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Do Multinationals Transplant Their Business Model?

Abstract

What determines whether or not multinational firms transplant the mode of organisation to other countries? We embed the theory of knowledge hierarchies in an industry equilibrium model of monopolistic competition to examine how the economic environment may affect the decision of multinational firms about transplanting the mode of organization to other countries. We test the theory with original and matched parent and affiliate data on the level of decentralization of 660 Austrian and German multinational firms and 2200 of their affiliate firms in Eastern Europe. We find that three factors stand out in promoting the multinational firm's decision to transplant the organisational form to the affiliate firm in the host country: a competitive host market, the human resource policy of the multinational firm, and when an innovative technology is transferred to the host country. These factors increase the respective probabilities of organizational transfer by 7, 21, and 24 percentage points.

JEL-Codes: D230, F120, F230, F610.

Keywords: organizational economics of multinational firms, trade and organisation, the theory of the firm, organizational transfer between countries.

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1 Introduction

When multinational firms invest abroad, they surprisingly often do not operate with the same organisational form as their parent firms in the home country. Table 1 documents for the first time that in 76.2 percent of foreign investments, multinational firms do not transplant their parent firms' mode of organisation to the affiliate firm in the host country, so that subsidiary firms in the host country operate with a different level of firm decentralization compared to their parent firms in the home country. The numbers shown in Table 1 are based on survey data we designed and collected on the level of decentralization of 660 Austrian and German multinational firms with 2200 of their affiliates in Eastern Europe.[1] We collected information on the level of decentralization of 13 corporate decisions in affiliate and parent firms, such as decisions on acquisitions, finance, budget, R&D, new strategy, firing of personnel, etc.[2] The measure of organisational transfer we use is based on the number of corporate decisions which are taken at the same level of decentralization in affiliate firms as in parent firms.

Table 1: ORGANIZATIONAL TRANSFER OF MULTINATIONAL FIRMS

	Percentage of Subsidiary Firms with	
	Identical or Similar[1]	Different[2]
	Level of Decentralisation as Parent Firms	
Austria	20.2%	79.8%
Germany	30.9%	69.1%
Total	23.8%	76.2%

Notes: For the listing of corporate decisions, see Table 7 in Appendix B.
[1] Identical or Similar: all corporate decisions are either taken at the same level of decentralisation in the subsidiary as in the parent firm or the level of decentralisation of one decision differs.
[2] Different: the level of decentralisation of two or more corporate decisions differs between the subsidiary and the parent firm.

Why are firm organisations so little transplanted? Why do the same firms use different organisations in different markets? Most of the literature on multinational firms assumes that multinational firms bring technology and organisational skills to the host countries. In a recent paper, Bloom, Van Reenen, and Sadun (2012) suggest that multinational firms are more decentralised than domestic firms because they take with them the more decentralised organisation from their parent firms when they invest in other countries. But the data on the frequency of exporting the organisational form

[1]For more details on the survey and the data, see Section 5.1

[2]For a full listing of corporate decisions and for the frequency of transplanting the level of decentralization of individual corporate decisions, see Table 7 and Figure 7 of Appendix B

to host countries documented in Table 1 does not suggest that organisational transfer can be taken for granted. Moreover, multinational firms may be more decentralised than domestic firms because they tend to be larger and more productive (Helpman, Melitz, and Yeaple (2004)). Furthermore, Marin and Verdier (2014,?) and Caliendo and Rossi-Hansberg (2012) show that larger firms more exposed to international trade are more decentralised.

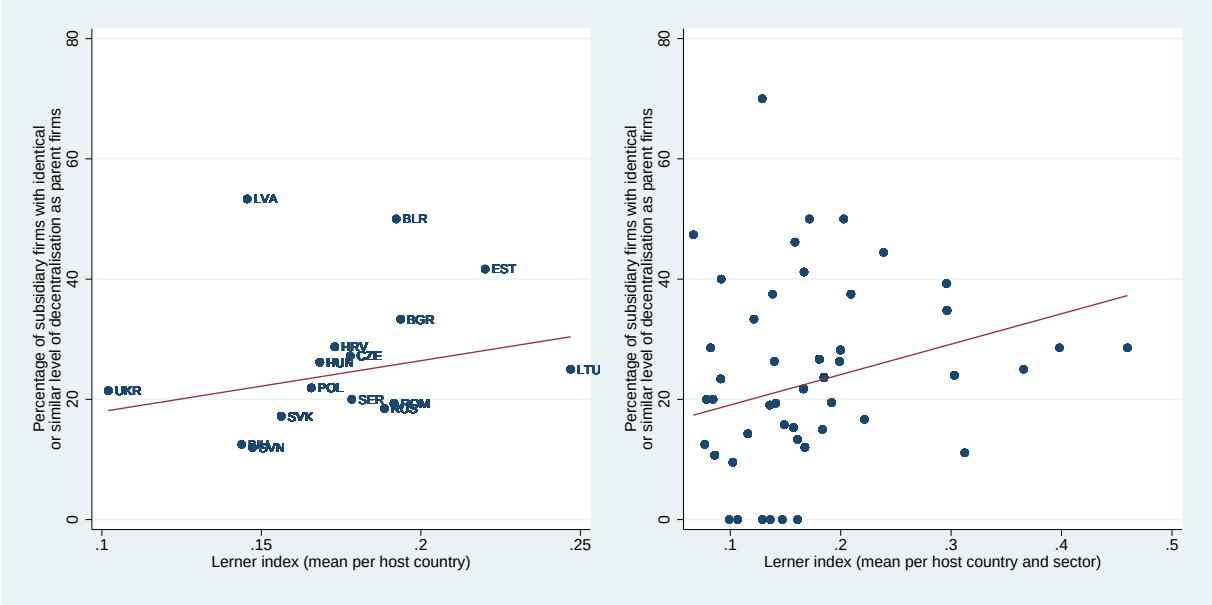
What then determines whether or not multinational firms transplant their mode of organisation to other countries? In this paper, we focus on the role of the economic environment in the decision to export the organisational form to other countries. We a priori expect firms to operate with the same organisational form in the countries they invest in. Presumably, once the firm has developed an organisational routine which serves it well, it might as well use this routine in other countries. One possible reason why this often does not happen is that the economic environment may force firms to adjust their organisational form to the conditions prevailing in these markets.

To get a first impression on whether the economic environment matters for the frequency of exporting the organisational form, we look in Table 1 at whether the size of the home market of multinational firms is correlated with the decision to transplant their mode of organisation. This is indeed the case. German multinationals, located in the larger economy, transplant their organisational form significantly more often than Austrian multinationals, located in the smaller home market. [3] Furthermore, in Figure 1 we show that the market competition in the host countries in Eastern Europe as measured by the Lerner index is correlated with the frequency with which the parent multinational firm, whether from Austria or Germany, brings the organisational form with them when they invest in these countries. The figure suggests that multinational firms transplant their organisational form more often to more competitive host markets. Equipped with this information, we proceed in this paper with a theory in which multinational firms' decisions to transplant their organisational form will be described as a function of the monopolistic competitive environment they face in the home market and in the host market. We then expose this theory to the survey data of 660 multinational firms and their 2200 affiliate firms in Eastern Europe.

We consider an economy in which multinational firms decide how to organise

[3]Austria has a population of 8 million people and Germany of 80 million people. In larger economies, firms earn larger profits but they tend to face more competition as the number of firms increase, see Melitz and Ottaviano (2008).

Figure 1: HOST COUNTRY COMPETITION AND THE DECISION TO TRANSPLANT THE LEVEL OF DECENTRALISATION



Notes: Vertical axis: percentage of subsidiary firms with identical or similar level of decentralisation as parent firms; horizontal axis: degree of market competition measured by the average Lerner index per host country (left panel) and per sector in a host country (right panel). The Lerner index is defined as $1-(P-MC)/P$ and an increase in the index indicates more competition. See Table 8 in Appendix B for more detailed definitions of the variables. The sectors are at the one-digit ISIC industry level. Observations with less than 7 subsidiary firms are excluded.

production in the parent firm in the home market and the affiliate firm in a host country. We follow a simplified version of Garicano and Rossi-Hansberg (2006) and model the organisation of multinational firms as a knowledge-based hierarchy in which the divisional managers in the parent firms and the affiliate firms deal with routine problems and headquarters (top managers) solve the exceptional problems. Divisional managers need to acquire knowledge to solve problems, which is costly. Therefore, it is efficient for the firm to let the top managers learn how to solve the more complex problems. The problem of the firm is to decide on the level of decentralisation to divisional managers. A more decentralised organisation of production allows the firm to save on top managerial wages and communication costs at the expense of larger training costs for the divisional managers.

We incorporate this model of knowledge hierarchies into a framework with monopolistic competition. Multinational firms and local firms decide whether or not to enter the two markets and they compete with one another in the home and host markets, respectively. Multinational firms have two options in the choice of organisation. They may use the same level of decentralization in the subsidiary as in the parent firm. In this case they transplant the organisation to the subsidiary firm.

Alternatively, multinational firms may choose different levels of decentralization for the parent and subsidiary firm. In this case they do not transplant the organisation. We solve for the industry equilibrium and we show that the decision to transplant the organisational form becomes a function of the economic environment multinational firms face in their home and host markets. In particular, the paper highlights how the trade-off between saving on coordination costs and adjusting to local market conditions interact with market competition in the home and host country of multinational firms.

Specifically, our model predicts that a more competitive home market leads multinational firms to transplant the organisational mode less frequently. Multinational firms weight the relative benefit to be closer to the optimal organisational form fitting the home market relative to the benefit of being closer to the one adapted to the foreign market. At the margin, the firm will lean towards the organisational form where the adjustment generates larger profits. In a more competitive home market, the home market profits weight relatively less than those from the foreign market, and the multinational firm does not transplant the organisational form to the subsidiary firm in the host market. In a more competitive host market it hurts the profits of the multinational firm less when its subsidiary firm operates with an organisational form which is not optimally adjusted to the host market conditions. When the subsidiary firm operates with the same level of decentralization as the parent firm (when the organisation is transplanted) each unit of output is sold with a lower profit margin, reducing total profits less when competition toughens in this market. This encourages the multinational firm to transplant the organisational form.

The model also predicts that multinational firms choose a more decentralised organization for the subsidiary firm and thus transplant the organization less often when communication costs between the parent and subsidiary firms increase to save on these costs. Finally, multinational firms, which reward workers' performance through salary increases and which transfer a more innovative technology are more likely to transplant the mode of organisation to the host country. Firms choose a more centralised organization for the subsidiary firm, which saves on the training costs of managers, and thus they will transplant the organization more often.

We confront the predictions of our theory with original firm survey data we collected and designed from 660 Austrian and German multinational parent firms with their 2200 affiliate firms in Eastern Europe. In the empirical analysis we examine the probability of transplanting the organisational form and we show that

the market environment variables and gravity factors are economically important for the probability of organisational transfer to host countries. When affiliate firms face an increase in the share of multinational competitors (our preferred measure of the toughness of competition) in their host markets by 10 percentage points, the probability of transplanting increases by 7 percentage points, while an increase in the share of multinational competitors in the home market by 10 percentage points lowers this probability by 9 percentage points. When the distance between the parent and affiliate firm (our proxy for communication costs) doubles the probability of transplanting the organisational mode declines by 8 percentage points. Moreover, multinational firms with human resource policies in place and those which transfer an innovative technology to the affiliate firms are 21 and 24 percentage points, respectively, more likely to transfer the organisational mode to the host country.

