsidiary firm in Eastern Europe either as input or final goods. Furthermore, the variable *distance* between parent and subsidiary firm is a measure of cultural differences between the parent firms and the host regions. The further away the foreign affiliate from the headquarters firm the more important becomes the local knowledge and the less able is headquarters to monitor the subsidiary firm.

Finally, we have information on how innovative the technology is that the parent firm transfers to the subsidiary firm. The innovativeness of the technology is captured by a dummy *technology is innovative* which takes a value of one if the technology is new, a dummy *technology is established* with value of one if the technology is relatively established and a dummy *technology is outdated* refers to a fully established or even outdated technology. The size of the multinational corporation is measured by the number of employees as the *size of parent firm* and the *size of subsidiary firm*. Another measure of size is the total *number of affiliates* in Eastern Europe which is recorded for each parent firm, though we put nine and more affiliates into one category to avoid outliers.

## 2.2 Measuring Competition and Trade

We use several data sources to measure product market competition and exposure to international trade. First we obtain from our survey data of 660 Austrian and German multinationals with their 2200 foreign affiliates two subjective measures of competition as perceived by parent and subsidiary firms. They are dummy variables indicating for each parent or subsidiary firm whether the firm faces *many domestic competitors* and *many world competitors* rather than few competitors, respectively. Second, we use the AMADEUS database from Bureau van Dijk (2005) to calculate the *Lerner* index of competition based on a large number of firms in the two home countries of the headquarters of multinational firms and in all host countries of their affiliates at the three-digit ISIC industry level. The Lerner index is defined as  $(1 - \text{average profits/sales})$ , where the average is taken, first, across all firms available in a three-digit industry in a specific country and, second, over the years 1996 to 2000. Finally, we use trade and tariff data from the WITS UN COMTRADE and TRAINS databases (World Bank, 2009) as well as data on domestic production from the INDSTAT 4 (UNIDO, 2008) and STAN (OECD, 2009) databases to proxy for the exposure to international trade of the sector of parent and subsidiary firms. From these types of data, we calculate the *import share* (defined as total imports divided by domestic production), the *export share* (defined as total exports divided by domestic production), and the average effective *tariff* rates on imports. These variables are calculated for each country at the three-digit industry level. If data at the three-digit industry level are missing, the two-digit level is used.

## 2.3 Social Capital in Host Countries

We consider additional characteristics of the subsidiaries' market environment. In particular, the variable *contract enforcement* reflects the perception by parent firms of ten possible risk factors that the subsidiary faces in host countries. The variable is calculated as the mean of ranking between one and five with one as a very important and five as an unimportant risk factor. The risk factors include the risk of profit transfer, exchange rate volatility, expropriation, changes in taxes or tariffs, property rights, macro-economic instability, political turnaround, corruption, crime and mafia, and f banking sector collapse.

Further characteristics of the market environment of host countries are captured by the variables *trust* and *hierarchical religion*. *Trust* measures the proportion of people



who answer "Most people can be trusted" to the question: "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?" *Hierarchical religion* captures the proportion of the population belonging to a "hierarchical religion" such as Roman and Greek Catholic, Orthodox, Gregorian and Armenian Apostolic Church, or Islam. Both sets of data come from the World Value Survey undertaken by the WVS Organization (2009).

### 3 Empirical Specification and Results

We are interested in two different, though inter-linked questions: What favors decentralization of the subsidiary firm? What determines the transplantation of the business model from the parent firm to the subsidiary firm? We start with the first question.

#### 3.1 What Favors Decentralization in Foreign Affiliates of Multinationals?

##### The Organization of the Multinational Corporation

We first look in Table 4 at the baseline model which examines how the organization of the multinational corporation influences the level of decentralization of foreign affiliates as measured by *decentralization of subsidiary firm*. We start with the organization of parent firms. As can be seen from Table 4, subsidiary firms are more decentralized when their parent firms are more decentralized, when parent firms themselves are a subsidiary of a domestic multinational (with *parent is a family firm* as the omitted category) and when parent firms have more affiliates in other countries, though the effect is nonlinear. Subsidiary firms will, however, be more centralized when their parent firms are larger and located in Germany and when they are themselves a subsidiary of a foreign multinational. The significant and positive coefficient of *decentralization of parent* of 0.42 suggests that when parent firms become more decentralized by one rank (a 25 percent increase in the possible range of the level of decentralization) the level of decentralization of subsidiary firms increases by 10.5 percent. We obtain this number by multiplying 1 (an increase of one rank) with the coefficient of 0.42 resulting in an

increase of the level of decentralization in the subsidiary of 0.42, which is 10.5 percent of the possible range of levels of decentralization of subsidiaries. Hence, the level of decentralization of parent firms is an economically important variable determining how decentralized the subsidiary is.

The organization of subsidiary firms also matters for the level of decentralization. Subsidiaries tend to be more decentralized when they are a horizontal foreign investment in which they sell mostly at the local market, when they are larger and further away from headquarters. Subsidiaries are, however, more centralized when they are more tightly linked to their parent firms. This is the case when headquarters has a larger ownership stake in subsidiaries and when the subsidiary is part of a global supply chain (measured by the volume of intra-firm trade) when it primarily provides inputs and final goods to headquarters.

All estimated coefficients are mostly significant at conventional levels and robust to the inclusion of host country and industry fixed effects. The inclusion of industry fixed effects substantially contributes to the explanatory power of the regression in columns (3) and (4) as the  $R^2$  increases from 0.28 to 0.46. The inclusion of host country fixed effects appears less important (column (2)). We include both types of fixed effects in the following analysis. The organizational variables together account for about 50 percent of the variation in the level of decentralization of foreign affiliates (column (9)) which leaves room for other variables to play a role.

## **Market Competition and International Trade**

Next, we turn to the influence of the market environment in host countries on the ability of foreign affiliates to decentralize. We start with the role of competition and international trade in Table 5. In their theory of decentralization Marin and Verdier (2004, 2007, 2008b) suggest that the level of competition and international trade needs to reach a critical level before firms start to decentralize. Firms trade off the profit gain from having control against the profit loss from losing the initiative of middle managers. When competition becomes sufficiently strong the latter effect on profits dominates and firms decentralize to empower middle managers. In contrast to the previous empirical literature on the decentralization of national firms (Marin and Verdier, 2007; Marin, 2008; Guadalupe and Wulf, 2008; Bloom, Sadun, and van Reenen, 2009) we find that foreign affiliates of multinational corporations tend to centralize in response to more

**Table 4: Level of Decentralization in Subsidiary Firms  
The Basic Model**

Dependent Variable	Decentralization of Subsidiary Firm <sup>1</sup>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Decentralization of parent firm <sup>1</sup>	0.42*** (0.00)	0.40*** (0.00)	0.43*** (0.00)	0.42*** (0.00)	0.43*** (0.00)	0.42*** (0.00)	0.42*** (0.00)	0.41*** (0.00)	0.41*** (0.00)
Parent is located in Germany	-0.11*** (0.00)	-0.12*** (0.00)	-0.19*** (0.00)	-0.19*** (0.00)	-0.17*** (0.00)	-0.20*** (0.00)	-0.23*** (0.00)	-0.24*** (0.00)	-0.29*** (0.00)
Parent is a subsidiary of foreign MNE <sup>2</sup>	-0.049 (0.37)	-0.059 (0.29)	-0.12* (0.07)	-0.12* (0.06)	-0.16** (0.02)	-0.12* (0.06)	-0.13** (0.05)	-0.12* (0.06)	-0.13** (0.04)
Parent is a subsidiary of domestic MNE <sup>2</sup>	0.10** (0.04)	0.090* (0.07)	0.13** (0.01)	0.13** (0.01)	0.043 (0.42)	0.13** (0.01)	0.12** (0.02)	0.14*** (0.01)	0.14*** (0.01)
Parent is a domestic MNE <sup>2</sup>	-0.042 (0.41)	-0.046 (0.37)	-0.020 (0.73)	-0.0089 (0.87)	-0.036 (0.53)	-0.014 (0.80)	-0.019 (0.74)	-0.031 (0.58)	-0.045 (0.43)
Log (Size of parent firm)	-0.042*** (0.00)	-0.040*** (0.00)	-0.039*** (0.00)	-0.039*** (0.00)	-0.046*** (0.00)	-0.035*** (0.00)	-0.040*** (0.00)	-0.029** (0.02)	-0.027** (0.03)
Log (Size of subsidiary firm)	0.023* (0.06)	0.033** (0.02)	0.045*** (0.00)	0.059*** (0.00)	0.050*** (0.00)	0.056*** (0.00)	0.059*** (0.00)	0.063*** (0.00)	0.060*** (0.00)
Number of affiliates	0.11*** (0.00)	0.11*** (0.01)	0.098** (0.03)	0.095** (0.04)	0.11** (0.02)	0.093** (0.04)	0.099** (0.03)	0.083* (0.07)	0.088* (0.06)
(Number of affiliates) <sup>2</sup>	-0.0093*** (0.00)	-0.0095*** (0.00)	-0.0090** (0.02)	-0.0091** (0.02)	-0.011*** (0.01)	-0.0088** (0.02)	-0.0094** (0.02)	-0.0082** (0.04)	-0.0084** (0.03)
Intra-firm trade					-0.21 (0.43)				
Parent's ownership share						-0.23*** (0.00)			-0.18** (0.03)
Log (Distance)							0.068* (0.06)		0.065* (0.08)
Horizontal investment								0.27*** (0.00)	0.25*** (0.01)
Country dummies	NO	YES	NO	YES	YES	YES	YES	YES	YES
Industry dummies (3d)	NO	NO	YES	YES	YES	YES	YES	YES	YES
Observations	1157	1157	1157	1157	1078	1154	1157	1111	1108
Adjusted R <sup>2</sup>	0.28	0.28	0.46	0.47	0.50	0.47	0.47	0.49	0.49

\* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%  
Notes: Coefficients obtained by OLS with robust standard errors. P-values reported in parentheses. See Table 12 in Appendix A for the definition of variables.  
<sup>1</sup> Mean of ranking between one (centralized) and five (decentralized) of several corporate decisions depending on whether the headquarters of the parent firm (centralized) or the CEO (decentralized) takes the decision. The CEO is the subsidiary manager for *decentralization of subsidiary firm* or divisional manager for *decentralization of parent firm* (see 12 in Appendix A for more details). For a listing of corporate decisions see Table 14 in Appendix B.  
<sup>2</sup> *Parent is a family firm* is the omitted category of *parent firm's organization*.

competition in host countries. Column (1) shows that the level of decentralization of subsidiaries declines with *many domestic competitors* rather than *few competitors* (the omitted category). When subsidiaries face *many domestic competitors* rather than few competitors they reduce the level of decentralization by a rank of 0.11 which is 2.75 percent.