While there is a large economic literature which has examined the determinants of technology transfer between countries (for a recent survey, see Harrison and Rodriguez-Clare (2010)), research on organisational transfer between countries virtually does not exist. However, there is a large empirical literature in international business which emphasizes the tension between the adjustment to local market conditions and the transfer of the mode of organisation and of human resource management practices in multinational firms, see for example Florida and Kenney (1991).

Why does it matter how firms organize? Why should we care whether multinational firms transplant the organizational form to other countries? In a set of papers, Bloom and Van Reenen (2007) and Bloom, Sadun, and Van Reenen (2012) show using two measures of firm organization - management practices and the level of decentralization of decision making within the organization - that there is a wide variation in the way firms organize in the same industry. By examining how the competitive conditions in more than one market affects the organization of multinational firms we offer a novel explanation why we observe firm heterogeneity in organizational forms between firms. Depending on the market environment in both the host and home market multinational firms optimally adjusts the firm organization to that market which generates the largest profits. As a result, the organizational form of multinational firms in a particular host market may differ depending on the competitive conditions prevailing in the parent firm's home market.

Moreover, we offer a novel explanation why firms will move to a more centralized organization in response to more competition in the host market. Previous literature

suggests that in response to more competition firms decentralize their organization in order to encourage more initiative (Marin and Verdier (2008, 2012, 2014)) or to save on communication costs (Caliendo and Rossi-Hansberg (2012)). In our paper, multinational firms become more centralized because they adjust the organization to fit optimally the competitive conditions in the home market rather than the host market when the host market becomes less profitable.

Furthermore, our paper shows that multinational firms act as an agent of transfer of competitive conditions of one market to that of the other markets. The organizational choice of multinational firms affects the production costs and thereby acts as a transmission mechanism through which the competitive conditions in the host and home market are linked. The link is at work in spite of the fact that competition is segmented in the two markets, since we do not allow for international trade to take place.

Our paper contributes to a rapidly expanding literature showing how the organization of firms matter for several economic dimensions. Bloom and Van Reenen (2007) show that the organization of firms can explain the wide variation in productivity levels between firms and countries. Marin, Schymik, and Tscheke (2015) find that firms with a more decentralized organization provide incentives for product quality improving the export competitiveness of firms and countries in Europe. Garicano and Rossi-Hansberg (2006) and Marin and Verdier (2012) demonstrate that the firm organization matters for wage inequality between CEOs and workers. Song, Price, Guvenen, Bloom, and von Wachter (2018) and Bloom, Ohlmacher, and Tello-Trillo (2018) show how the firm organization can contribute to earnings inequality in the US.

Our paper is also related to previous research on organisations in international trade.[4] Helpman, Melitz, and Yeaple (2004) and Antras and Helpman (2004) focus on how firms' home productivity advantage determines the mode of organisation firms choose abroad. Antras, Garicano, and Rossi-Hansberg (2006) study the formation of teams between countries, Marin and Verdier (2008, 2012, 2014), Caliendo and Rossi-Hansberg (2012) and Conconi, Legros, and Newman (2012) examine how a greater exposure to international trade influences the organisational mode firms choose at home. More recently, an empirical literature on firm decentralisation has emerged with a focus on national firms. This literature examines the trend to decentralisation of US firms (Rajan and Wulf (2006)), how information technology (Bloom, Van Reenen,

[4]For an overview, see Helpman, Marin, and Verdier (2008) and Marin (2016).

and Sadun (2012); Acemoglu, Aghion, Lelarge, Van Reenen, and Zilibotti (2007)), international trade and competition (Marin and Verdier (2012, 2014), Guadalupe and Wulf (2010) and Caliendo, Monte, and Rossi-Hansberg (2015)), and trust and religion (Bloom, Van Reenen, and Sadun (2010)) affect the level of decentralisation of firms.

The paper is organised into the following sections. Section 2 to Section 4 describe the model. Section 5 contains the data and the empirical results and Section 6 concludes. The proofs of the main results and the description of the data are relegated to the Appendix.

2 A Generic Economy

Demand Side

Consider an economy with L consumers whose preferences are defined over a continuum of differentiated varieties indexed by $i \in \Omega$ and a homogenous good chosen as the numeraire. Preferences are given by

$$U = q_0 + \int_{i\in\Omega} q_i di - \frac{1}{2}\gamma \int_{i\in\Omega} q_i^2 di - \frac{1}{2}\left[\int_{i\in\Omega} q_i di\right]^2,$$

where q_0 and q_i are, respectively, the consumptions of the numeraire good and of variety i of the differentiated good.

Utility maximisation for a typical consumer provides demand for each variety i

$$d_i(p_i, \overline{p}) = \frac{1}{\gamma + N} - \frac{1}{\gamma}\, p_i + \frac{N}{\gamma + N}\frac{1}{\gamma}\, \overline{p}, \tag{1}$$

where $d_i(p_i, \overline{p})$ is the market demand for variety i, γ is the degree of product differentiation between varieties i, p_i is the price of variety i, and $\overline{p} = \frac{1}{N}\int_{i\in\Omega} p_i di$ is the average price index $\overline{p}$ in the differentiated good sector. The aggregate demand for variety i is simply $q_i(p_i, \overline{p}) = L d_i(p_i, \overline{p})$.

Supply Side

The numeraire good 0 is produced with constant returns to scale (one unit of good 0 requires one unit of labor) under perfect competition. Each variety of the differentiated good is produced under monopolistically competitive conditions. A given variety i is produced with marginal cost c_i. The equilibrium monopolistic profit level of a firm with cost c_i is :

$$\pi(c_i) = \frac{L}{4\gamma}\left[c_D - c_i\right]^2 \tag{2}$$

where c_D is a cutoff cost level

$$c_D = \frac{2\gamma}{2\gamma + N} + \frac{N}{2\gamma + N}\,\overline{c} \tag{3}$$

which is the cost level of a firm indifferent between remaining or leaving the industry. $\overline{c}$ is the average cost in the industry $\overline{c} = \frac{1}{N}\int_{i\in\Omega} c_i di$. Firms with cost $c_i < c_D$ earn positive profits. The cutoff cost level c_D captures the 'toughness' of competition in an industry. In this linear demand system (1), in addition to the taste for variety parameter γ, the markup is determined by the toughness of competition in the market induced either by a lower average costs $\overline{c}$ or a larger number of varieties N [5].

Knowledge Hierarchies

We turn now to the internal organisation of multinational firms and their subsidiaries in foreign markets. We consider the organisation of a multinational firm as a knowledge hierarchy as in Garicano (2000) and Garicano and Rossi-Hansberg (2006). Production is described as a problems solving and information processing activity in which there is a basic trade-off between communication and information access. The role of a hierarchy is to facilitate the acquisition of knowledge by increasing its utilisation rate. We use a simple version of this framework to extend the theory towards a setting with market competition and multinational firms.

Multinational firms choose the hierarchy of their organisation by taking the following considerations into account. There are two types of managers: production managers (that we alternatively also name divisional managers) who draw a unit measure of problems (or tasks or decisions) in [0, 1] per unit of time, and headquarters

[5] For more details, see Ottaviano, Tabuchi, and Thisse (2002).

managers who coordinate the production projects of the divisional managers and also help solve production problems that production managers are unable to solve. Production takes place only if all problems are dealt with by someone in the organisation and are coordinated at the level of the firm. We normalise to 1 the output per production manager and per unit of time once problems are solved. The problems are distributed according to a density function $f(z)$. Without loss of generality, the problems are ordered such that $f'(z) < 0$, i.e., more common problems have a lower index. Agents can only deal with a problem or task if they have the relevant knowledge.

The training cost of divisional managers acquiring the knowledge to deal with all problems with complexity less than z is $a_p z$. This cost may depend on the technology available to different agents, their skill, and local market conditions in the country where the agent is. The cost of training a divisional manager depends therefore on his autonomy z (the level of complexity of problems that he can solve). When that autonomy is reduced, so that the divisional manager has only the knowledge for dealing with the most common problems, i.e., those in $(0, z_p)$, he asks for help for the more complex problems (those with $z > z_p$) from top management who may solve the problem. We assume that top managers (headquarters) have the necessary skills to be able to solve problems for all tasks in $[0,\ 1]$[6].

The value of an additional layer of problem solvers is to reduce the cost of training workers to higher autonomy levels. The cost of hierarchy is the time wasted, since problem solvers do not produce output, but instead use their time to help divisional managers solve their problems.

Suppose then that the organisation must deal with q problems per unit of time. The team needs then $N_p = q$ divisional managers in layer 0 and M top managers (problem solvers) at headquarters. The profits generated by this hierarchy with N_p divisional managers, each receiving a wage w_p, and M top managers specialised in 'problem solving' receiving a wage w_m is

$$\pi = P(q)q - (w_p + a_p z_p)\, N_p - w_m M. \tag{4}$$

When the N_p divisional managers have autonomy z_p they must learn the z_p most common problems. It is also assumed that the learning technology is such that top managers know all the tasks that the production managers also know, and that

[6] In other words, $z_m = 1$.

the knowledge overlaps. Whenever the production managers confront problems or decisions for which they do not have enough information, so that they need help, a communication cost h (for a helping cost) per question posed must be incurred. The communication cost is only incurred when the problem could not be solved at first and help must be sought. These communication costs depend on the specifics of the organisational form and how agents interact in the organisation. In particular, the geographic distance between the divisional managers and the top managers matters.

A divisional manager can deal with a fraction $F(z_p)$ of the tasks and passes on $(1 - F(z_p)$ to a top manager in the headquarters who spends time $h(1 - F(z_p)$ helping each of the divisional managers assigned to him. Each top manager is endowed with 1 unit of time. Since there are N_p divisional managers, the time constraint of a particular top manager is given by

$$sh(1 - F(z_p)) = 1,$$

where s is the span of control, or ratio of divisional managers per top manager $s = N_p/M$. The top manager spends $sh(1 - F(z_p))$ time solving problems. It follows that the necessary number of top managers to deal with a firm of size N_p of divisional managers is simply given by

$$M = h(1 - F(z_p))N_p$$

This constraint determines a trade-off between what production managers can do and how many top managers are needed. The more knowledge is acquired by divisional managers, the smaller is $sh(1 - F(z_p))$ and the less top managers are needed.

Recalling that a given output level q necessitates $N_p = q$ divisional managers, the profits of the firm rewrites easily as

$$\pi = P(q)q - c(z_p)q.$$

with $c(z_p)$ the average cost of production given by:

$$c(z_p) = w_p + a_p z_p + h[1 - F(z_p)]w_m.$$

For a given level of output q, the problem of the multinational firm is to decide the degree of worker autonomy (z_p) to minimize average costs of production $c(z_p)$. This results in

$$-c_z(z_p) = 0. \tag{5}$$

The solution of this equation provides an optimal level of decentralisation of a multinational firm z_p^* [7]

or

$$z_p^* = f^{-1}\left[\frac{a_p}{hw_m}\right].$$

which depends on the training costs of production managers a_p, the top managers' wages w_m and the communication costs between top managers and divisional managers h. A more decentralised level of decentralization (larger value of z_p) allows a firm to save on top managerial wages and communication costs at the expense of larger training costs of divisional managers.