One problem with the subjective firm level measure of competition is that it may suffer from reverse causality. More decentralized firms may face less tough competition (because they may empower their knowledge workers to bring new ideas to the firm resulting in higher quality of products) rather than that firms facing less tough competition decentralize more, as we postulate here. To prevent the possibility of a single firm influencing the market outcome we introduce a more exogenous measure of competition at the sectoral level for the host country markets given by the *Lerner* index. Column (2) reports the results and shows that the previous result in column (1) is robust to the measure of competition as subsidiaries tend to centralize with an increase in the Lerner index. An increase in the Lerner index in the affiliates' markets by ten percent reduces the level of decentralization in affiliates by a rank of 0.14 which is 3.5 percent.

A possible explanation for the contrasting results with the empirical literature on national firms is that subsidiaries in host countries of Eastern Europe (including the former Soviet Union) may face less competition compared with firms in developed market economies and hence they do not reach the threshold level of competition suggested by Marin and Verdier (2007) and they stay centralized. A comparison of the Lerner index and the firm level measure of domestic competition in Austria and Germany with those in host countries (see Tables 13, 16 and 17 in Appendix C) reveals, however, that competition does not seem to be weaker in host countries. It appears then that the results are driven by the fact that the firms in our data sample are multinational rather than national firms. Austrian and German multinationals relocate activities to Eastern Europe and the former Soviet Union in order to exploit the lower labor costs there. When competition intensifies in host countries the level of costs matters more for profits and hence multinationals centralize foreign affiliates to avoid the possibility that subsidiary managers choose activities which are more favorable to them than to the profits of the firm. The profit gain from having control dominates the profit loss from losing the initiative of subsidiary managers when multinationals relocate activities to low-cost host countries to save labor costs.

**Table 5: Level of Decentralization in Subsidiary Firms  
The Role of Competition and Trade: OLS Estimates**

Dependent Variable	Decentralization of Subsidiary Firm <sup>1</sup>					
	(1)	(2)	(3)	(4)	(5)	(6)
Decentralization of parent firm <sup>1</sup>	0.41*** (0.00)	0.40*** (0.00)	0.41*** (0.00)	0.35*** (0.00)	0.35*** (0.00)	0.35*** (0.00)
Parent is located in Germany	-0.32*** (0.00)	-0.30*** (0.00)	-0.31*** (0.00)	-0.47*** (0.00)	-0.47*** (0.00)	-0.34*** (0.00)
Parent is a subsidiary of foreign MNE <sup>2</sup>	-0.20*** (0.00)	-0.10 (0.13)	-0.18*** (0.01)	0.011 (0.94)	0.0100 (0.94)	-0.14 (0.32)
Parent is a subsidiary of domestic MNE <sup>2</sup>	0.15*** (0.01)	0.17*** (0.00)	0.17*** (0.00)	0.31*** (0.00)	0.31*** (0.00)	0.16 (0.11)
Parent is a domestic MNE <sup>2</sup>	-0.065 (0.26)	0.010 (0.86)	-0.053 (0.36)	0.044 (0.70)	0.044 (0.71)	-0.12 (0.28)
Log (Size of parent firm)	-0.023* (0.07)	-0.027* (0.05)	-0.029** (0.02)	0.0070 (0.84)	0.0065 (0.85)	0.0014 (0.97)
Log (Size of subsidiary firm)	0.062*** (0.00)	0.063*** (0.00)	0.060*** (0.00)	0.068** (0.04)	0.069** (0.04)	0.087*** (0.00)
Number of affiliates	0.098** (0.04)	0.11** (0.03)	0.081* (0.08)	0.30*** (0.00)	0.30*** (0.00)	0.23*** (0.00)
(Number of affiliates) <sup>2</sup>	-0.0091** (0.02)	-0.011*** (0.01)	-0.0076* (0.05)	-0.029*** (0.00)	-0.028*** (0.00)	-0.023*** (0.00)
Parent's ownership share	-0.21** (0.01)	-0.16* (0.08)	-0.21** (0.01)	-0.24* (0.07)	-0.24* (0.06)	-0.29** (0.03)
Log (Distance)	0.043 (0.26)	0.076* (0.06)	0.055 (0.14)	0.15** (0.01)	0.15** (0.01)	0.11 (0.13)
Horizontal investment	0.25*** (0.01)	0.26*** (0.01)	0.26*** (0.01)	0.11 (0.44)	0.11 (0.43)	0.11 (0.45)
Many domestic competitors <sup>3</sup>	-0.11** (0.01)					
Subsidiary market Lerner		-0.014** (0.03)				
Many world competitors <sup>3</sup>			0.089* (0.09)			
Import share				-0.028* (0.09)		
Export share					-0.032** (0.02)	
Tariffs						-0.00098 (0.46)
Country dummies	YES	YES	YES	YES	YES	YES
Industry dummies (3d)	YES	YES	YES	YES	YES	YES
Observations	1090	960	1083	373	375	372
Adjusted R <sup>2</sup>	0.50	0.47	0.50	0.54	0.55	0.52

\* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%

Notes: Coefficients obtained by OLS with robust standard errors. P-values reported in parentheses. See Table 12 in Appendix A for the definition of variables.

<sup>1</sup> Mean of ranking between one (centralized) and five (decentralized) of several corporate decisions depending on whether the headquarters of the parent firm (centralized) or the CEO (decentralized) takes the decision. The CEO is the subsidiary manager for *decentralization of subsidiary firm* or divisional manager for *decentralization of parent firm* (see 12 in Appendix A for more details). For a listing of corporate decisions see Table 14 in Appendix B.

<sup>2</sup> Parent is a family firm is the omitted category of parent firm's organization.

<sup>3</sup> Many domestic competitors and many world competitors refer to subsidiary firm's market.

Furthermore, we find that subsidiaries centralize their organization in response to a greater exposure to international trade as measured by the import and export ratios at the sectoral level given in columns (4) and (5). The effect of a change in the trade ratios on the level of command in affiliates is, however, almost negligible. An increase in the trade ratios in host countries by ten percentage points reduces the level of decentralization in foreign affiliates by a rank of approximately 0.003 which is 0.08 percent. The negligible effect of the trade ratios on the level of decentralization of affiliates is, however, not surprising. The average trade ratio of a sector hides the true exposure to trade of individual firms. As suggested by recent literature on trade and firm heterogeneity (see Melitz, 2003; Bernard, Jensen, Redding, and Schott, 2007) the distribution of individual firms' trade exposure in a sector is particularly skewed. Only a small proportion of firms in a sector engage in trade activities (the extensive margin of trade) and produce a significant share of their output for the world market (the intensive margin of trade). Therefore, an increase in the trade ratio of the sector does not expose the mass of subsidiary firms in the sector to the critical level of international competition as is suggested by Marin and Verdier (2007) and thus affiliate firms do not significantly change the level of decentralization.

We introduce the firm level measure of trade *many world competitors* which is supposed to be better able to capture firms' true exposure to trade. Interestingly, we find that *many world competitors* is positively associated with the level of decentralization of affiliates (column (3)). When subsidiaries are faced with many foreign competitors rather than a few, they increase the level of decentralization by a rank of 0.09 which is 2.25 percent. We interpret the contrasting results of the two measures of trade as suggesting that affiliates with a large number of foreign competitors reach the critical level of international competition and thus decentralize, whereas an increase in the trade ratio of the sector does not expose a sufficient number of firms in the sector to this critical level of trade and thus they remain centralized.<sup>4</sup>

Note that the estimated coefficients of the organizational variables do not change with the inclusion of the different measures of competition. The size of the estimated coefficients does, however, change with the inclusion of the trade ratios. This is, nevertheless, a result of a substantial drop in the sample size owing to the unavailability

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<sup>4</sup>When we aggregate the firm level measure of trade *many world competitors* over all host countries and compare it with the firm level measure of trade for the two home countries Austria and Germany, we indeed find that host countries are on average much less exposed to international competition. About 30 percent of subsidiaries in host countries face *many world competitors* compared with 73 percent of parent firms in Austria and Germany. See Table 13 in Appendix A.

of data on trade shares for some of the Eastern European countries.

Surprisingly, the effective tariff rates on imports have no significant effect on the level of decentralization of foreign affiliates. A closer inspection of the data reveals, however, that Eastern European countries tend to have higher tariffs on imports in less productive sectors with lower profits. Hence, import tariffs and profits tend to be negatively (rather than positively) correlated.

## **Endogeneity**

We proceed next to address the problem of endogeneity associated with using the level of decentralization of parent firms as a determinant of the level of decentralization of foreign affiliates. It could be argued that the level of decentralization of subsidiary firms may influence the level of command in parent firms rather than the other way around. Parent firms' involvement in foreign affiliates may crowd out the CEO's ability to monitor and control at headquarters. This trade-off between monitoring at home and abroad may then force parent firms to decentralize. In this case we would underestimate the true effect of the parents' level of decentralization on subsidiary firms. We address the potential endogeneity problem in Table 6.

We introduce the toughness of competition at the headquarters' firms' markets as an instrument for the level of decentralization of parent firms. The relevance of this instrument is motivated by the theory of decentralization of firms suggested by Marin and Verdier (2007). They argue that the level of decentralization of firms will be governed by the toughness of competition in the market and they indeed find that the intensity of competition has a statistically significant effect on the level of decentralization of Austrian and German firms. We measure the instrument toughness of competition in headquarters' firms' markets by the Lerner index and denote it as *parent market Lerner*. The instrument can be considered as exogenous to the decentralization of subsidiary firms as it reflects the competitive conditions in parent firms' markets rather than in subsidiaries' firms' markets and the Lerner index for the headquarters' firms' markets is based on a large sample of firms at the three-digit ISIC level from the AMADEUS data. Therefore, we can safely exclude feedback effects from the level of decentralization of subsidiaries on the intensity of competition in parent firms' markets.