3 A Model of Transplanting the Level of Decentralization

We now embedd the model of knowledge hierarchies into an industry equilibrium with free entry. There is monopolistic competition between local firms and multinational firms acting in a home market H and a foreign market F. The two markets are segmented and do not engage in international trade with one another.

We assume that local firms (in H and F) do not have knowledge hierarchies (all production problems are solved at the bottom level) and that they are heterogenous in their productivity. More precisely, we assume that monopolistically competitive local firms pay a fixed set-up cost when entering their respective local markets. Then they draw a constant marginal cost of production c from a given cost distribution and decide (or not) to produce output with their drawn marginal cost.

Multinational firms compete on a product market as described in the previous section. To enter as global firms, they have to pay an entry cost to set-up a hierarchical structure with a parent firm in H and a subsidiary firm in F. Parent firms have a one-level hierarchical organization between the headquarters and divisional managers, subsidiary firms have a one-level hierarchical organisation between the headquarters in the parent firms and subsidiary managers.

Following the previous section, the marginal costs of the parent and the subsidiary

[7] Note that the optimal degree of decentralization does not depend on the output size of the firm. This is because we assume that there is no hiring constraints at each level of the firm hierarchy and a constant return to scale production function for output.

firms depend on the level of decentralization z between the headquarters and managers. Headquarters resides in the home country H only. For a given level of decentralization z in the multinational parent firm, the marginal costs of production of parent firms are $c_H^m(z) = w_p^H + a_p^H z + h[1 - F(z)]w_m$. w_p^H and a_p^H are the divisional managers' wages and training costs in the parent firm in H. w_m is the wage of headquarters managers. For a given level of decentralization between the headquarters and the subsidiary managers, the marginal costs of production of the subsidiary firms are $c_F^m(z) = w_p^F + a_p^F z + h[1 - F(z)]w_m(1 + \delta)$. w_p^F and a_p^F are the subsidiary managers' wages and training costs in F. The cost of communication between headquarters and subsidiary managers increase from h to $h\,(1 + \delta)$, because subsidiary managers reside in F different from the multinational headquarters (located in H).

The optimal level of decentralization in the parent firm in H may differ from that in the subsidiary firm in F. The optimal level of decentralization of the parent firm in H is given by

$$z_p^H = f^{-1}\left[\frac{a_p^H}{hw_m}\right] = \arg\min c_H^m(z)$$

The optimal level of decentralization of the subsidiary firm in F is

$$z_p^F = f^{-1}\left[\frac{a_p^F}{h\,(1+\delta)\,w_m}\right] = \arg\min c_F^m(z)$$

Multinational firms have two options. They may use the same level of decentralization z in the subsidiary firm in F as in the parent firm in H. We call this a 'transplant' strategy. Alternatively, the multinational firm may choose different levels of decentralization for the parent and subsidiary firm. We call this a 'no–transplant' strategy. Under the 'no-transplant' strategy the multinational firm adopts the level of decentralization z_p^H in the parent firm and z_p^F in the subsidiary firm. The parent firm operates then with the marginal costs $c_H^m(z_p^H) = c_H^m$ and the subsidiary firm produces with the marginal costs $c_F^m(z_p^F) = c_F^m$. However, the 'no-transplant' strategy involves an efficiency loss at the parent firm due to frictions in coordinating activities between firms with different organizational routines. This efficieny loss is assumed to increase the parent firms' costs by some factor $1 + \theta$. Under the 'transplant' strategy the multinational firm saves these coordination costs, but it prevents the firm to adjust its organization optimally to the market conditions prevailing in each local market.[8]

[8]The efficiency loss of two organizations within the same multinational firm may arise because the

3.1 Stage Game

To analyze the industry equilibrium in the home market (H) and the host market (F), we consider the following stage game structure:

- Stage 1 (entry stage):

m multinational firms decide to enter into the global economy, after drawing a fixed cost G of setting up a hierarchical structure in the parent firm in market H and in one subsidiary firm in market F. Multinational firms are heterogenous with respect to the set-up cost G. We assume that G is distributed according to a distribution with a cumulative function $\chi(.)$ defined on $[0, +\infty[$.

Local domestic firms and local foreign firms decide to enter in their respective local markets H and F. They pay a fixed set-up cost of entry of F_H and F_F, respectively. These firms draw a constant marginal cost of production c from a distribution with a cumulative function $\Lambda(c)$ defined on$[c_{\min}, c_{\max}]$. Given the realization of the production costs, they decide to operate or not on their respective markets. We denote n_H and n_F the active local domestic and foreign firms in their respective markets.

- Stage 2 (organizational stage):

Multinational parent firms m decide whether or not to transplant the organisation to the subsidiary firms. Under the 'transplant' strategy, z is constrained to be the same across markets and chosen optimally to maximize total profits of the multinational firm. Under the 'no transplant' strategy, the multinational firm implements z_p^H and z_p^F in markets H and F, respectively. Due to the efficiency loss of two organizations, the marginal costs of parent firms increase by $1+\theta$. We assume, however, that multinational firms are also heterogenous with respect to the efficiency loss of two organization. Some firms may be more flexible than others in dealing with diffferent organizational routines. We assume that the parameter θ is distributed on an interval $\left[0, \overline{\theta}\right]$ with a density distribution $g(\theta)$.

- Stage 3: (competition and production stage)

The multinationals firms compete in prices in both markets with local domestic firms N_H and foreign firms N_F.

same type of workers compare themselves across parent and subsidiary firms. Rewarding the same position differently within the same organization may reduce incentives of workers. Grossman and Helpmann (2008) describe this trade-off in a model of fair wages and foreign sourcing. In the early 2000s workers in the Volkswagen subsidiary in the Czech Republic ask for extraordinary large increases in wages, by pointing to the much higher wages comparable workers received in the Volkswagen parent company in Germany.

The model can be solved backwards. Stage 3 is obtained from the standard monopolistic competition model with heterogenous firms as outlined in section 2. In stage 2, the optimal level of decentralization is determined depending on the multinational strategy of 'transplant' or 'no transplant'. Moreover, it provides the equilibrium decisions of 'transplant' or 'no transplant' of multinational firms given the market structures in H and F. Stage 1 provides the free entry conditions for local domestic and foreign firms in their respective markets and the equilibrium number of multinational firms operating in the two markets.

The Optimal Organisation

We turn now to stage 2 in which multinational firms determine the optimal level of decentralization under the 'no-transplant' strategy and choose the optimal joint level of decentralization under the 'transplant' strategy.

The optimal organisation under the 'no-transplant' strategy When multinational firms do not transplant the level of decentralization to the subsidiary firm, they will choose $z_p^H = \arg\min c_H^m(z)$ for the parent firm in H and $z_p^F = \arg\min c_F^m(z)$ for the subsidiary firm in F.

The optimal organization under the 'transplant' strategy For a given level of decentralization z, total profits of multinational firms are

$$\pi\left(c_D^H, c_D^F, z\right) = \frac{L^H}{4\gamma}\left[c_D^H - c_H^m(z)\right]^2 + \frac{L^F}{4\gamma}\left[c_D^F - c_F^m(z)\right]^2$$

For given market toughness c_D^H and c_D^F in the two markets, the total profits of multinational firms under the 'transplant' strategy are given by:

$$\pi_T\left(c_D^H, c_D^F\right) = \max_{z\in[0,1]} \pi\left(c_D^H, c_D^F, z\right)$$

The first order condition for the joint organizational form z is

$$\frac{\partial \pi\left(c_D^H, c_D^F, z\right)}{\partial z} = -\frac{L^H}{2\gamma}\left[c_D^H - c_H^m(z)\right]\frac{\partial c_H^m}{\partial z} - \frac{L^F}{2\gamma}\left[c_D^F - c_F^m(z)\right]\frac{\partial c_F^m}{\partial z} = 0 \qquad (6)$$

We assume that $\pi\left(c_D^H, c_D^F, z\right)$ is a concave function of $z \in [0,1]$[9] and thus the second order condition $\partial^2\pi\left(c_D^H, c_D^F, z\right)/\partial z^2 < 0$ holds at the optimum value z^*.We assume further that the cost of communication between the headquarters and the subsidiary firm δ is sufficiently large so that $z_p^H < z_p^F$. Subsidiary firms have more management autonomy z_p^F than parent firms z_p^H when each optimally adjusts the organization to local market conditions.[10] We show in the appendix that the optimal joint level of decentralization z^* solution of (6) is such that $z_p^H < z^* < z_p^F$. Intuitively, the joint optimal organization under the 'transplant' strategy z^* lies between the optimal level of decentralization of the parent firm and the subsidiary firm, respectively.

Differenciating (6) we get $z^*\underset{- \quad +}{\left(c_D^H, c_D^F\right)}$. Under the 'transplant' strategy, multinational firms become more decentralized with tougher competition in H (smaller c_D^H) and they becomes more centralized with tougher competition in F (smaller c_D^F). Intuitively, the joint optimal level of decentralization z^* under the 'transplant' strategy weights the relative benefit to be closer to the optimal level of decentralizatin fitting the home market z_p^H relative to the benefit of being closer to the one adapted to the foreign market z_p^F. At the margin, the firm will lean more towards the level of decentralization where the adjustment generates larger profits. When competition becomes tougher in H, the profit margin of the home market weights relatively less than the one of the foreign market F. This induces z^* to be closer to z_p^F, the level of decentralization of market F which is more decentralized to begin with. Hence, the multinational firms choose to be more decentralized when competition becomes tougher in H. Conversely, when competition becomes tougher in F, it is more important for multinational firms to adjust the level of decentralization towards the one that best corresponds to the home market H with the larger profit margin. Given that the organization of the parent firm is more centralized to begin with, multinational firms choose to be more centralized when competition increases in F.

The preceding discussion can then be summarized in the following Proposition.

Proposition 1. *Under the 'transplant'-strategy multinational firms are more decentralized when competition in the home market increases and they are more centralized when competition in the host market increases.*

Proposition 1 implies that the marginal costs of production of parent and subsidiary firms become a function of the toughness of competition at home and abroad:

[9] This will be ensured when $c_H^m(z)$ and $c_F^m(z)$ are sufficiently convex in $z \in [0,1]$.

[10] We show in the empirical part of this paper that this assumption is supported by the data.

$$
\begin{aligned}
c_H^m(z^*) &= f^H(\underset{-}{c_D^H}, \underset{+}{c_D^F}) \\
c_F^m(z^*) &= f^F(\underset{+}{c_D^H}, \underset{-}{c_D^F})
\end{aligned}
$$

A smaller c_D^H induces z^* to be closer to the optimal level of decentralization of the foreign market z_p^F. This is bad news for the parent firm's costs which are now further away from the minimum cost level associated with z_p^H. Hence, $c_H^m(z^*)$ goes up when c_D^H goes down. At the same time, a smaller c_D^H is good news for the subsidiary firm's costs which are now closer to the minimum cost level associated with z_p^F. Hence, $c_F^m(z^*)$ goes down when c_D^H goes down. The other signs of variation can be understood by the same logic.

Furthermore, we make the following assumption:

Assumption T: $c_H^m(z^*) < c_{\min}$, $c_F^m(z^*) < c_{\min}$ and $\left(1+\overline{\theta}\right) c_H^m(z_p^H) < c_{\min}$

Assumption T states that multinational firms have a technological advantage compared to local firms in markets H and F, and produce with lower costs independently whether or not they transplant the organisation.

The Decision to Transplant the Level of Decentralization

We can now determine the conditions under which multinational firms will transplant the level of decentralization. Denote $x \in [0,1]$ as the fraction of multinationals which choose to transplant the level of decentralization. Consider then a generic multinational firm characterized by an efficiency loss under the 'no-transplant' strategy θ. This

multinational firms' profits write as :

$$\begin{aligned}\pi_T\left(c_D^H, c_D^F\right) &= \max_{z\in[0,1]} \frac{L^H}{4\gamma}\left[c_D^H - c_H^m(z)\right]^2 + \frac{L^F}{4\gamma}\left[c_D^F - c_F^m(z)\right]^2 \\ &\quad \text{for the 'transplant' strategy}\end{aligned}$$

$$\begin{aligned}\pi_{NT}\left(c_D^H, c_D^F, \theta\right) &= \frac{L^H}{4\gamma}\left[c_D^H - (1+\theta)\, c_H^m(z_p^H)\right]^2 + \frac{L^F}{4\gamma}\left[c_D^F - c_F^m(z_p^F)\right]^2 \\ &\quad \text{for the 'no-transplant' strategy}\end{aligned}$$

This multinational firm decides to transplant the organisation if anf only if

$$\pi_T\left(c_D^H, c_D^F\right) \geq \pi_{NT}\left(c_D^H, c_D^F, \theta\right)$$

This is equivalent to θ larger than some threshold θ^* given by $\pi_T\left(c_D^H, c_D^F\right) = \pi_{NT}\left(c_D^H, c_D^F, \theta^*\right)$ which rewrites as the following threshold condition:

$$\frac{L^H}{4\gamma}\left[c_D^H - c_H^m(z^*)\right]^2 + \frac{L^F}{4\gamma}\left[c_D^F - c_F^m(z^*)\right]^2 = \frac{L^H}{4\gamma}\left[c_D^H - (1+\theta^*)\, c_H^m(z_p^H)\right]^2 + \frac{L^F}{4\gamma}\left[c_D^F - c_F^m(z_p^F)\right]^2$$

or

$$\begin{aligned}&L^H\left[(1+\theta^*)\, c_H^m(z_p^H) - c_H^m(z^*)\right]\left[c_D^H - \tfrac{c_H^m(z^*) + (1+\theta^*) c_H^m(z_p^H)}{2}\right] \\ &= L^F\left[c_F^m(z^*) - c_F^m(z_p^F)\right]\left[c_D^F - \tfrac{c_F^m(z^*) + c_F^m(z_p^F)}{2}\right]\end{aligned} \tag{7}$$

In the Appendix, we show that condition (7) necessarily implies:

$$c_H^m(z^*) < (1+\theta^*)\, c_H^m(z_p^H). \tag{8}$$

Intuitively, for the threshold firm to be indifferent between the 'transplant' and the 'no-transplant' strategy, the production costs of the parent firm under the 'no transplant' strategy $(1+\theta^*)\, c_H^m(z_p^H)$ have to be larger than the production costs under the transplant' strategy $c_H^m(z^*)$. The subsidiary firm has lower cost of production under the 'no-transplant' strategy than under the 'transplant'strategy. Therefore, in order for multinational firms to be indifferent between the two strategies, it must be the case that parent firms have larger costs of production under the 'no-transplant' (ie. $(1+\theta^*)\, c_H^m(z_p^H) > c_H^m(z^*)$).

The threshold cost characterizing the decision to transplant is $\theta^* =$

$\theta\left(c_D^H, c_D^F, L^H, L^F\right)$. It depends on the toughness of competition in the two markets H and F, and on the market size L^H, L^F. The fraction of multinational firms with a 'transplant' strategy is

$$x = \int_{\theta^*}^{\bar{\theta}} f(\theta) d\theta = 1 - F(\theta^*) \tag{9}$$

We then have the following proposition:

Proposition 2. *i) Multinational firms transplant the level of decentralization less often when competition becomes tougher in the home market H:*

$$\frac{\partial \theta^*}{\partial c_D^H} < 0 \quad \frac{\partial x^*}{\partial c_D^H} > 0$$

ii) Multinational firms transplant the level of decentralization more often when competition becomes tougher in the host market F.

$$\frac{\partial \theta^*}{\partial c_D^F} > 0 \quad \frac{\partial x^*}{\partial c_D^F} < 0$$

iii) Multinational firms transplant the level of decentralization more often when the home market H is larger:

$$\frac{\partial \theta^*}{\partial L^H} < 0 \quad \frac{\partial x^*}{\partial L^H} > 0$$

iv) Multinational firms transplant the level of decentralization less often when the host market F is larger

$$\frac{\partial \theta^*}{\partial L^F} > 0 \quad \frac{\partial x^*}{\partial L^F} < 0$$

Proof. The threshold θ^* is given by the condition$\pi_T\left(c_D^H, c_D^F\right) = \pi_{NT}\left(c_D^H, c_D^F, \theta^*\right)$. Simple differentiation with respect to c_D^H, c_D^F. L^H and L^F provides:

$$\begin{aligned}
\frac{\partial \pi_T}{\partial c_D^H} - \frac{\partial \pi_{NT}}{\partial c_D^H} &= \frac{L^H}{2\gamma}\left[\left(1+\theta^*\right) c_H^m(z_p^H) - c_H^m(z^*)\right] > 0 \\
\frac{\partial \pi_T}{\partial c_D^F} - \frac{\partial \pi_{NT}}{\partial c_D^F} &= \frac{L^F}{2\gamma}\left[c_F^m(z_p^F) - c_F^m(z^*)\right] < 0
\end{aligned}$$

and

$$\frac{\partial \pi_T}{\partial L^H} - \frac{\partial \pi_{NT}}{\partial L^H} = \frac{1}{2\gamma}\left[(1+\theta^*)\, c_H^m(z_p^H) - c_H^m(z^*)\right]\left[c_D^H - \frac{c_H^m(z^*) + (1+\theta^*)\, c_H^m(z_p^H)}{2}\right] > 0$$

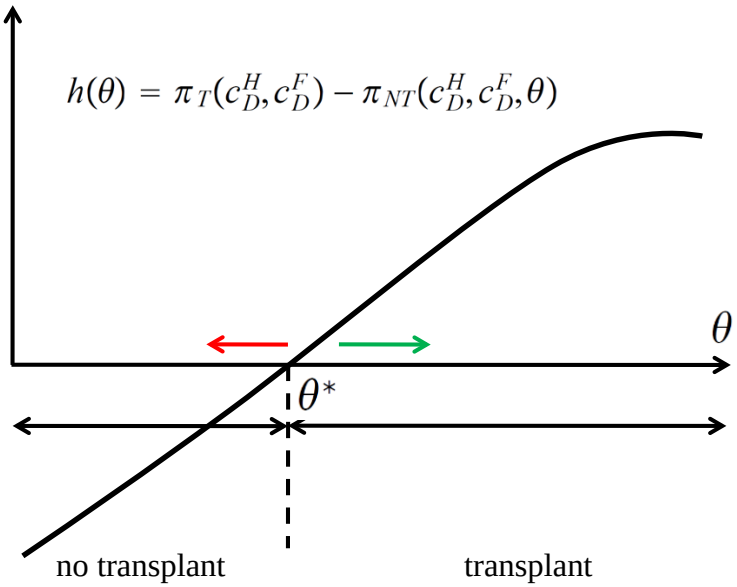
$$\frac{\partial \pi_T}{\partial L^F} - \frac{\partial \pi_{NT}}{\partial L^F} = \frac{1}{2\gamma}\left[c_F^m(z_p^F) - c_F^m(z^*)\right]\left[c_D^F - \frac{c_F^m(z^*) + c_F^m(z_p^F)}{2}\right] < 0$$

The proposition follows then immediately from the fact that $\pi_{NT}\left(c_D^H, c_D^F, \theta\right)$ is decreasing in θ and (9). □

Figure 2 illustrates the results and shows the curve $h(\theta) = \pi_T\left(c_D^H, c_D^F\right) - \pi_{NT}\left(c_D^H, c_D^F, \theta\right)$ as a function of θ. When $\theta = 0$, there is no cost of having two different organizations in the multinational parent and the subsidiary firm. Hence, the 'no transplant' strategy generates larger aggregate profits and $h(0) < 0$. When θ is sufficiently large, the efficiency costs of having two organizations become too large. For sufficiently large θ, the 'transplant' strategy is preferred and $h(\theta)$ becomes positive. There is a unique threshold θ^* satisfying condition (9) above which the multinational firm transplants the organisation.

The effect of an increase in the toughness of competition in the home market (lower c_D^H) is shown in Figure 3. Lower c_D^H shifts the $h(\theta)$-curve downward and the threshold θ^* increases with a lower fraction of multinational firms transplanting the level of decentralization to the subsidiary firm. Similarly, lower c_D^F shifts the $h(\theta)$-curve upwards with a larger fraction of multinational firms transplanting.

Figure 2: THE DECISION TO TRANSPLANT THE ORGANISATION



4 The Industry Equilibrium

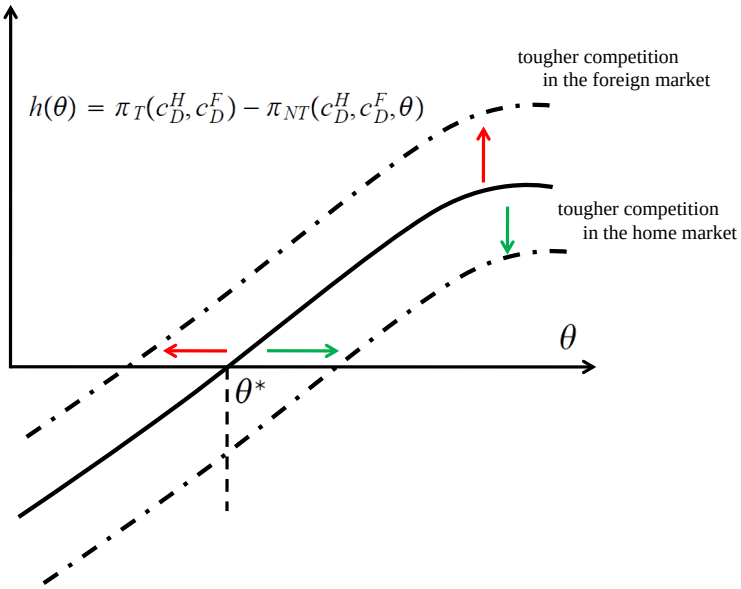
We now solve for stage 1 and describe the industry equilibrium with free entry of n^H local domestic firms, n^F local foreign firms, and m multinational firms operating in both markets. We first characterize the equilibrium conditions linking the thoughness competition c_D^H and c_D^F in markets H and F, as implied by equilibrium 'transplanting' of multinational firms and the local market structures. Then, we solve for the free entry conditions of local domestic and foreign firms, as well as multinational firms.