**Table 6: Level of Decentralization in Subsidiary Firms  
The Role of Competition and Trade: IV Estimates**

Dependent Variable	Decentralization of Subsidiary Firm <sup>1</sup>					
	(1)	(2)	(3)	(4)	(5)	(6)
Decentralization of parent firm <sup>1</sup>	0.67*** (0.00)	0.60*** (0.00)	0.63*** (0.00)	0.36 (0.45)	0.38 (0.43)	0.28 (0.29)
Parent is located in Germany	-0.30*** (0.00)	-0.28*** (0.00)	-0.29*** (0.00)	-0.47*** (0.00)	-0.46*** (0.00)	-0.35*** (0.00)
Parent is a subsidiary of foreign MNE <sup>2</sup>	-0.18*** (0.01)	-0.098 (0.12)	-0.17*** (0.01)	0.00085 (1.00)	-0.014 (0.97)	-0.088 (0.71)
Parent is a subsidiary of domestic MNE <sup>2</sup>	0.048 (0.55)	0.11 (0.16)	0.089 (0.23)	0.31 (0.21)	0.30 (0.24)	0.19 (0.18)
Parent is a domestic MNE <sup>2</sup>	-0.15 (0.12)	-0.067 (0.45)	-0.13 (0.18)	0.035 (0.92)	0.021 (0.95)	-0.077 (0.68)
Log (Size of parent firm)	-0.052*** (0.01)	-0.047** (0.02)	-0.054*** (0.00)	0.0056 (0.92)	0.0031 (0.96)	0.0097 (0.79)
Log (Size of subsidiary firm)	0.045** (0.02)	0.047** (0.02)	0.047** (0.01)	0.068*** (0.00)	0.069*** (0.00)	0.088*** (0.00)
Number of affiliates	0.052 (0.27)	0.078* (0.08)	0.040 (0.39)	0.29** (0.04)	0.29* (0.05)	0.26** (0.01)
(Number of affiliates) <sup>2</sup>	-0.0056 (0.18)	-0.0079** (0.05)	-0.0046 (0.28)	-0.028** (0.03)	-0.028** (0.04)	-0.026*** (0.01)
Parent's ownership share	-0.14 (0.10)	-0.14 (0.12)	-0.15* (0.07)	-0.24* (0.08)	-0.24* (0.09)	-0.30** (0.02)
Log (Distance)	0.047 (0.19)	0.087** (0.01)	0.057 (0.10)	0.16* (0.08)	0.16* (0.08)	0.098 (0.12)
Horizontal investment	0.26*** (0.00)	0.27*** (0.00)	0.29*** (0.00)	0.11 (0.25)	0.11 (0.24)	0.11 (0.25)
Many domestic competitors <sup>3</sup>	-0.11** (0.01)					
Subsidiary market Lerner		-0.013** (0.04)				
Many world competitors <sup>3</sup>			0.14*** (0.01)			
Import share				-0.029 (0.32)		
Export share					-0.033 (0.27)	
Tariffs						-0.00099 (0.61)
Country dummies	YES	YES	YES	YES	YES	YES
Industry dummies (3d)	YES	YES	YES	YES	YES	YES
Observations	1039	955	1032	373	375	371
Adjusted R <sup>2</sup>	0.41	0.43	0.43	0.54	0.55	0.52
First Stage:						
Parent market Lerner <sup>4</sup>	0.033*** (0.00)	0.032*** (0.00)	0.035*** (0.00)	0.027 (0.21)	0.026 (0.22)	0.043** (0.03)
F-statistics <sup>5</sup>	19.29	16.55	21.25	1.59	1.53	4.96

\* significant at 10%, \*\* significant at 5%, \*\*\*significant at 1%

Notes: Coefficients obtained by instrumental variable technique. P-values reported in parentheses. The instrument for the decentralization of parent firm is the variable *Parent market Lerner*. See Table 12 in Appendix A for the definition of variables.

<sup>1</sup> Mean of ranking between one (centralized) and five (decentralized) of several corporate decisions depending on whether the headquarters of the parent firm (centralized) or the CEO (decentralized) takes the decision. The CEO is the subsidiary manager for *decentralization of subsidiary firm* or divisional manager for *decentralization of parent firm* (see 12 in Appendix A for more details). For a listing of corporate decisions see Table 14 in Appendix B.

<sup>2</sup> *Parent is a family firm* is the omitted category of *parent firm's organization*.

<sup>3</sup> *Many domestic competitors* and *many world competitors* refer to subsidiary firm's market.

<sup>4</sup> Estimated coefficients of the instrument *parent market Lerner* in the first stage regression.

<sup>5</sup> F-statistics for the significance of the instrument in the first stage regression.



In Table 6 we indeed find that the level of competition in parent firms' markets is a relevant instrument as more competition is estimated to significantly increase the level of decentralization of parent firms in the first stage regressions (columns (1) to (3)). Moreover, the estimated effect of the parent firms' decentralization on the level of command in subsidiaries indeed turns out to be underestimated in the OLS regressions as the estimated coefficients increase now to over 0.6 compared with 0.4 before. In the IV regressions in columns (1) to (3) some of the other organizational variables now become insignificant or weakly significant, whereas the firm level measure of trade *many world competitors* now has a much stronger effect on the level of decentralization of subsidiaries. Turning to the results with the sectoral measures of trade in columns (4) to (6), we find that the Lerner index of headquarters' firms' markets is only a weak instrument and the level of decentralization of parent firms as well as the trade ratios becomes insignificant. We do not, however, have the same confidence in these regressions since the sample size drops to one-third and the sectoral trade ratios are less able to capture firms' true exposure to trade. Still, the sign of the estimated coefficients remains the same as in the OLS regressions and thus the direction of the estimated effects appears robust to the use of the alternative estimation technique.

### **Social Capital: Contract Enforcement, Trust, and Religion**

Finally, we turn to other characteristics of the market environment which may have helped foreign affiliates to decentralize. Bloom, Sadun, and van Reenen (2009) have found that social capital as proxied by trust and the rule of law are positively associated with the level of decentralization in 4000 firms in the US, Europe, and Asia. We expect these variables to play an even more important role in our data sample as our affiliates are often located in countries with very weak legal institutions and low protection of property rights. When contracts are not respected, trust and religion may become critical mechanisms for obtaining cooperation between parent firms and their subsidiary managers. Figure 4 indeed shows for three groups of host countries that contracts and trust appear to be substitutes as they are weakly negatively correlated.<sup>5</sup> Therefore, we include these measures of social capital in Table 7. We exclude the country fixed effects in the regressions when *trust* and *hierarchical religion* are included, since both are country-specific variables.

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<sup>5</sup>See also Figures 5, 6, and 7 in Appendix C for the level of contract enforcement, trust, and hierarchical religion in host countries, respectively.

**Table 7: Level of Decentralization in Subsidiary Firms  
The Role of Contracts, Trust, and Religion**

Dependent Variable	Decentralization of Subsidiary Firm <sup>1</sup>					
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	IV	IV
Decentralization of parent firm <sup>1</sup>	0.41*** (0.00)	0.41*** (0.00)	0.41*** (0.00)	0.41*** (0.00)	0.57*** (0.00)	0.56*** (0.00)
Parent is located in Germany	-0.28*** (0.00)	-0.28*** (0.00)	-0.27*** (0.00)	-0.28*** (0.00)	-0.27*** (0.00)	-0.27*** (0.00)
Parent is a subsidiary of foreign MNE <sup>2</sup>	-0.058 (0.41)	-0.041 (0.55)	-0.042 (0.54)	-0.054 (0.44)	-0.064 (0.31)	-0.060 (0.34)
Parent is a subsidiary of domestic MNE <sup>2</sup>	0.21*** (0.00)	0.23*** (0.00)	0.23*** (0.00)	0.22*** (0.00)	0.15* (0.05)	0.16** (0.04)
Parent is a domestic MNE <sup>2</sup>	0.058 (0.36)	0.072 (0.25)	0.067 (0.29)	0.064 (0.31)	-0.028 (0.76)	-0.015 (0.87)
Log (Size of parent firm)	-0.029** (0.04)	-0.027* (0.06)	-0.028** (0.05)	-0.028* (0.05)	-0.045** (0.01)	-0.042** (0.01)
Log (Size of subsidiary firm)	0.067*** (0.00)	0.059*** (0.00)	0.059*** (0.00)	0.062*** (0.00)	0.054*** (0.00)	0.051*** (0.00)
Number of affiliates	0.12** (0.01)	0.12*** (0.01)	0.12*** (0.01)	0.12** (0.01)	0.091** (0.04)	0.092** (0.04)
(Number of affiliates) <sup>2</sup>	-0.012*** (0.00)	-0.012*** (0.00)	-0.012*** (0.00)	-0.012*** (0.00)	-0.0092** (0.02)	-0.0092** (0.02)
Parent's ownership share	-0.21** (0.03)	-0.22** (0.02)	-0.21** (0.03)	-0.21** (0.02)	-0.18** (0.04)	-0.19** (0.03)
Log (Distance)	0.069* (0.09)	0.062** (0.01)	0.050** (0.04)	0.064** (0.01)	0.082** (0.02)	0.073*** (0.00)
Horizontal investment	0.23** (0.02)	0.23** (0.02)	0.24** (0.02)	0.24** (0.02)	0.26*** (0.00)	0.26*** (0.00)
Subsidiary market Lerner	-0.014** (0.02)	-0.015*** (0.00)	-0.011** (0.02)	-0.016*** (0.00)	-0.014** (0.03)	-0.015*** (0.01)
Contract enforcement	0.10*** (0.00)	0.095*** (0.00)	0.092*** (0.00)	0.10*** (0.00)	0.13*** (0.00)	0.13*** (0.00)
Trust		0.55 (0.28)		1.56** (0.01)		1.52** (0.02)
Hierarchical religion			0.089 (0.30)	0.27** (0.01)		0.26** (0.02)
Country dummies	YES	NO	NO	NO	YES	NO
Industry dummies (3d)	YES	YES	YES	YES	YES	YES
Observations	946	946	946	946	941	941
Adjusted R <sup>2</sup>	0.48	0.48	0.48	0.48	0.45	0.46
First Stage:						
Parent market Lerner <sup>3</sup>					0.040*** (0.00)	0.041*** (0.00)
F-statistics <sup>4</sup>					26.69	27.52

\* significant at 10%, \*\* significant at 5%, \*\*\*significant at 1%

Notes: OLS estimates with robust standard errors in columns (1) to (4) and IV estimates in columns (5) and (6). P-values reported in parentheses. The instrument for the decentralization of parent firm is the variable *parent market Lerner*. See Table 12 in Appendix A for the definition of variables.

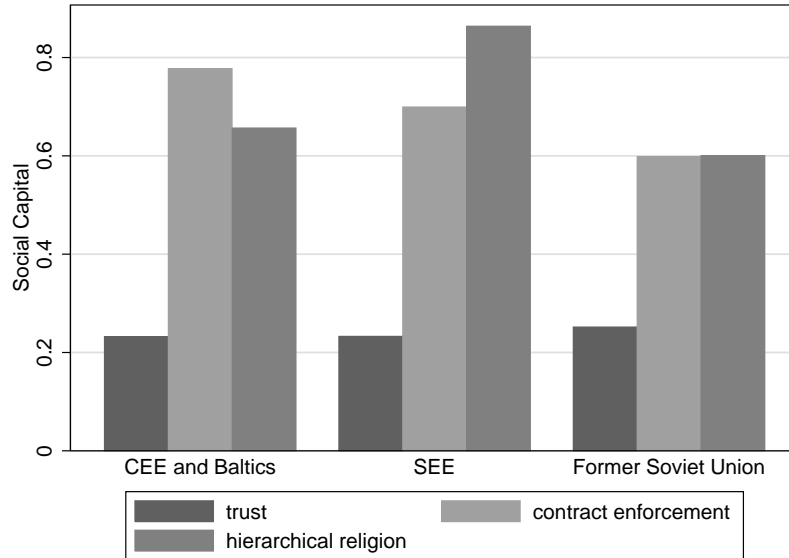
<sup>1</sup> Mean of ranking between one (centralized) and five (decentralized) of several corporate decisions depending on whether the headquarters of the parent firm (centralized) or the CEO (decentralized) takes the decision. The CEO is the subsidiary manager for *decentralization of subsidiary firm* or divisional manager for *decentralization of parent firm* (see 12 in Appendix A for more details). For a listing of corporate decisions see Table 14 in Appendix B.

<sup>2</sup> *Parent is a family firm* is the omitted category of *parent firm's organization*.

<sup>3</sup> Estimated coefficients of the instrument *parent market Lerner* in the first stage regression.

<sup>4</sup> F-statistics for the significance of the instrument in the first stage regression.

Figure 4: Social Capital in Host Regions



Notes: CEE refers to Central Eastern European countries (Czech Republic, Hungary, Slovakia, Slovenia, Poland), Baltics to Baltic countries (Estonia, Latvia, Lithuania), SEE to South Eastern European countries (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Serbia), and Former Soviet Union includes Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan. The level of contract enforcement is used as a mean of ranking between one (important) and five (not important) factors affecting contract enforcement divided by five to obtain a measure in the range zero and one (for a listing of the factors see Table 12 in Appendix A). The level of hierarchical religion is the proportion of people that list a hierarchical religion (Roman Catholic, Greek Catholic, Orthodox, Islam, Gregorian or Armenian Apostolic Church) to the question: "Do you belong to a religious denomination? If yes: Which one?" The level of trust is the proportion of people that answer "Most people can be trusted" to the question: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?"

We find that multinationals tend to give subsidiary managers more autonomy when they perceive that contracts are well enforced in host countries. An improvement in *contract enforcement* by one rank in host countries (a 25 percent increase in the possible range between one and five) induces affiliates to decentralize by a rank of 0.13 which is 3.25 percent. In other words, multinational parent firms in Austria and Germany appear not to delegate responsibility in decision-making to their subsidiary managers in host countries with weak legal institutions, because they may fear that subsidiary managers will exploit the opportunity and misuse the firms' assets under their control when the likelihood of punishment by the legal system is low. Similarly, we find that *trust* facilitates decentralization. A ten percentage point increase in the share of people who trust others leads to an increase in the level of decentralization of 0.16 ranks which is four percent. The estimated coefficient of *hierarchical religion* contradicts the findings of Bloom, Sadun, and van Reenen (2009). We find that a larger proportion of the population in a country belonging to a hierarchical religion (believing in authority) favors decentralization rather than centralization. One possible explanation is that non-hierarchical religions such as the Protestant Christian church are not very prevalent

in Eastern Europe and the former Soviet Union. Therefore, the variable hierarchical religion may capture the total proportion of religious people in a country. In our sample, the correlation between these two variables is indeed 0.93. Note, however, that when the two variables are included separately in the estimation they cease to be significant.

Lastly, we show in columns (5) and (6) that the estimated coefficients of the variables on social capital are robust, when we instrument for parent firms' decentralization.

### 3.2 When Does Transplantation Happen?

The previous section has shown that multinationals are often able to imprint the level of decentralization on their foreign affiliates. At the same time, however, Table 1 shows that only 24 percent of foreign affiliates use the same organization as their parent firms. Why do multinationals transplant so infrequently? What determines whether or not multinationals transplant their business model across countries? Does this depend on "home-made", "host-made" or "organization-made" factors? In other words, are German firms better able to export their business culture abroad? Or is it the other way around and the likelihood to transplant does not depend on the natural advantage of the home market of multinationals but rather on how favorable host countries' markets are towards foreign affiliates with a different business model from that of domestic firms?<sup>6</sup> Or is the ability or willingness to transplant driven by the global business organization of the multinational corporation rather than the characteristics of home and host countries' markets? We examine these questions in Tables 8 to 11.

#### Transplantation via Organization

In Table 8 we estimate the probability of transplantation in a Probit model in which the dependent variable is a dummy variable *transplantation via organization*. The dummy takes a value of one if each corporate decision has the same hierarchical rank in foreign affiliates as in parent firms or if one corporate decision differs in rank. In this case the

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<sup>6</sup>Bloom, Sadun, and van Reenen (2009) indeed find that multinationals tend to operate with a different business model by being more decentralized than national firms.

organization is fully transplanted, otherwise (when more than one corporate decision differs in hierarchical rank) we consider the organization as not transplanted.<sup>7</sup>

In column (1) we estimate the baseline model including all variables determining the global business organization of the multinational corporation such as the level of *decentralization* of parent and subsidiary firms, *parent is subsidiary*, *number of affiliates*, *size of subsidiary*, *parent firms' ownership share* in the foreign affiliate and *distance*. We find that multinationals are more likely to transplant their business model to foreign affiliates in host countries when parent firms are more decentralized, the affiliates are larger and when multinationals have a larger number of affiliates (although the effect is nonlinear). Multinationals are, however, less likely to transplant when the affiliates are more decentralized and further away, when the parent firm is itself a subsidiary and when it has a larger stake in the subsidiary. The level of decentralization of the parent firm has an economically important effect on the likelihood to transplant. When the level of decentralization increases by one rank (the parent firm becomes more decentralized by 25 percent) then the probability to transplant the business model to the foreign affiliate increases by about 16 percentage points (for the partial effects of Table 8 see Table 9).

One variable stands out by virtue of its importance in the likelihood to transplant via organization, namely, the level of innovation of the *technology* transferred to foreign affiliates. When the parent firm transfers an innovative technology rather than a fully established or even outdated technology (the omitted category) then the probability to transplant the organization to subsidiary firms is increased by 40 percentage points. It appears that technology transfer and organizational transfer are complements and go together.<sup>8</sup>

Taken together the "organization-made" factors appear to be most important for the probability determining whether or not multinationals transplant their business model to foreign affiliates.

The positive and significant coefficient of the home country dummy *parent is located in Germany* rather than Austria does support the notion that "home-made" factors are

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<sup>7</sup>As a robustness check we also use softer versions of full transplantation of organization with very similar results.

<sup>8</sup>This corresponds to evidence in Acemoglu, Aghion, Lelarge, Reenen, and Zilibotti (2007); Bloom, Sadun, and van Reenen (2007). Bloom, Sadun, and van Reenen find that US firms do IT better than European firms because they are more decentralized, giving more flexibility and power to those workers that are implementing the technology.

**Table 8: Transplantation via Organization  
The Role of Competition, Contracts, and Religion**

Dependent Variable	Transplantation via Organization <sup>1</sup>					
	(1)	(2)	(3)	(4)	(5)	(6)
Decentralization of parent firm	0.75*** (0.00)	0.74*** (0.00)	0.79*** (0.00)	0.69*** (0.00)	0.79*** (0.00)	0.73*** (0.00)
Decentralization of subsidiary firm	-0.62*** (0.00)	-0.64*** (0.00)	-0.63*** (0.00)	-0.58*** (0.00)	-0.58*** (0.00)	-0.58*** (0.00)
Parent is located in Germany	0.51*** (0.00)	0.59*** (0.00)	0.50*** (0.00)	0.32* (0.09)	0.66*** (0.00)	0.20 (0.26)
Parent is a subsidiary	-0.24** (0.04)	-0.27** (0.02)	-0.37*** (0.00)	-0.39*** (0.00)	-0.40*** (0.00)	-0.33** (0.01)
Log (Size of subsidiary)	0.070* (0.08)	0.085** (0.05)	0.10** (0.02)	0.10** (0.04)	0.095** (0.04)	0.077* (0.10)
Number of affiliates	0.56*** (0.00)	0.60*** (0.00)	0.62*** (0.00)	0.57*** (0.00)	0.68*** (0.00)	0.58*** (0.00)
(Number of affiliates) <sup>2</sup>	-0.044*** (0.00)	-0.048*** (0.00)	-0.051*** (0.00)	-0.046*** (0.00)	-0.057*** (0.00)	-0.047*** (0.00)
Log (Distance)	-0.23*** (0.00)	-0.35*** (0.00)	-0.36*** (0.01)	-0.33*** (0.01)	-0.40*** (0.00)	-0.21** (0.01)
Parent's ownership share	-0.82*** (0.00)	-1.02*** (0.00)	-0.85*** (0.00)	-0.81*** (0.00)	-0.65** (0.01)	-0.76*** (0.01)
Technology is established <sup>2</sup>	0.40*** (0.01)	0.46*** (0.00)	0.56*** (0.00)	0.37** (0.03)	0.46*** (0.01)	0.38** (0.02)
Technology is innovative <sup>2</sup>	1.24*** (0.00)	1.22*** (0.00)	1.29*** (0.00)	1.27*** (0.00)	1.25*** (0.00)	1.32*** (0.00)
Many domestic competitors-subsidiary			0.72*** (0.00)			
Many domestic competitors-parent			-0.17 (0.30)			
Subsidiary market Lerner				0.045* (0.09)		0.039* (0.06)
Parent market Lerner				0.084*** (0.00)		0.086*** (0.00)
Many world competitors-subsidiary					0.43*** (0.01)	
Many world competitors-parent					-0.43*** (0.00)	
Contract enforcement						0.059 (0.60)
Trust						-0.87 (0.71)
Hierarchical religion						-0.46 (0.25)
Country dummies	NO	YES	YES	YES	YES	NO
Industry dummies (2d)	YES	YES	YES	YES	YES	YES
Observations	933	920	887	794	865	785
Pseudo R <sup>2</sup>	0.29	0.32	0.35	0.36	0.35	0.35

\* significant at 10%, \*\* significant at 5%, \*\*\*significant at 1%

Notes: Probit estimates with robust standard errors. P-values reported in parentheses. See Table 12 in Appendix A for the definition of variables.

<sup>1</sup> A dummy that takes a value of one if the organization is fully transplanted and zero otherwise. The organization is fully transplanted if each corporate decision obtained the same hierarchical rank for the parent firm as for the subsidiary firm or if only one corporate decision differs.

<sup>2</sup> *Technology is outdated* is the omitted category of *technology*.