4.1 The Transmission of Competition between Markets

Denote by $N^H = m + n^H$, the total number of firms competing in market H, the toughness of competition in the home market can be written as

$$c_D^H = \frac{\gamma + \int_{i \in \Omega_H} p_i di}{\gamma + N^H}$$

Figure 3: MARKET COMPETITION AND MULTINATIONAL TRANSPLANTING



After substituting the pricing equation $p_i = p(c_i) = \frac{c_D^H + c_i}{2}$ for each variety i produced in H, we obtain

$$c_D^H = \frac{2\gamma + n^H c_D^H + n^H \overline{c}_H + m\left(c_D^H + \overline{c}_H^m(\theta^*)\right)}{2\left(\gamma + n^H + m\right)}$$

where $\overline{c}_H\left(c_D^H\right)$ is the average cost of the local domestic firms, and $\overline{c}_H^m(\theta^*)$ the average cost of the multinational parent firms operating in H:

$$\overline{c}_H\left(c_D^H\right) = \frac{1}{n_H}\int_{i\in\Omega_H} c_i di = \int_0^{c_D^H} c\frac{d\Lambda(c)}{\Lambda(c_D^H)}$$

$$\overline{c}_H^m\left(\theta^*\right) = \left(\int_0^{\theta^*} f(\theta)(1+\theta)c_H^m(z_p^H)d\theta + \int_{\theta^*}^{\overline{\theta}} f(\theta)c_H^m(z^*)d\theta\right)$$

Thus, we get the toughness of competition c_D^H as the solution of the following equation:

$$c_D^H = \frac{2\gamma + n^H \overline{c}_H\left(c_D^H\right) + m\overline{c}_H^m(\theta^*)}{2\gamma + n^H + m}$$

For a reasonable distribution $\Lambda(c)$ of heterogeneity of local domestic firms [11], the equation defines implicitly the threshold level $c_D^H = c_D^H(\underset{+}{\theta^*}, \underset{+}{c_H^m(z^*)}, n_H, m)$ that is an

[11] It is sufficient to have that $\frac{d\overline{c}_H}{dc_D^H} < 1$. This will be the case when for instance $\Lambda(c)$ follows a

increasing function of $\theta^*$and the cost $c_H^m(z^*)$. The larger the threshold θ^*, the larger is the fraction of multinational firms with 'no transplant'. Therefore, the toughness of competition in this market becomes weaker (ie. c_D^H is larger) as parent firms with a 'no-transplant' strategy have larger marginal costs of production as they incur an efficieny loss of θ (recall condition (8)). Similarly, parent firms with larger costs of production under the 'transplant' strategy $c_H^m(z^*)$ lead to weaker competition in H and a larger value of c_D^H.

From Propositions 1 and 2 linking the cost function $c_H^m(z^*) = f^H(c_D^H, c_D^F)$ and the threshold $\theta^* = \theta^*(c_D^H, c_D^F)$ to the toughness of competition, we obtain a 'fixed point' condition that characterizes the equilibrium toughness of competition c_D^H in H

$$c_D^H = \Phi^H(\underset{-}{\theta^*}(\underset{-}{c_D^H}, \underset{+}{c_D^F}), \underset{-}{f^H}(\underset{-}{c_D^H}, \underset{+}{c_D^F}), n_H, m)$$

The condition shows a positive relationship between the toughness of competition in the home market $c_D^H = \Theta^H(\underset{+}{c_D^F}, n_H, m)$, and the toughness of competition in the foreign market c_D^F. An increase in the thougness of competition in F (lower c_D^F) influences the market conditions in H via two channels. First, according to Proposition 2, lower c_D^F leads to more multinational transplanting, which lowers the costs of parent firms (see condition (8)) increasing the competitive conditions in H. Second, from Proposition 1, tougher competition in F induces, for the inframarginal multinational firms with a 'transplant' strategy, a move to a more centralized organisation which is closer to the optimal organization fitting the home market. This way, the parent firms are now operating closer to their minimum costs which, in turn, increases the competitive conditions in H. For both reasons, more competition in F gets transmitted to more competition in H, and therefore a positive relationship between c_D^H and c_D^F.

Similarly, denote by $N^F = m + n^F$, the total number of firms competing in market F, the toughness of competition in the foreign market can be written as:

$$c_D^F = \frac{2\gamma + n^F \overline{c}_F\left(c_D^F\right) + m\overline{c}_F^m(\theta^*)}{2\gamma + n^F + m}$$

---

truncated Pareto law distribution:

$$\Lambda(c) = \begin{cases} 0 & \text{for } c \leq c_{\min} \\ \frac{(c-c_{\min})^k}{(c_{\max}-c_{\min})^k} & \text{for } c_{\min} \leq c \leq c_{\max} \\ 1 & \text{for } c_{\max} \leq c \end{cases}$$

with $k > 1$

with

$$\begin{aligned}\overline{c}_F\left(c_D^F\right) &= \frac{1}{n_F}\int_{i\in\Omega_F} c_i di = \int_0^{c_D^F} c\frac{d\Lambda(c)}{\Lambda(c_D^F)} \\ \overline{c}_F^m\left(\theta^*\right) &= \left(\int_0^{\theta^*} f(\theta)c_F^m(z_p^F)d\theta + \int_{\theta^*}^{\overline{\theta}} f(\theta)c_F^m(z^*)d\theta\right)\end{aligned}$$

$\overline{c}_F\left(c_D^F\right)$ is the average cost of the local foreign firms and $\overline{c}_F^m(\theta^*)$ the average cost of the subsidiary multinational firms operating in the foreign market. $c_D^F = c_D^F(\underset{-}{\theta^*}, \underset{+}{c_F^m}(z^*), n_F, m)$ is a decreasing function of θ^* and an increasing function of the cost $c_F^m(z^*)$. Linking the cost function $c_F^m(z^*) = f^F(c_D^H, c_D^F)$ and the threshold $\theta^* = \theta^*(c_D^H, c_D^F)$ to the market toughness condition, we obtain a fixed point condition that characterizes the equilibrium market toughness c_D^F in F:

$$c_D^F = \Phi^F(\theta^*(\underset{-}{c_D^H}, \underset{+}{c_D^F}), f^F(\underset{+}{c_D^H}, \underset{-}{c_D^F}), n_F, m)$$

leading to another positive relationship between the toughness of competition in the foreign market $c_D^F = \Theta^F(\underset{+}{c_D^H}, n_F, m)$ and the toughness of competition on the home market c_D^H. Tougher competition in H now spills over to more competition in F. The channels at work are similar to before. First, according to Proposition 2, lower c_D^H leads to less multinational transplanting, which lowers the costs of subsidiary firms in F (they are now operating with their minimum costs in the foreign market). Second, from Proposition 1, tougher competition in H induces, for the inframarginal multinational firms with a 'transplant' strategy, a move to a more decentralized organisation which is closer to the optimal organization fitting the foreign market. This way, the subsidiary firms are now operating closer to their minimum costs which, in turn, increases the competitive conditions in F. Note, that via their organizational choice of z^* multinational firms transmit the competitive conditions of one market to that of the other market. This way, the multinational firms' choice of organisation acts as a transmission mechanism through which the competitive conditions in the foreign and domestic markets are linked. The connection between the two markets is at work inspite of the fact that competition is segmented, since we do not allow for international trade to take place.

4.2 Free Entry

We now solve for the free entry conditions of domestic local and foreign firms and of multinational firms. The industry equilibrium can be characterized by the following set of conditions:

$$\begin{aligned} E\pi^H(c_D^H) &= \frac{L^H}{4\gamma}\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]^2 d\Lambda(c) - F_H = 0 \quad \text{free entry local domestic firms} \\ E\pi^F(c_D^F) &= \frac{L^F}{4\gamma}\int_{c_{\min}}^{c_D^F}\left[c_D^F - c\right]^2 d\Lambda(c) - F_F = 0 \quad \text{free entry local foreign firms} \end{aligned} \tag{10}$$

$$m = \chi(E\pi^m) \quad \text{free entry multinational firms} \tag{11}$$

The first two equations (10) are the free entry conditions for local domestic and foreign firms. Entry occurs as long as expected profits with positive production in each market matches the respective fixed costs of entry F_H and F_F.

Equation (11) characterizes the equilibrium number of multinational firms in both markets. The expected multinational firms' profit $E\pi^m$ to enter in both markets is

$$\begin{aligned} E\pi^m &= \int_0^{\theta^*} f(\theta)\pi_{NT}\left(c_D^H, c_D^F, \theta\right) d\theta + \int_{\theta^*}^{\bar{\theta}} f(\theta)\pi_T\left(c_D^H, c_D^F\right) d\theta \quad (12) \\ \text{with } \pi_T\left(c_D^H, c_D^F\right) &= \frac{L^H}{4\gamma}\left[c_D^H - c_H^m(z^*)\right]^2 + \frac{L^F}{4\gamma}\left[c_D^F - c_F^m(z^*)\right]^2 \\ \text{and } \pi_{NT}\left(c_D^H, c_D^F, \theta\right) &= \frac{L^H}{4\gamma}\left[c_D^H - (1+\theta)\, c_H^m(z_p^H)\right]^2 + \frac{L^F}{4\gamma}\left[c_D^F - c_F^m(z_p^F)\right]^2 \end{aligned}$$

Multinational firms with a set-up fixed cost G below the expected profit $E\pi^m$ enter in both markets. Given that G is distributed according to the cumulative function $\chi(.)$ defined on $[0, +\infty[$, (11) characterizes the equilibrium number of multinational firms in the industry equilibrium.

The toughness of competition in the two markets c_D^H and c_D^F, is jointly determined by[12]

[12] In the empirical part of the paper, we use the share of multinational firms in the market as our measure of the toughness of competition.

$$
\begin{aligned}
c_D^H &= \Theta^H(\underset{+}{c_D^F}, n_H, m) \qquad \text{domestic market competition} \\
c_D^F &= \Theta^F(\underset{+}{c_D^H}, n_F, m) \qquad \text{foreign market competition}
\end{aligned} \tag{13}
$$

The equilibrium threshold for transplanting the level of decentralization θ^* and the equilibrium level of decentralization under the 'transplant' strategy z^* are determined by

$$
\begin{aligned}
\theta^* &= \theta\left(c_D^H, c_D^F,\right) \qquad \text{equilibrium threshold for transplanting} \\
z^* &= z^*\left(c_D^H, c_D^F\right) \qquad \text{equilibrium level of decentralization under the 'transplant' strategy}
\end{aligned} \tag{14}
$$

The industry equilibrium is fully characterized by the set of equations ((10), (11), (12), (13), and (14).