**Table 9: Transplantation via Organization**  
**The Role of Competition, Contracts, and Religion: Marginal Effects<sup>1</sup>**

Dependent Variable	Transplantation via Organization <sup>2</sup>					
	(1)	(2)	(3)	(4)	(5)	(6)
Decentralization of parent firm	16.5	16.1	14.6	14.4	15.4	15.0
Decentralization of subsidiary firm	-13.7	-13.9	-11.6	-12.1	-11.2	-12.3
Parent is located in Germany	13.7	14.9	10.9	7.3	15.7	6.8
Parent is a subsidiary	-5.2	-5.8	-7.0	-8.1	-7.9	-7.6
Log (Size of subsidiary)	1.5	1.8	1.9	2.1	1.8	2.0
Number of affiliates	12.3	13.0	11.6	11.8	13.2	12.6
Number of affiliates <sup>2</sup>	-1.0	-1.0	-0.9	-1.0	-1.1	-1.0
Log (Distance)	-5.0	-7.7	-6.6	-6.9	-7.7	-6.4
Parent's ownership share	-18.1	-22.1	-15.7	-16.8	-12.6	-16.3
Technology is established <sup>3</sup>	8.5	9.6	9.7	7.3	8.4	7.9
Technology is innovative <sup>3</sup>	40.1	39.0	38.5	40.0	38.2	40.1
Many domestic competitors-subsidiary			13.6			
Many domestic competitors-parent			-3.1			
Subsidiary market Lerner				0.9		1.0
Parent market Lerner				1.8		1.8
Many world competitors-subsidiary					9.4	
Many world competitors-parent					-9.3	
Contract enforcement						0.8
Trust						0.0
Hierarchical religion						0.0
Country dummies	NO	YES	YES	YES	YES	NO
Industry dummies (2d)	YES	YES	YES	YES	YES	YES
Observations	933	920	887	794	865	785
Pseudo $R^2$	0.29	0.32	0.35	0.36	0.35	0.35

<sup>1</sup> Marginal effects at mean in percentage points for continuous variables and discrete changes from zero to one in percentage points for dummy variables based on Probit estimates with robust standard errors in Table 8. See Table 12 in Appendix A for the definition of variables.

<sup>2</sup> A dummy that takes a value of one if the organization is fully transplanted and zero otherwise. The organization is fully transplanted if each corporate decision obtained the same hierarchical rank for the parent firm as for the subsidiary firm or if only one corporate decision differs.

<sup>3</sup> *Technology is outdated* is the omitted category of *technology*.

also important for the likelihood to transplant. Multinational firms located in Germany rather than Austria are by some 15 percentage points more likely to transplant. This effect acts beyond and above the fact that German parent firms tend to be more decentralized than Austrian parent firms (which is already captured by the positive coefficient of decentralization of parent in the regression). Another important "home-made" factor is the level of competition and the exposure to trade in the home markets where headquarters' firms are located. It appears that more domestic competition in the parent firms' market increases the likelihood that transplantation takes place (as is suggested by *parent market Lerner*, but the firm level measure of competition *many domestic competitors* in the parent market is not significant at conventional levels). An

increase of *parent market Lerner* by ten percentage points increases the probability to transplant by eighteen percentage points. This effect of competition on the probability to transplant is beyond and above the effect of decentralization of parent firms on the probability to transplant. This result indeed suggests that Germany is the more favorable home market for transplantation.<sup>9</sup> Furthermore, we find that when parent firms face *many world competitors* rather than a few they are less likely to transplant by nine percentage points.

We turn now to the influence of "host-made" factors on the probability to transplant the organization to subsidiary firms in host countries. In column (2) of Table 8 we include the host country dummies in the regression which increase the pseudo  $R^2$  from 0.29 to 0.32, suggesting that "host-made" factors do play a role in explaining the probability to transplant. As in home countries, we expect the level of competition and trade in host countries to be important for the ability of multinationals to transplant. We indeed find this. The *Lerner* index and the firm level measure of *domestic competition* as well as *world competition* for the subsidiaries markets all indicate that transplantation is more likely when competition is tougher and trade exposure is stronger in host countries. An increase in the *subsidiary market Lerner* by ten percentage points increases the likelihood to transplant by nine percentage points and the probability to transplant is fourteen and nine percentage points, respectively, larger when the subsidiary firm faces many rather than few domestic and foreign competitors (see columns (3) to (5) of Table 9).

Interestingly, contracts, trust, and hierarchical religion appear not to affect the probability to transplant via organization (column (6)).

### **Transplantation via CEO**

Alternatively to transplanting via organization, the multinational firm may affect the business culture of the subsidiary firm by sending one or more managers from the parent firm to the host country to run the foreign affiliate. This seems to be a common practice, since more than 40 percent of foreign affiliates are run by CEOs of parent firms (see Table 1). We examine the probability of sending at least one manager to the foreign affiliate in Table 10 and 11.

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<sup>9</sup>Marin and Verdier (2007) show that more intense competition in the parents' markets has led parent firms to decentralize their organization. This finding is also in line with our first stage regression results in Table 6.



**Table 10: Transplantation via CEO  
The Role of Competition, Contracts, and Religion**

Dependent Variable	Transplantation via CEO <sup>1</sup>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Decentralization of parent firm	0.016 (0.88)	0.087 (0.41)	0.037 (0.74)	-0.085 (0.42)	0.012 (0.91)	0.0073 (0.95)	0.0045 (0.97)	0.0073 (0.95)
Decentralization of subsidiary firm	-0.34*** (0.01)	-0.44*** (0.00)	-0.40*** (0.00)	-0.22 (0.11)	-0.40*** (0.01)	-0.35** (0.01)	-0.34** (0.02)	-0.34** (0.02)
Parent is located in Germany	-1.08*** (0.00)	-1.29*** (0.00)	-0.95*** (0.00)	-0.98*** (0.00)	-1.41*** (0.00)	-1.44*** (0.00)	-1.48*** (0.00)	-1.50*** (0.00)
Log (Size of parent firm)	0.20*** (0.00)	0.24*** (0.00)	0.15** (0.02)	0.24*** (0.00)	0.27*** (0.00)	0.24*** (0.00)	0.25*** (0.00)	0.25*** (0.00)
Log (Size of subsidiary firm)	0.11* (0.06)	0.11** (0.05)	0.14** (0.03)	0.12** (0.05)	0.075 (0.19)	0.091* (0.08)	0.080 (0.13)	0.078 (0.13)
Number of affiliates	-0.083*** (0.01)	-0.10*** (0.00)	-0.085** (0.02)	-0.11*** (0.00)	-0.10*** (0.00)	-0.12*** (0.00)	-0.12*** (0.00)	-0.12*** (0.00)
Technology is established <sup>2</sup>	0.25 (0.17)	0.17 (0.35)	0.36* (0.08)	0.24 (0.19)	0.17 (0.34)	0.12 (0.50)	0.12 (0.49)	0.12 (0.51)
Technology is innovative <sup>2</sup>	0.67** (0.02)	0.67** (0.01)	0.80*** (0.01)	0.71** (0.01)	0.60** (0.03)	0.66** (0.02)	0.62** (0.02)	0.60** (0.03)
Many domestic competitors-subsidiary		-0.60*** (0.01)			-0.61*** (0.01)			
Many domestic competitors-parent		0.48** (0.03)			0.45** (0.04)			
Subsidiary market Lerner			-0.049* (0.10)					
Parent market Lerner			0.0095 (0.74)					
Many world competitors-subsidiary				-0.40* (0.06)				
Many world competitors-parent				-0.39* (0.06)				
Contract enforcement					-0.46*** (0.00)			
Trust						-0.28** (0.02)		
Hierarchical religion						0.81 (0.56)		
Country dummies	YES	YES	YES	YES	YES	NO	NO	NO
Industry dummies (3d)	YES	YES	YES	YES	YES	YES	YES	YES
Observations	552	549	480	547	549	559	559	559
Pseudo R <sup>2</sup>	0.24	0.26	0.23	0.26	0.27	0.24	0.25	0.25

\* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%

Notes: Probit estimates with robust standard errors. P-values reported in parentheses. See Table 12 in Appendix A for the definition of variables.

1. A dummy that takes a value of one if at least one manager is sent from the parent firm to the subsidiary firm and zero otherwise.

2. *Technology is outdated* is the omitted category of *technology*.

**Table 11: Transplantation via CEO  
The Role of Competition, Contracts, and Religion: Marginal Effects<sup>1</sup>**

Dependent Variable	Transplantation via CEO <sup>2</sup>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Decentralization of parent firm	-13.1	-17.1	-15.1	-8.5	-15.2	-13.3	-12.9	-13.0
Decentralization of subsidiary firm	0.6	3.3	1.4	-3.3	0.5	0.3	0.2	0.3
Parent is located in Germany	-32.8	-36.1	-28.1	-30.5	-37.5	-38.1	-38.6	-38.9
Log (Size of parent)	7.6	9.3	5.7	9.1	10.4	9.2	9.6	9.6
Log (Size of subsidiary)	4.1	4.3	5.1	4.5	2.9	3.5	3.0	3.0
Number of affiliates	-3.2	-3.9	-3.2	-4.3	-4.0	-4.6	-4.5	-4.5
Technology is established <sup>3</sup>	9.4	6.5	13.3	9.3	6.6	4.5	4.5	4.4
Technology is innovative <sup>3</sup>	26.2	26.3	31.0	27.8	23.5	25.8	24.2	23.5
Many domestic competitors-subsidiary		-22.8			-22.9	-18.2	-18.5	-18.6
Many domestic competitors-parent		18.2			17.1	16.0	16.1	16.2
Subsidiary market Lerner			-1.9					
Parent market Lerner			0.4					
Many world competitors-subsidiary				-14.9				
Many world competitors-parent				-15.3				
Contract enforcement					-17.8	-10.8	-11.9	-12.3
Trust						30.8		-50.8
Hierarchical religion							-21.6	-29.1
Country dummies	YES	YES	YES	YES	YES	NO	NO	NO
Industry dummies (3d)	YES	YES	YES	YES	YES	YES	YES	YES
Observations	552	549	480	547	549	559	559	559
Pseudo R <sup>2</sup>	0.24	0.26	0.23	0.26	0.27	0.24	0.25	0.25

<sup>1</sup> Marginal effects at mean in percentage points for continuous variables and discrete changes from zero to one in percentage points for dummy variables based on Probit estimates with robust standard errors in Table 10. See Table 12 in Appendix A for the definition of variables.

<sup>2</sup> A dummy that takes a value of one if at least one manager is sent from the parent firm to the subsidiary firm and zero otherwise.

<sup>3</sup> *Technology is outdated* is the omitted category of *technology*.

We run Probit regressions with the dependent variable *transplantation via CEO* which takes a value of one if at least one manager is sent from the parent firm to its subsidiary firm. Parent firms are more likely to send their own managers to run the affiliate firm when the parent and subsidiary firm is larger, when the parent firm is located in Austria rather than Germany, when the subsidiary firm is centralized and has little autonomy, when the multinational firm does not have too many affiliates and when the technology transferred to the foreign affiliate is innovative. Among these determinants, being an Austrian multinational which transfers a new technology to a foreign affiliate with little autonomy from the parent firm maximizes the chances that the multinational firm will send one or more CEOs to its foreign affiliate (see Table 11). As sending a manager is more likely when the subsidiary has little autonomy from the parent firm, the two ways of transplanting appear to be complements which reinforce each other in helping the parent firm to exert control over its subsidiary firm. In addition, it appears that Austrian multinationals are less likely to *transplant via organization* but rather imprint their business culture on their subsidiaries by sending CEOs.

We now turn to the influence of the market environment on the probability of sending a CEO to the subsidiary given in columns (2) to (4) of Tables 10 and 11. We start with the host countries' markets. More domestic competition in the subsidiary firms' markets (given by the *subsidiary market Lerner* and by the firm level measure *many domestic competitors*) as well as a stronger exposure to trade (measured by *many world competitors*) makes it less likely that the parent firms will send their own managers to run the subsidiary. A possible explanation is that when the subsidiary is faced with tough domestic and foreign competition, the local knowledge of the market becomes more important and hence local rather than foreign CEOs tend to be employed to run the subsidiary. Turning to the parent firms' markets, we find that more domestic competition favors engaging the parent firm's CEO in the foreign affiliate (at least according to the firm level measure of domestic competition), whereas a greater exposure to trade of the parent firm tends to make it less likely that the multinational will send its manager to the affiliate. A possible explanation for the latter result is given by the model of Marin and Verdier (2004) and the evidence in Marin (2009). With a greater exposure to trade in the parent firms' market a "war for manager talent" may be leading foreign firms to compete with incumbent firms for manager talent, making the available managers in the parent firms' market more scarce. This trade-induced scarcity of managers in the parent firms' market makes it less likely that parent firms will send additional managers to their affiliates in host countries.

The parent and subsidiary firm's market conditions are economically important for the probability of sending a CEO. *Many world competitors* at the parent market or *many domestic competitors* at the subsidiary market rather than few make it less likely by 15 to 23 percentage points that a manager is sent to the affiliate.

Interestingly, although the social capital variables do not change the probability to transplant the organization to the affiliate, they do affect the probability to send a manager to the affiliate. In host countries with working legal institutions and good contract enforcement it is less likely (and probably less important) that the multinational firm will send its own manager to control the subsidiary. A larger proportion of the population in the host countries belonging to hierarchical religion and thus believing in authority makes it also less likely that a parent firm's manager is employed in the subsidiary. One possible reason is that the belief in authority does not extend to foreign managers. Another possible explanation is that in countries with a larger proportion of religious people in the population it is less likely that workers shirk their duty and hence it is less important to exert control.

## 4 Conclusions

In this paper we investigate with unique data on 660 headquarters' firms in Austria and Germany with their 2200 foreign affiliates in Eastern Europe including the former Soviet Union countries the conditions under which foreign affiliates decentralize their decision-making and implement the business model of their multinational parent firms.

We find that one variable stands out in terms of importance for the level of decentralization of subsidiary firms, namely the level of decentralization of parent firms. We also identify other organizational variables as central in the decision to decentralize the subsidiary such as the size of the multinational corporation and whether the foreign affiliate is a horizontal rather than a vertical foreign direct investment. In addition, the competitive and trading environments in host countries play a role in the level of decentralization of subsidiaries. Interestingly, we find in contrast to the available empirical literature on national firms that multinational firms centralize their subsidiaries with more competition than national firms. The trade exposure, in turn, turns out to favor decentralization of the subsidiary. The effect of competition on the level of decentralization of the subsidiaries is robust to different measures of

competition. Moreover, the results remain unchanged when we deal with the possible problem of endogeneity of the parent's firm organization. We use the parent firms' level of competition in their home market as an instrument for their organization. Finally, we somewhat confirm the results of the importance of social capital for the level of decentralization found in a previous paper on national firms, namely, that trust and contract enforcement tend to facilitate decentralization.

In contrast to the decision to decentralize, the decision to transplant the business model to the foreign affiliate is more strongly affected by the market conditions in both the home and host country, whereas trust, contracts and religion in host countries appear to be less decisive. We examine two ways of transplanting the multinational business model to the foreign affiliate, one via transplanting the organization and one via transplanting the CEO. We find that tougher domestic and foreign competition in the subsidiary markets favors transplantation via organization but hinders transplantation via manager. Tougher domestic competition in the parent market, however, favors both types of transplantation whereas foreign competition in parent markets decreases the likelihood that multinationals transplant via organization as well as via CEO. Transplantation of organization and of CEO appear to be weak complements although German multinationals tend to go for transplanting via the organization and Austrian multinationals for transplanting via the CEO.

# Appendix A Data and Descriptives

**Table 12: Description of Variables and Data Sources**

Variable	Description
<b>1. Organization of the Multinational Corporation</b>	
<b>Organization of the Parent Firm</b>	
Decentralization of parent firm	mean of ranking between one (centralized) and five (decentralized) of several corporate decisions depending on whether the headquarters (centralized) or the divisional manager of the parent firm (decentralized) takes the decision; see Table 14 for a listing of corporate decisions
Parent is located in Germany	dummy that takes a value of one if the parent firm is located in Germany and zero otherwise
Parent firm's organization	categorical variable with four categories: parent is a family firm, parent is a subsidiary of a foreign MNE, parent is a subsidiary of domestic MNE and parent is a domestic MNE; a more detailed description of the categories follows
↔ Parent is a family firm	dummy that takes a value of one if the parent firm is a family firm (i.e. independent firm with subsidiaries only in Eastern Europe) and zero otherwise
↔ Parent is a subsidiary of foreign MNE	dummy that takes a value of one if the parent firm is a subsidiary of foreign multinational and zero otherwise
↔ Parent is a subsidiary of domestic MNE	dummy that takes a value of one if the parent firm is a subsidiary of domestic (Austrian/German) multinational and zero otherwise
↔ Parent is a domestic MNE	dummy that takes a value of one if the parent firm is a domestic (Austrian/German) multinational and zero otherwise
Parent is a subsidiary	dummy that takes a value of one if the parent firm is a subsidiary of a larger (foreign or domestic) multinational and zero otherwise
<b>Organization of the Subsidiary Firm</b>	
Decentralization of subsidiary firm	mean of ranking between one (centralized) and five (decentralized) of several corporate decisions depending on whether the headquarters of the parent firm (centralized) or the subsidiary manager (decentralized) takes the decision; see Table 14 for a listing of corporate decisions
Transplantation via organization	dummy that takes a value of one if the organization is fully transplanted from the parent firm to its subsidiary and zero otherwise; full transplantation means that either each corporate decision obtained the same hierarchical rank for the parent firm as for the subsidiary firm or only one corporate decision differs

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Variable	Description
Transplantation via CEO	dummy that takes a value of one if at least one manager is sent from the parent firm to the subsidiary and zero otherwise
Intra-firm trade	share of intra-firm imports from the subsidiary firm to the parent firm in parent sales
Parent's ownership share	parent firm's ownership share in the subsidiary firm
Distance	distance between the parent and the subsidiary firm in km
Horizontal investment	share of output sold by the subsidiary firm at its domestic market
Technology	categorical variable with three categories: technology is outdated, established, and new; a more detailed description of the categories follows
↔ Technology is outdated	dummy that takes a value of one if the technology of the investment project is fully established or outdated and zero otherwise
↔ Technology is established	dummy that takes a value of one if the technology of the investment project is relatively established and zero otherwise
↔ Technology is innovative	dummy that takes a value of one if the technology of the investment project is new and zero otherwise
Country dummies	country dummies for the location of subsidiary firm
Industry dummies (3d)	three-digit industry dummies for the subsidiary firm based on ISIC Rev. 3
Industry dummies (2d)	two-digit industry dummies for the subsidiary firm based on ISIC Rev. 3

## 2. Size of the Multinational Corporation

Size of parent firm	number of employees of parent firm
Size of subsidiary firm	number of employees of subsidiary firm
Number of affiliates	number of affiliates in Eastern Europe of parent firm; more than nine subsidiaries are coded as nine subsidiaries

## 3. Market Environment

### Competition

Many domestic competitors ↔ subsidiary/parent	dummy that takes a value of one if the subsidiary/parent firm has many competitors at the domestic market and zero otherwise
Lerner ↔ subsidiary/parent market	for a three-digit ISIC Rev. 3 industry $j$ of country $k$ :

$$\text{Lerner}_{jk} = \left( 1 - \frac{1}{N_{jk}} \sum_{i \in jk} \frac{\text{profit before taxes}_i}{\text{operating revenue}_i} \right) * 100\%,$$

where  $N_{jk}$  denotes the number of firms  $i$  in industry  $j$  of country  $k$ ; a simple

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Variable	Description
	average over the years 1996 to 2000 is taken in addition; parent market and subsidiary market Lerner denotes the Lerner index calculated for host countries and for Austria/Germany, respectively
	<i>Data source: AMADEUS database (Bureau van Dijk, 2005)</i>
<b>Trade</b>	
Many world competitors ↔ subsidiary/parent	dummy that takes a value of one if the subsidiary/parent firm has many competitors worldwide and zero otherwise
Import share	total imports divided by domestic production at the three-digit ISIC Rev. 3 level in host countries and averaged over the years 1996 to 2000; when the three-digit level information is missing, the two-digit ISIC level is used
Export share	total exports divided by domestic production at the three-digit ISIC Rev. 3 level in host countries and averaged over the years 1996 to 2000; when the three-digit level information is missing, the two-digit ISIC level is used
	<i>Source of trade data: WITS - UN COMTRADE database (World Bank, 2009)</i> <i>Source of production data: INDSTAT 4 (three-digit), STAN (two-digit) database (UNIDO, 2008; OECD, 2009)</i>
Tariffs	average effective tariffs on imports in host countries over the years 1996 to 2000 at the three-digit ISIC Rev. 3 level; when the three-digit level information is missing, the two-digit ISIC level is used
	<i>Data source: WITS - TRAINS database (World Bank, 2009)</i>
<b>Social Capital in Host Countries</b>	
Contract enforcement	mean of ranking between one (important) and five (not important) factors affecting contract enforcement; these factors include the risk of profit transfer, exchange rate volatility, expropriation, changes in taxes resp. tariffs, property rights, macro-economic instability, political turnaround, corruption, crime and mafia, and banking sector collapse
Trust	proportion of people that answer "Most people can be trusted" to the question: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?"
	<i>Data source: World Values Survey, wave 1995–1999 (WVS Organization, 2009)</i>
Hierarchical religion	proportion of people that list a hierarchical religion (Roman Catholic, Greek Catholic, Orthodox, Islam, Gregorian or Armenian Apostolic Church) to the question: "Do you belong to a religious denomination? If yes: Which one?"
	<i>Data source: World Values Survey, wave 1995–1999 (WVS Organization, 2009)</i>

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Notes: If not reported otherwise, the data come from a survey of 660 German and Austrian firms with 2200 investment projects in Eastern Europe, conducted by the Chair of International Economics at the University of Munich.