The equilibrium is obtained recursively. First, the free entry condition for local firms provides the equilibrium toughness of competition c_D^H and c_D^F in the two markets:

$$
\begin{aligned}
\frac{L^H}{4\gamma}\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]^2 d\Lambda(c) &= F_H \quad \text{or } c_D^H = \sigma(\frac{4\gamma F_H}{L^H}) \\
\frac{L^F}{4\gamma}\int_{c_{\min}}^{c_D^F}\left[c_D^F - c\right]^2 d\Lambda(c) &= F_F \quad \text{or } c_D^F = \sigma(\frac{4\gamma F_F}{L^F})
\end{aligned}
$$

with $\sigma(x)$ defined as the solution of the following equation

$$
\int_{c_{\min}}^{\sigma}\left[\sigma - c\right]^2 d\Lambda(c) = x
$$

The equilibrium level of decentralization under the 'transplant' strategy $z^* = z^*\left(c_D^H, c_D^F\right)$ is immediately deduced. Then, the equilibrium threshold θ^* is obtained from (9) which can be rewritten as:

$$
\begin{aligned}
&L^H\left[(1+\theta^*)\,c_H^m(z_p^H) - c_H^m(z^*)\right]\left[c_D^H - \tfrac{c_H^m(z^*)+(1+\theta^*)c_H^m(z_p^H)}{2}\right] \\
&= L^F\left[c_F^m(z^*) - c_F^m(z_p^F)\right]\left[c_D^F - \tfrac{c_F^m(z^*)+c_F^m(z_p^F)}{2}\right]
\end{aligned} \tag{15}
$$

The equilibrium threshold θ^* and the cutoff costs c_D^H and c_D^F pin down the expected entry profits of a multinational firm $E\pi^m$. The equilibrium number of multinational firms m is obtained from the multinational free entry condition (11). From this and

the relationships $c_D^H = \Theta^H(c_D^F, n_H, m)$ and $c_D^F = \Theta^F(c_D^H, n_F, m)$ we get the equilibrium number of domestic firms n_H and foreign firms n_F which are consistent with the competitive conditions in both markets.

4.3 Market Size and Competition

We now examine how changes in the market environment affects the decision to transplant the organisation to the subsidiary firm in the host country. The comparative statics are summarized in the following proposition:

Proposition 3. *In the free entry industry equilibrium with domestic and foreign firms, the following comparative statics hold*

i) Multinational firms transplant the level of decentralization more often when the home market becomes larger (with an increase in L^H).

ii) Multinational firms transplant the level of decentralization less often when the host market becomes larger (with an increase in L^F).

iii) Multinational firms transplant the level of decentralization more often when competition in the home market becomes weaker (with larger fixed cost of entry F_H)

iv) Multinational firms transplant the level of decentralization less often when competition in the host market becomes weaker (with larger fixed cost of entry F_F)

v) The organization of multinational firms under the 'transplant' strategy becomes more decentralized (ie. z^* increases) when the home market becomes larger (increase in L^H), when the host market becomes smaller (a decrease in L^F), when competition in the home market becomes stronger (with smaller fixed cost of entry F_H), and when competition in the host market becomes weaker (with larger fixed cost of entry F_F).

Proof. In the Appendix. □

Intuitively, an increase in the size of the home market L^H has two effects. First, from part iii) of Proposition 2, an increase in L^H leads to more transplanting of the level of decentralization. Second, an increase in L^H leads to entry of local domestic firms and an increase in competition. From part i) of Proposition 2, an increase in

competition (lower c_D^H) leads to less organisational transplanting. It turns out, that the first effect dominates the second effect and thus an increase in L^H leads to more transplanting of the level of decentralization. Similarly, an increase in L^F leads to less organisational transplanting from part iv) of Proposition 2, but it leads via entry of local foreign firms (lower c_D^F) to more competition and thus from part ii) of Proposition 2 to more organisational transplanting. The first effect dominates the second, and as a result, an increase in L^F leads to less transplanting of the level of decentralization.

The intuition of parts iii) and iv) of the proposition is also straightforward. An increase in the fixed costs of entry of domestic firms F_H weakens competition and, thus, from part i) of Proposition 1 encourages organisational transplanting. Similarly, an increase in the fixed costs of entry of foreign firms F_F weakens competition and leads via part ii) of Proposition 1 to less organisational transplanting. The intuition of part v) comes from the fact that in an industry equilibrium tougher competition in both markets (lower c_D^H and lower c_D^F) is associated with a higher value of L^H and a lower value of F_H, respectively a higher value of L^F and a lower value of F_F and according to proposition 1, the level of decentralization of multinational firms under the 'transplant strategy' responds to the competitive conditions in H and in F.

4.4 Reverse Transplanting

We can use Proposition 3 to illustrate how a continuous change in one parameter affects the pattern of multinational transplanting and the reorganisation within the global multinational corporation. To fix ideas, we consider an increase in globalization, a continuous increase in the toughness of competition in H (a continuous decline in c_D^H). From Proposition 2 it holds that $\theta^* = \theta^*(c_D^H)$.In an industry equilibrium with free entry the threshold θ^* is a declining function of c_D^H. Figure 4 plots this threshold-curve for the marginal multinational firm which is indifferent between the 'transplant' and the 'no-transplant' strategy. The set of multinational firms with an efficiency costs θ to the right of the downward-sloping curve $\theta^*(c_D^H)$ and a low toughness of competition (large c_D^H) are adopting the 'transplant' strategy with the same level of decentralization z in the parent and subsidiary firm. The set of multinational firms with efficiency costs to the left of $\theta^*(c_D^H)$ and intense competition (small c_D^H) choose the 'no-transplant' strategy and disconnect the organisational routines in the parent and subsidiary firm.

To examine the reorganisation within the global multinational corporation in

response to changes in c_D^H we take the perspective of one specific multinational firm with an efficiency cost θ_A. In Figure 6 we show that for a tougness of competition of c_D^H above the threshold c_{AD}^H the multinational firm adopts the 'transplant' strategy, and for c_D^H below the threshold c_{AD}^H the firm shifts to the 'no-transplant' strategy. Above c_{AD}^H, the multinational firm implements under the 'transplant' strategy the common level of decentralization $z^*\left(c_D^H\right)$ that satisfies the FOC (6). This level lies in the interval $z_p^H \leq z^*\left(c_D^H\right) \leq z_p^F$. As competition in H increases (and c_D^H declines), the subsidiary firm's profits take a larger weight and $z^*\left(c_D^H\right)$ increases and becomes closer to z_p^F to better fit the host market conditions. Below c_{AD}^H, the multinational firm shifts to the 'no-transplant' strategy with the parent firms' level of decentralization of z_p^H and the subsidiary firms' z_p^F

Figure 4: MULTINATIONAL TRANSPLANTATION AND HOME MARKET COMPETITION

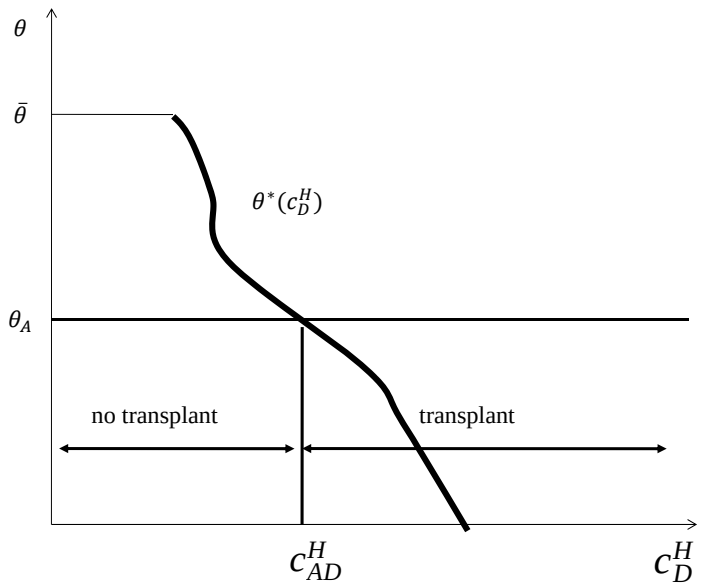
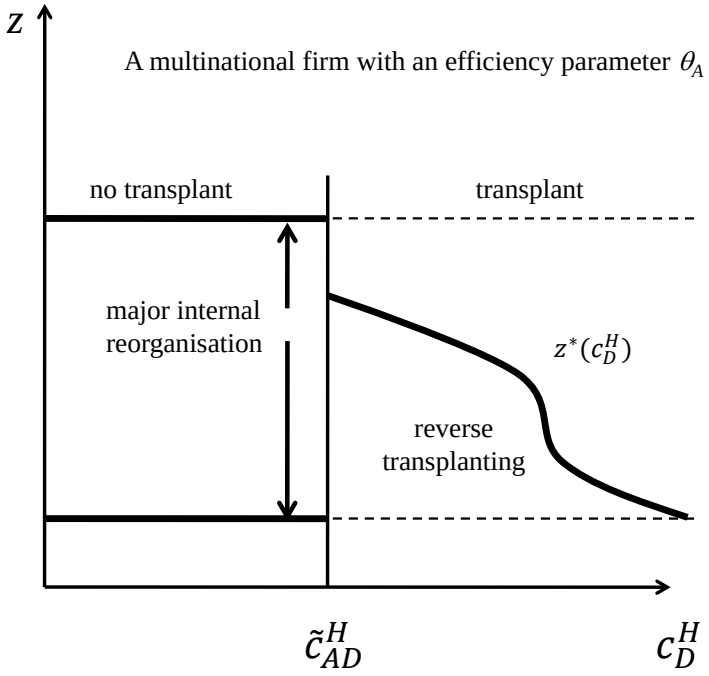


Figure 5: MULTINATIONAL TRANSPLANTATION AND HOME MARKET COMPETITION



Note that a shift of c_D^H induces an extensive and an intensive margin of reorganization. On the extensive margin, a decline in c_D^H increases the threshold θ^* determining which multinational firm shifts to the 'no-transplant' strategy. On the intensive margin, a decline in c_D^H affects the level of decentralization of the inframarginal multinational firm which adopts a 'transplant' strategy. For this multinational firm, a smaller c_D^H shifts the optimal $z^*\left(c_D^H\right)$ of the whole multinational corporation towards an organizational pattern that is optimally adjusted to the subsidiary firm's market conditions. This process can be seen as some kind of 'reverse transplanting' in which the parent firm's organization is modified to converge towards the optimal organisation of the subsidiary firm. This convergence process goes on until the multinational firm shifts to the 'no-transplant' strategy when c_D^H crosses the threshold c_{AD}^H. A major reorganisation in the multinational corporation follows when the parent's and the subsidiary's organisations become disconnected.

4.5 An Increase in Communication Costs

We now consider how changes in the cost of communication δ affect the strategy to transplant the organisation to the subsidiary firm in the host country. We summarize the findings in the following proposition.

Proposition 4. *An increase in communication costs between the headquarters and the subsidiary firm is a priori ambiguous on the decision to transplant the level of decentralization. When z_p^F is close to 1 and/or $c_F^m(z^*)$ is close to $c_F^m(z_p^F)$, a larger value of δ leads to less multinational transplanting in the free entry industry equilibrium.*

Proof. In the appendix. □

Intuitively, an increase in communication costs affects profits of the multinational firm via two channels. First, larger communication costs increase the cost of production of the subsidiary firms $c_F^m(z^*)$ and $c_F^m(z_p^F)$ under both organisations. Production costs increase less the more decentralized the subsidiary firm as it needs to ask for less help from the headquarters. Therefore, firms prefer a more decentralised subsidiary, which saves on the communication costs, and thus they will transplant the organization less often when δ raises. Second, an increase in δ translates into lower profits in the subsidiary firm. Profits decline less the lower the output of the subsidiary firm. The output of the subsidiary firm will be smaller when the organisation is transplanted

to the subsidiary firm (as the firm does not adjust optimally to the host market conditions.). Therefore, the multinational firm will prefer to shift to the 'transplant' strategy when δ increases. Overall, the effect of δ on profits is a priori ambigious. When the subsidiary firm is very decentralized under the strategy of 'no-transplant' (ie. z_p^F close to 1) and/or the cost increase in the subsidiary firm under the 'transplant' strategy is not too large (ie $c_F^m(z^*)$ close to $c_F^m(z_p^F)$) the first effect on profits dominates the second and the multinational firm prefers not to transplant the level of decentralization when δ increases.