**Table 13: Descriptive Statistics**

Variable	Obs.	Mean	Min	Max	Std. Dev.	Obs. with dummy = 1
<b>1. Organization of the Multinational Corporation</b>						
<b>Organization of the Parent Firm</b>						
Decentralization of parent firm	1472	2.81	1	5	0.84	.
Parent is located in Germany	2123	0.56	0	1	0.50	1186
Parent is a family firm	2123	0.16	0	1	0.36	333
Parent is a subsidiary of foreign MNE	2123	0.18	0	1	0.38	372
Parent is a subsidiary of domestic MNE	2123	0.31	0	1	0.46	657
Parent is a domestic MNE	2123	0.36	0	1	0.35	761
Parent is a subsidiary	2123	0.48	0	1	0.50	1029
<b>Organization of the Subsidiary Firm</b>						
Decentralization of subsidiary firm	1388	2.95	1	5	0.69	.
Transplantation via organization	1335	0.24	0	1	0.43	318
Transplantation via CEO	751	0.41	0	1	0.49	306
Intra-firm trade	1934	0.021	0	1	0.090	.
Parent's ownership share	2093	0.86	0	1	0.23	.
Distance	2122	903.04	17	6000	799.24	.
Horizontal investment	1981	0.82	0	1	0.36	.
Technology is outdated	1826	0.32	0	1	0.47	585
Technology is established	1826	0.60	0	1	0.49	1099
Technology is innovative	1826	0.08	0	1	0.27	142
<b>2. Size of the Multinational Corporation</b>						
Size of parent firm	1993	6970.20	1	233000	25233.78	.
Size of subsidiary firm	1921	346.61	1	49000	1660.02	.
Number of affiliates	2123	5.41	1	9	3.01	.
<b>3. Market Environment</b>						
<b>Competition</b>						
Many domestic competitors-subsidiary	1978	0.46	0	1	0.50	900
Many domestic competitors-parent	2058	0.46	0	1	0.50	940
↔ Austria	936	0.45	0	1	0.50	424
↔ Germany	1122	0.46	0	1	0.50	516
Subsidiary market Lerner	1900	96.57	54.73	124.56	4.42	.
Parent market Lerner	2053	93.68	73.15	121.58	6.14	.
↔ Austria	890	92.83	77.52	121.58	6.58	.
↔ Germany	1163	94.32	73.15	119.61	5.69	.
<b>Trade</b>						
Many world competitors-subsidiary	1938	0.29	0	1	0.45	563
Many world competitors-parent	2010	0.73	0	1	0.45	1463
↔ Austria	934	0.72	0	1	0.45	675
↔ Germany	1076	0.73	0	1	0.44	788
Import share	827	0.67	0.0028	23.74	1.18	.
Export share	843	0.53	0.0039	25.17	1.07	.
Tariffs	875	10.17	0	246.08	19.37	.
<b>Social Capital in Host Countries</b>						
Contract enforcement	2064	3.73	1	5	0.71	.
Trust	2101	0.23	0.082	0.52	0.045	.
Hierarchical religion	2100	0.68	0.17	0.98	0.21	.

## Appendix B Corporate Decisions

Table 14: Corporate Decisions in Subsidiary and Parent Firms

Corporate decision <sup>1</sup>	Mean level of decentralization <sup>2</sup>	
	Subsidiary firms	Parent firms
on acquisitions	1.41	1.34
on a new strategy	1.88	1.90
on transfer prices	2.43	2.45
financial decisions	2.54	1.90
on R&D expenditure	2.58	2.79
on budget	2.72	2.70
to introduce a new product	2.80	2.76
to hire 20 new workers	2.82	2.51
to change of a supplier	3.23	3.09
on product price	3.75	3.48
on wage increase	4.10	3.45
to hire two new workers	4.26	3.67
to hire a new secretary	4.65	4.15

<sup>1</sup> The corporate decisions listed were collected for both German and Austrian parent firms as well as all subsidiary firms and are sorted from the most centralized to the most decentralized based on subsidiaries.

<sup>2</sup> Mean over the rank of one to five with one (centralized) in which solely the headquarters of the parent firm take the decision and five (decentralized) in which the decision is delegated to the divisional manager (parent firm) or to the subsidiary manager (subsidiary firm).

Table 15: Similarity of Corporate Decisions between Subsidiaries and Parent Firms

Subsidiaries with decision:	Panel A			Panel B			Panel C					
	same	different	more centralized	more centralized	more decentralized	more centralized	more decentralized	Similarity index <sup>2</sup> =				
	=0	≠ 0	<0	>0	-4	-3	-2	-1	1	2	3	4
Decision <sup>1</sup> on acquisitions	1008	288	151	137	2	1	23	125	61	46	8	22
	78%	22%	12%	11%	0%	0%	2%	10%	5%	4%	1%	2%
to hire a new secretary	897	387	90	297	9	0	34	47	80	53	48	116
	70%	30%	7%	23%	1%	0%	3%	4%	6%	4%	4%	9%
to hire two new workers	820	468	77	391	1	2	11	63	123	136	55	77
	64%	36%	6%	30%	0%	0%	1%	5%	10%	11%	4%	6%
to change a supplier	714	448	159	289	20	13	38	88	203	46	7	33
	61%	39%	14%	25%	2%	1%	3%	8%	17%	4%	1%	3%
on transfer prices	660	417	208	208	22	32	52	102	116	58	6	28
	61%	39%	19%	19%	2%	3%	5%	9%	11%	5%	1%	3%
on budget	793	520	256	264	4	8	129	115	119	121	13	11
	60%	40%	19%	20%	0%	1%	10%	9%	9%	9%	1%	1%
to hire 20 new workers	752	521	146	375	0	31	45	70	160	174	25	16
	59%	41%	11%	29%	0%	2%	4%	5%	13%	14%	2%	1%
to introduce a new product	661	532	266	266	16	35	69	146	108	110	20	28
	55%	45%	22%	22%	1%	3%	6%	12%	9%	9%	2%	2%
on wage increase	699	574	137	437	12	12	53	60	115	134	59	129
	55%	45%	11%	34%	1%	1%	4%	5%	9%	11%	5%	10%
on product price	659	570	212	358	17	44	66	85	125	134	42	57
	54%	46%	17%	29%	1%	4%	5%	7%	10%	11%	3%	5%
on a new strategy	702	588	298	290	6	12	112	168	173	106	5	6
	54%	46%	23%	22%	0%	1%	9%	13%	13%	8%	0%	0%
financial decisions	610	556	113	443	0	12	40	61	174	130	71	68
	52%	48%	10%	38%	0%	1%	3%	5%	15%	11%	6%	6%
on R&D expenditure	235	49%	141	89	11	16	61	53	30	40	14	5
	51%	49%	30%	19%	2%	3%	13%	11%	6%	9%	3%	1%

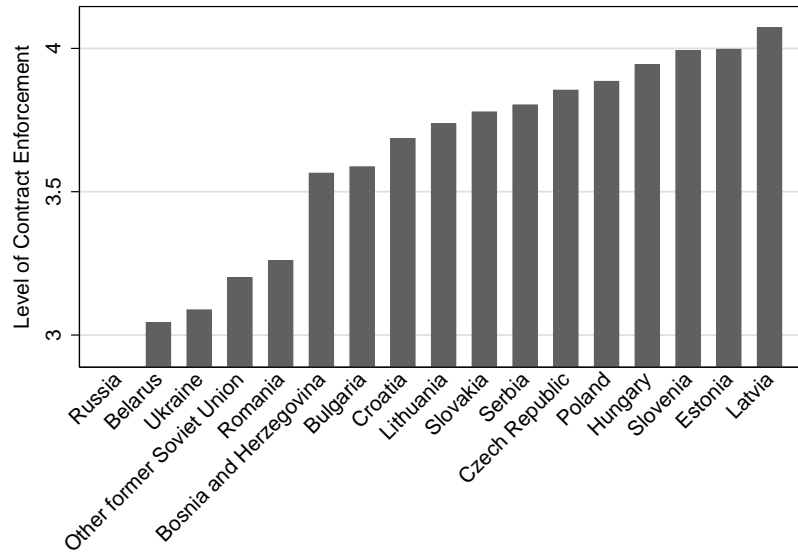
Notes: The table reports absolute number of subsidiary firms and percent of subsidiary firms.

<sup>1</sup> Corporate decisions are sorted from the most similar decisions in subsidiary firms compared with parent firms to the least similar decisions.

<sup>2</sup> The similarity index is computed as the hierarchical level at which the decision is taken in the subsidiary firm minus the hierarchical level at which the decision is taken in the parent firm. Since the possible hierarchical levels are 1, 2, ..., 5 for both the parent and the subsidiary firm, the similarity index takes values in the interval (-4, 4).

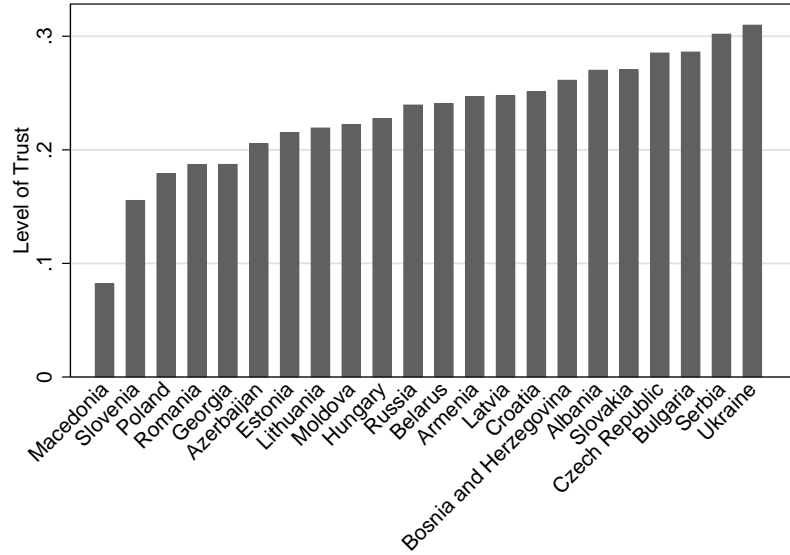
## Appendix C Market Environment in Host Countries

Figure 5: Level of Contract Enforcement in Host Countries



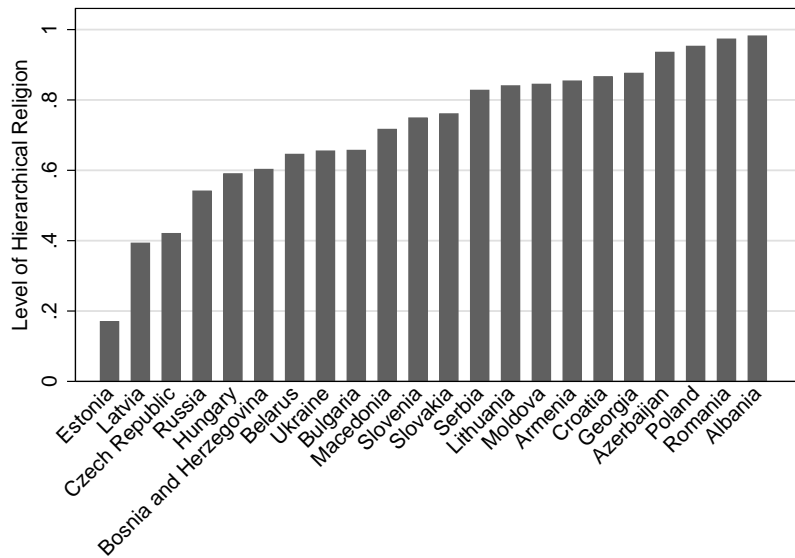
Notes: The level of contract enforcement is as a mean of ranking between one (important) and five (not important) factors affecting contract enforcement; these factors include the risk of profit transfer, exchange rate volatility, expropriation, changes in taxes resp. tariffs, property rights, macro-economic instability, political turnaround, corruption, crime and mafia, and banking sector collapse. "Other former Soviet Union" refers to Armenia, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan and Uzbekistan. The aggregation achieves at least eight observations per bar.