5 Empirical Evidence

In this section, we confront the predictions of our theory with original data about 660 multinational firms in Austria and Germany with 2200 affiliate firms in Eastern Europe and the former Soviet Union. We first describe the data and their collection. We then derive the predictions from the theory we want to test. Here, we proceed in three steps. First, we examine how the decision to transplant the organisational form is influenced by the multinational's human resource policy, communication costs, and technology. Second, we analyse how a multinational firm's decision to transplant the organisational form is affected by market competition. Third, we investigate the joint decision of whether to transplant or not and the level of decentralisation of those multinationals firms which decide to transplant the organizational form.

5.1 The Survey and Other Data

In 1999-2001, we conducted a survey of 660 multinational firms in Austria (200 firms) and Germany (460 firms) with 2200 of their affiliate firms in Eastern Europe including Russia and the Ukraine and other former Soviet Republics, covering investment projects in the period 1990-2001. In 1998–1999, about 90 percent of total outgoing foreign direct investment in Austria was reoriented to Eastern Europe, while in Germany, Eastern Europe accounted for only about 4 to 5 percent of total outgoing foreign investment. This explains why the sample consists of relatively more Austrian firms inspite of Austria being much smaller than Germany in terms of population or GDP.

The sampling of the survey targeted a full population of multinational firms in Austria and Germany investing in Eastern Europe and the former Soviet Union. For Austria, we obtained the list of Austrian investors in Eastern Europe from the Austrian National Bank. Due to the data secrecy law, Germany does not provide such list and, therefore, we contacted the trading organizations in the Eastern European countries to obtain a full list of German investors in these countries. Since foreign investment activity in Eastern Europe started only with the fall of communism in 1990 (under central planning, foreign ownership was prohibited), we were able to obtain information on 80 percent of German foreign investment and 100 percent of Austrian foreign investment in Eastern Europe between 1990 and 2001.[13]

A comparison of our data with the OECD FDI data confirms the representativeness of our survey. Specifically, the correlation between the OECD outgoing FDI stocks from Austria and Germany to Eastern Europe between 1997 and 2000 with our data is 0.82. Our volumes of foreign investment are on average larger compared to the OECD data because we also included investment projects with an ownership share between 10-20 percent, while the OECD uses an ownership threshold of 20 percent for its definition of FDI.

The parent firms in our sample are mostly active in manufacturing, followed by wholesale and retail trade (see Table 5 in Appendix B). Almost half of the parent firms have only one subsidiary located in Eastern Europe (see Figure 6 in Appendix B), while around 5% have more than 10 such subsidiaries. On average, there are 3.2 subsidiary firms per parent firm, which are located in 2.5 distinct host countries. In addition, the most attractive Eastern European region for the Austrian and German FDI is Central Eastern Europe, which hosts more than two thirds of subsidiaries in our sample (see Table 6 in Appendix B).

Due to the length of the questionnaire, we personally visited the firms in Austria and Germany, or conducted the interviews by phone. We interviewed the CEO in the board of the parent company in German/Austria who was responsible for the Eastern European region and thus had a deep knowledge about the functioning of the subsidiary, including about its internal organization and human resource policies. In spite of this,

[13]The survey data have been used in Marin (2006) to examine the new international division of labour, which emerged after the fall of communism in Europe. Marin and Verdier (2014) concluded from these data that greater exposure to international trade prompted firms in Austria and Germany to devolve decisions, in particular those for which the initiative of middle management was most important, such as decisions about R&D and the decision to introduce a new product.

her view about the effective decision-making in the subsidiary might have been biased and, therefore, the collected information on decision-making may reflect formal rather than "real" authority in the firm in the sense of Aghion and Tirole (1997)'s theory of the firm.[14]

Measuring Organisation, Communication, and Technology

The dataset is unique not only because of its scope but also because of the detailed information on the internal organisation of multinational firms.[15] In particular, the data include matched parent and affiliate information on the level of decentralization and multinationals' human resource policies. To our knowledge, it is the only existing dataset suitable for testing our theory.

Measuring Transplantation We measure the transplantation of the parent firm's level of decentralization to the affiliate firm by asking the CEO at the headquarters of the corporation, regarding the organisational form of the parent firm: "Who decides in your company about the following corporate decisions listed in Table 7 in Appendix B? Please rank between 1, taken at headquarters, and 5, taken at the divisional level." We also asked, regarding the organisational form of the affiliate firm, 'Who decides in your company about the following decisions listed in Table 7 of Appendix B? Please rank between 1, taken at the headquarters of the parent firm, and 5, taken by the manager of the affiliate firm in the host country.' The 13 corporate decisions are, 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, respectively as well as hiring a new secretary. Responses ranged between five hierarchical ranks with 1 as a centralised decision, taken entirely at headquarters, and 5 as a decentralised decision, taken at the divisional/affiliate level (for a full listing of the corporate decisions and their hierarchical rank in the affiliate and parent firms, see Table 7 of Appendix B).

Using the information on the level of decentralization of corporate decisions in the parent and affiliate firms, we constructed our measure of transplantation of the

[14] Aghion and Tirole (1997) consider formal authority as decision power assigned to a CEO by contract, while real authority reflects the effective decision power of a CEO due to better information.

[15] For a detailed overview of all the variables and their descriptive statistics, see Tables 8 and 9 in Appendix B.

organisational form from parent firms to foreign affiliate firms. We employ three measures which vary by the tightness of when the organisation is considered to be transplanted. The dummy variable *identical* indicates whether or not all 13 corporate decisions are taken at the same level of decentralisation in the subsidiary firm as in the parent firm. The dummy variable *identical or similar* takes a value of one if the level of decentralisation is the same for each corporate decision or if it differs for one of the decisions. Finally, the dummy variable *identical, similar or partially different* takes a value of one if the level of decentralisation is the same for each corporate decision with up to two exceptions.

Table 7 of Appendix B shows the percentages of affiliate firms in which a particular corporate decision is taken at the same level of decentralisation as in the parent firm. It is interesting to note that the most centralised and the most decentralised corporate decisions appear to be transplanted most often to affiliate firms. The very centralised decision over acquisitions and the very decentralised decision on hiring a secretary are transplanted to more than 70 percent of the affiliate firms, while the decisions on finances and R&D are least often transplanted to the affiliate firm. Only in about half of the affiliate firms are these two decisions taken at the same level of decentralisation in the affiliate as in the parent firm.

The Level of Decentralisation We use the two survey questions on the level of decentralisation of corporate decisions in affiliate and parent firms to construct an overall measure of the level of decentralisation of the decision making process in both the parent and the affiliate firm. We calculate simple means from the available scores of the 13 decisions in the parent and affiliate firms and call it the *decentralisation of parent firm* and the *decentralisation of affiliate firm*, respectively. Table 7 of Appendix B shows that the most centralised 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 decentralised 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 divisional/subsidiary managers in the host country (with a respective mean ranking of 2.58 and 2.80). It is interesting to note that affiliate firms tend to be more decentralised than parent firms in Germany and Austria.

We calculate a simple average of *decentralization of parent firm* and *decentralization of affiliate firm* and denote it *decentralization of multinational* for those multinational firms which decide to transplant the organisational form. We distinguish three versions of the variable, depending on whether the level of decentralisation in the parent and subsidiary firms are *identical*, *identical or similar* or *identical, similar or partially different*.

Human Resource Policies Our survey includes further information on the human resource policy of the multinational firm. The variable *incentive salary in parent firm* is a dummy variable that takes a value of 1 if a parent firm has a human resource policy in place to reward workers for performance through performance based wage increases. Such performance based pay increases are relatively rare, being in place in only 14% of parent firms (see Tables 8 and 9 of Appendix B). We use this variable to proxy for the cost of a change in the organisational form. The idea is that firms with an explicit human resource policy are likely to have larger costs of operating with two organisational routines.

Communication Costs As a proxy for communication costs, we use the variable *distance*. We constructed it by calculating the georgraphical distance (in km) between the cities in which the parent firm and the subsidiary firm are located. Thus, the distance measure is calculated at the parent-subsidiary level. *Distance* is supposed to capture not only the costs of face-to-face communication but also cultural differences between the parent firms and the host regions. The further away the foreign affiliate firm from the headquarters firm, the more costly is communication between them. The average distance between parent and affiliate firms is over 900 kilometres (see Tables 8 and 9 of Appendix B).

Alternatively, we use the variable *common spoken language* developed by Melitz and Toubal (2014) as a measure of the ease of communication between parent and subsidiary. It measures the communication proficiency between the citizens of the home and host countries and is derived from the number of languages that are spoken by at least 4% of the population in a pair of countries. We do not use the typical variable *common language*, which is widely used in the literature on gravity models and which indicates whether a pair of countries share a common official language or not. This is because there are no common official languages between Austria/Germany and Eastern European countries.

Technology In our survey we also asked the parent firms to provide us with information on the nature of the technology transferred to subsidiary firms. The dummy *technology is innovative* takes a value of one if the technology is new, a dummy *technology is established* takes a value of one if the technology is relatively established and a dummy *technology is outdated* refers to a fully established or even outdated technology. In most cases, the transferred technology is either established (60%) or outdated (32%).

Finally, the size of the multinational corporation is measured by the number of employees as the *size of parent firm* and the *size of affiliate firm*. As expected, parent firms are usually much larger than affiliate firms: the average number of employees in parent firms reaches 7000, while it is only around 350 in affiliate firms.

Measuring Market Competition We use several data sources to proxy for product market competition in a home and a host market. First, our preferred measure of competition is the share of multinational firms in a market as derived in equation (13) of the model. An increase in the share of multinational firms indicates more competition because multinational firms are the firms with the lowest costs in the market. As their share in the market increases, the threshold level of costs at which firms can survive in the market declines. We use OECD data on the activity of multinational firms (OECD, 2012) and calculate the share of multinationals as the ratio of the number of multinational firms with inward FDI activity to the total number of firms in a given market (the latter is obtained from OECD (2009)). The measure is calculated for the home and host markets, respectively, at the two-digit ISIC industry level.

Second, we obtain from our firm survey two subjective firm-level measures of competition as perceived by parent and subsidiary firms. They are dummy variables indicating for each parent and subsidiary firm whether the firm faces *many domestic competitors* and *many world competitors* rather than few competitors, respectively. 73 percent of parent firms indicate that they face many world competitors as compared to 31 percent of subdidiary firms. Therefore, many world competitors rather than many domestic competitors is our preferred subjective measure of competition for the parent firms.