**Figure 6: Level of Trust in Host Countries**



Notes: The level of trust is the proportion of people that answer "Most people can be trusted" to the question: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?"

**Figure 7: Level of Hierarchical Religion in Host Countries**



Notes: The level of hierarchical religion is the proportion of people that list a hierarchical religion (Roman Catholic, Greek Catholic, Orthodox, Islam, Gregorian or Armenian Apostolic Church) to the question: "Do you belong to a religious denomination? If yes: Which one?"

Table 16: Market Environment: Czech Republic and Hungary

ISIC Rev. 3 Classification	Czech Republic				Hungary			
	Import	Export	Tariffs	Lerner	Import	Export	Tariffs	Lerner
<b>A Agriculture, hunting and forestry</b>								
1 Agriculture, hunting and related service activities	0.16	0.06	4.26	101.34	0.06	0.11	20.15	96.55
2 Forestry, logging and related service activities	0.01	0.03	1.02	100.62	0.10	0.26	8.36	98.14
<b>B Fishing</b>								
5 Fishing, operation of fish hatcheries and fish farms	0.00	0.02	0.71	98.42	0.06	0.29	13.24	99.38
<b>C Mining</b>								
10 Mining of coal and lignite; extraction of peat	0.04	0.24	0.85	99.63	0.80	0.01	3.89	98.11
11 Extraction of crude petroleum and natural gas	1.10	0.01	0.00	93.07	14.76	0.00	0.69	95.12
12 Mining of uranium and thorium ores	0.00	.	.	108.21	.	.	.	.
13 Mining of metal ores	.	.	.	.	0.91	0.02	0.05	99.03
14 Other mining and quarrying	23.74	25.17	0.37	96.63	0.42	0.07	2.43	88.03
<b>D Manufacturing</b>								
15 Manufacture of food products and beverages	0.14	0.10	11.14	100.11	0.11	0.26	37.99	96.67
16 Manufacture of tobacco products	0.01	0.01	40.88	92.77	0.04	0.19	76.50	93.23
17 Manufacture of textiles	0.40	0.44	5.27	102.39	1.20	0.55	7.26	96.86
18 Manufacture of wearing apparel; dressing and dyeing of fur	0.19	0.31	5.14	100.28	0.26	0.80	10.05	90.23
19 Tanning and dressing of leather	0.43	0.37	5.00	102.93	0.88	0.84	6.96	92.28
20 Manufacture of wood and of products of wood and cork, except furniture	0.53	1.30	4.56	100.02	0.33	0.42	4.78	95.62
21 Manufacture of paper and paper products	0.27	0.21	6.70	102.45	1.02	0.43	5.11	94.97
22 Publishing, printing and reproduction of recorded media	0.28	0.26	4.06	99.05	0.14	0.06	4.76	93.84
23 Manufacture of coke, refined petroleum products and nuclear fuel	0.04	0.03	2.43	97.62	0.14	0.16	1.89	95.16
24 Manufacture of chemicals and chemical products	2.07	1.21	3.57	98.77	0.97	0.51	4.50	93.50
25 Manufacture of rubber and plastics products	3.29	2.58	5.18	98.10	0.71	0.40	9.69	93.40
26 Manufacture of other non-metallic mineral products	0.25	0.58	6.24	98.51	0.36	0.31	5.39	95.42
27 Manufacture of basic metals	0.20	0.20	3.66	101.77	0.79	0.50	3.73	94.38
28 Manufacture of fabricated metal products, except machinery and equipment					0.44	0.31	6.76	92.37
29 Manufacture of machinery and equipment n.e.c.	0.28	0.29	3.92	99.86	1.30	0.65	6.37	93.20
30 Manufacture of office, accounting and computing machinery	0.17	0.06	3.64	97.56	0.63	0.98	5.07	92.60
31 Manufacture of electrical machinery and apparatus n.e.c.	4.12	4.21	5.32	98.39	0.61	0.77	7.52	91.58
32 Manufacture of radio, television and communication equipment and apparatus	0.52	0.28	4.44	95.86	0.99	0.74	8.04	92.54
33 Manufacture of medical, precision and optical instruments, watches and clocks	0.63	0.27	4.66	97.58	1.03	0.49	6.42	92.37
34 Manufacture of motor vehicles, trailers and semi-trailers	0.37	0.58	6.86	99.71	0.56	0.70	9.60	91.71
35 Manufacture of other transport equipment	0.10	0.11	5.47	103.48	0.51	0.40	5.77	96.09
36 Manufacture of furniture; manufacturing n.e.c.	0.25	0.53	7.09	97.94	0.73	0.95	6.61	95.81
<b>E Electricity, gas and water supply</b>								
40 Electricity, gas, steam and hot water supply	0.01	0.02	0.28	99.66	0.03	0.03	0.00	98.37

Notes: Import, Export and Lerner stand for *import share*, *export share*, and *subsidiary market Lerner*, respectively. See Table 12 in Appendix A for the definition of variables.

<sup>1</sup> For the exact name of product see <http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=2>.

Table 17: Market Environment: Poland and Slovak Republic

ISIC Rev. 3 Classification	Poland				Slovak Republic			
	Import	Export	Tariffs	Lerner	Import	Export	Lerner	Lerner
<b>A Agriculture, hunting and forestry</b>								
1 Agriculture, hunting and related service activities	0.08	0.02	23.83	99.90	0.12	0.06	100.26	
2 Forestry, logging and related service activities	0.04	0.04	32.85	93.47	0.04	0.15	97.57	
<b>B Fishing</b>								
5 Fishing, operation of fish hatcheries and fish farms	0.13	0.09	9.20	94.35	1.40	0.51	.	
<b>C Mining</b>								
10 Mining of coal and lignite; extraction of peat	0.02	0.19	2.61	105.58	2.49	0.00	101.09	
11 Extraction of crude petroleum and natural gas	56.82	0.14	0.09	92.73	9.90	0.02	.	
12 Mining of uranium and thorium ores	.	.	.	.	.	.	.	
13 Mining of metal ores	.	.	0.53	92.04	5.00	0.25	.	
14 Other mining and quarrying	.	.	0.76	95.20	0.43	0.60	93.99	
<b>D Manufacturing</b>								
15 Manufacture of food products and beverages	0.09	0.10	42.90	98.96	0.23	0.12	99.05	
16 Manufacture of tobacco products	0.01	0.04	246.07	99.61	0.59	0.28	.	
17 Manufacture of textiles	1.03	0.36	6.82	98.59	1.53	0.65	97.42	
18 Manufacture of wearing apparel; dressing and dyeing of fur	0.15	0.75	15.30	95.96	0.27	1.09	101.34	
19 Tanning and dressing of leather	0.49	0.39	8.98	95.19	0.57	0.78	102.03	
20 Manufacture of wood and of products of wood and cork, except furniture	0.09	0.27	4.53	96.46	0.19	0.49	100.60	
21 Manufacture of paper and paper products	0.63	0.30	3.22	99.91	0.39	0.64	96.64	
22 Publishing, printing and reproduction of recorded media	0.09	0.04	2.98	92.62	0.23	0.23	97.63	
23 Manufacture of coke, refined petroleum products and nuclear fuel	0.07	0.07	4.36	103.88	0.08	0.16	94.52	
24 Manufacture of chemicals and chemical products	0.83	0.27	4.60	93.38	1.06	0.81	102.16	
25 Manufacture of rubber and plastics products	0.45	0.20	4.49	94.78	0.73	0.63	99.21	
26 Manufacture of other non-metallic mineral products	0.21	0.15	4.05	94.82	0.26	0.45	96.67	
27 Manufacture of basic metals	0.34	0.40	6.75	101.71	0.25	0.58	101.67	
28 Manufacture of fabricated metal products, except machinery and equipment	0.30	0.29	5.59	95.97	0.42	0.38	99.37	
29 Manufacture of machinery and equipment n.e.c.	0.98	0.29	3.66	98.03	1.15	0.71	101.24	
30 Manufacture of office, accounting and computing machinery	3.72	0.20	4.30	93.60	4.01	1.16	105.89	
31 Manufacture of electrical machinery and apparatus n.e.c.	0.56	0.46	3.78	95.73	0.82	0.70	102.48	
32 Manufacture of radio, television and communication equipment and apparatus	1.12	0.45	7.56	98.07	1.73	0.83	100.72	
33 Manufacture of medical, precision and optical instruments, watches and clocks	0.75	0.12	4.92	94.26	1.07	0.31	96.43	
34 Manufacture of motor vehicles, trailers and semi-trailers	0.68	0.36	8.41	97.50	0.85	1.16	96.45	
35 Manufacture of other transport equipment	0.22	0.49	4.55	102.62	0.56	0.75	97.81	
36 Manufacture of furniture; manufacturing n.e.c.	0.19	0.49	6.84	97.33	0.47	0.56	99.61	
<b>E Electricity, gas and water supply</b>								
40 Electricity, gas, steam and hot water supply	0.00	0.01	2.27	97.99	0.02	0.01	97.65	

Notes: Import, Export and Lerner stand for *import share*, *export share*, and *subsidiary market Lerner*, respectively. See Table 12 in Appendix A for the definition of variables.

1 For the exact name of product see <http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=2>.

2 Tariff data for the Slovak Republic are missing and therefore not reported.

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