Finally, we calculate the sectoral *Lerner* index for parent and subsidiary firms at the one-digit ISIC industry level. The original Lerner index captures a firm's market

power and is defined as $(P - MC)/P$, where P is the market price of a product and MC refers to the marginal costs of production. It ranges between 0 and 1, where 1 indicates that a firm has monopoly power (no competition), while 0 implies a perfectly competitive market. We consider the inverse of the Lerner index as $1 - (P - MC)/P$ and proxy P with sale revenues and MC with personnel costs (see Tables 8 of Appendix B for a more formal definition).

5.2 Predictions and Empirical Results

Human Resource Policy, Distance, Technology and Market Competition

In this section, we examine how the multinational firms' human resource policy, distance, technology and market competition affect the decision to transplant the organisational form to other countries. From Propositions 3 to 5 we derive the following predictions.

Prediction 1 (human resource policy): Multinational firms with a human resource policy which rewards workers for performance (increasing the efficiency loss $1 + \theta$ of two organizational routines) are more likely to transplant the organizational form to the subsidiary firm in the host country.

Prediction 2 (communication costs): An increase in communication costs between the multinational headquarters and the affiliate firm makes it less likely that the organisational form is transplanted. The prediction holds when the subsidiary firm is very decentralized (under the strategy of 'no-transplant') and/or the level of decentralization between the parent and affiliate firm is sufficiently close.

Prediction 3 (technology): A more innovative technology increases the training costs of managers in the host country which makes it more likely that the organisational form is transplanted to the affiliate firm.

Prediction 4 (market competition): (a) A multinational firm is more likely to transplant its organizational form to its affiliate firm facing tougher competition in its host market, (b) while it is less likely to transplant from a more competitive home market.

To expose Predictions 1 to 4 to the data, we consider the following econometric model of the probability of transplanting the organisational form to the affiliate firm in the host country.

$$\begin{aligned} Prob(trans_{ijk}) = \partial_1 + \partial_2 inc_{ijk} + \partial_3 dist_{ijk} + \partial_4 tech_{ijk} + \\ \partial_5 \log comp_k + \partial_6 \log comp_j + \partial_7 w'_{ijk} + \nu_{ijk} \end{aligned} \tag{16}$$

Here, $trans_{ijk}$ is a dummy variable taking the value 1 for a multinational firm which has *identical or similar* level of decentralisation in the parent and subsidiary firms, i.e. when all corporate decisions or all corporate decisions except one have the same level of decentralisation in the affiliate firm as in the parent firm, and zero otherwise. i denotes the firm, j denotes the home country, and k denotes the host country. inc_{ijk} is a dummy variable indicating the cost of having two organisational routines. It is captured by whether the parent multinational firm has an explicit human resource policy in place rewarding workers for performance. $dist_{ijk}$ measures the communication costs between the parent and affiliate firm and is given by the geographic distance between the parent and affiliate firm. $tech_{ijk}$ indicates that the technology transferred to the affiliate firm is innovative rather than established or outdated. $comp_k$ and $comp_j$ are proxies for market competition in the host and home countries, respectively. w'_{ijk} is avector of controls and ν_{ijk} is an error term. In light of the four predictions, we test for the hypotheses $\partial_2 > 0$, $\partial_3 < 0$, $\partial_4 > 0.$, $\partial_5 > 0$ and $\partial_6 < 0$.

Our findings are given in Table 2 which presents probit maximum likelihood estimates of equation 16. All p-values are based on standard errors clustered at host country level. In all regressions, we also include two additional firm-level controls to avoid omitted variable bias. These are the log of the number of employees in parent and affiliate firms as a measure of firm size. Furthermore, we include two survey controls to control for the way the survey was conducted). The first dummy indicates whether the respondent to the survey was a top executive, while the second dummy takes a value of one if the respondend was a middle (i.e. divisional) manager.

The coefficient of *incentive salary in parent firm* is, as predicted by the theory, positive and highly significant at conventional levels, suggesting that firms with larger costs of having two different organisational routines tend to transplant the organization significantly more often. *incentive salary in parent firm* is capturing whether or not multinational firms reward their workers for performance by having performance based wages in place. To get a sense of the economic importance of each of the regressors,

we report the marginal effects in the last column of Table 2. Multinational firms which reward workers for performance are 21 percentage points more likely to transplant the level of decentralization to the subsidiary firm.

Columns 2 and 3 test for Prediction 2. The estimated coefficient on *distance* in Column 2 is negative and significant, suggesting that when the affiliate firm's distance to the parent firm doubles, the probability of transplanting decreases by 8.1 percentage points. As an alternative, we use *common spoken language* that measures the ease of (rather than costs of) communication between the home and host country. Although the estimated coefficient has the expected sign, it is found to be insignificant. Therefore, we proceed with using *distance* as our preferred measure of communication costs.

In column 4, we test Prediction 3. The dummy variables *technology is innovative* or *established* rather than outdated are both positive and significant. The probability of transplanting increases most (by 24 percentage points) when an innovative technology is transferred to the subsidiary firm and by 6 percentage points when the technology is established rather than outdated.

Finally, in columns 5-7, we test Prediction 4 by emploing several measures of market competition. First, we use the share of multinational firms in total number of firms in a sector as our preferred measure of competition (column 5). According to the theory, a larger share of multinational competitors present in the host or home markets, respectively, increases the toughness of competition as the share of low cost firms in the market is larger. As predicted, the coefficient of *share of multinationals, home market* is negative and significant suggesting that multinational firms faced with a larger number of multinational competitors in the home market transplant significantly less frequently. When the share of multinational exposure in the home market increases by 10 percentage points the probability to transplant declines by 9 percentage points. The coefficient of the *share of multinationals, host market* is positive and significant suggesting that multinational firms faced with a larger number of multinational competitors in the host market transplant the organisational mode significantly more frequently. When the share of multinational exposure in the host market increases by 10 percentage points the probability to transplant increases by 7 percentage points.

In column (6), we show the results with firm specific measures of competition. As predicted by the theory, multinational firms transplant the level of decentralization

Table 2: DETERMINANTS OF TRANSPLANTING THE LEVEL OF DECENTRALIZATION

Dependent variable: Identical or similar level of decentralisation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Marginal effects
Human resource policy								
Incentive salary in parent firm	0.62***	0.68***	0.62***	0.47***	0.64***	0.72***	0.48***	20.8
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(column 5)
Communication costs								
Log (distance)		-0.20***		-0.15*	-0.30***	-0.10	-0.14*	-8.1
		(0.00)		(0.05)	(0.00)	(0.20)	(0.07)	(column 5)
Common spoken language			0.53					
			(0.31)					
Technology								
Technology is established				0.21*	0.22	0.39***	0.23*	5.9
				(0.08)	(0.22)	(0.00)	(0.06)	(column 5)
Technology is innovative				0.95***	0.72***	1.03***	0.97***	24.0
				(0.00)	(0.00)	(0.00)	(0.00)	(column 5)
Market competition								
Share of multinational, host market					0.03***			0.7
					(0.01)			(column 5)
Share of multinational, home market					-0.04**			-0.9
					(0.03)			(column 5)
Many domestic competitors, subsidiary						0.81***		20.2
						(0.00)		(column 6)
Many world competitors, parent						-0.53***		-14.3
						(0.00)		(column 6)
Host market Lerner							0.03*	0.7
							(0.10)	(column 7)
Home market Lerner							-0.04***	-1.0
							(0.01)	(column 7)
Observations	1,155	1,155	1,146	1,031	631	986	1,031	
Pseudo R^2	0.0674	0.0805	0.0673	0.0966	0.0945	0.172	0.106	
Firm size controls (2)	Y	Y	Y	Y	Y	Y	Y	
Survey controls (2)	Y	Y	Y	Y	Y	Y	Y	

Notes: * significant at 10%, ** significant at 5%, ***significant at 1%. Probit estimates with standard errors clustered by host country. P-values are reported in parentheses. Marginal effects calculated at mean for continuous variables and for distcrete changes from zero to one for dummy variables (in percentage points, the columns with corresponding specification are reported in parentheses). The dependent variable *identical or similar* is a dummy that takes a value of one if each corporate decision was taken at the same level of decentralisation in the subsidiary firm as in the parent firm or if only one corporate decision differs. *Incentive salary in parent firm* is a dummy that takes a value of one if the parent firm rewards workers' performance through salary increases. *Distance* is the distance between parent and subsidiary firm in km. *Common spoken language* measures ease of communication between the home and host country. *Technology is established* and *technology is innovative* are dummy variables that indicate the nature of the technology transferred to a subsidiary firm, while *technology is outdated* is the omitted category. *Share of multinationals* is the share of multinational firms in total firms operating in the home/host market. *Many domestic competitors* and *many world competitors* (rather than few competitors) are subjective measures of market competition as perceived by the subsidiary and parent firm respectively. *Home* and *host market Lerner* are defined as $1-(P-MC)/P$ and an increase indicates more competition. Firm size controls refer to the log of the number of employees in the parent and subsidiary firms. Survey controls include two dummy variables, which indicate whether the survey respondend is an executive or a middle (i.e. division) manager respectively. See also Table 8 in Appendix B for more detailed definitions of the variables.

significantly more often when they are faced with many competitors in their host markets and they transplant their organisational form with lower probability when they are facing many competitors in their home market. Competition in host and home markets is an economically important driver of organisational transfer to the host economies of Eastern Europe. When competition in the host country is tough (*many competitors)* rather than weak (few competitors), the probability of transplanting increases by 20 percentage points, while *many competitors* in the home market lowers this probability by around 14 percentage points. In addition, in column (7) we replace the firm-level measures of competition by the (inverse) *Lerner index*. A 10 percentage point increase of the *Lerner index* in the host market increases the probability to transplant the organisational form by 7 percentage points, while the same increase of the *Lerner index* in the home market decreases the probability to transplant by 10 percentage points.

Robustness checks

In Table 3 we test the robustness of the results, taking the specification from column 5 of Table 2 as our baseline. First, we include home and host country dummies as well as industry dummies in columns 2 and 3 of Table 3 respectively. The industry dummies are included at 1-digit level only, so that the effects of the sectoral variable *share of multinationals* (computed at 2-digit level) can still be estimated. Second, since the two firm size controls may be endogeneous, we exclude these two controls in column 4. Third, we include in column 5 the variable *intra-firm trade* and *size of investment* to control for further characteristics of the investment project. *Intra-firm trade* indicates whether intra-firm trade between the parent and the subsidiary firm takes place and thus captures vertical (as opposed to horizontal) FDI. The negative coefficient suggests that multinational firms transplant the organizational mode less with vertical FDI. *Size of investment* refers to the value of the parent firm's invesment in the subsidiary firm. Finally, in column 6, we alter the measure of competition and use the *Lerner index*. Overall, all the estimated coefficients of interest maintain their signs and significance in table 3, which further supports the validity of our results.

As a further robustness check, we run the empirical analysis at the parent level rather than the subsidiary level in column 7. We calculate the average level of competition over all host countries of a parent firm to see how the competitive conditions in all host countries together affect the decision to transplant the organizational form.

The sample size shrinks by two thirds (from 631 in the baseline specification to 212 observations) and the coefficient does not turn out significant (at least not at the conventional significance level of 10%). But its sign is as predicted by the model and the size remains similar. The insignificant result is not surprising since by taking the average of the market competition variable over all host countries, the variable does not reflect anymore the true market environment in each of the host markets. At the same time, the coefficients of other variables such as distance and technology, which are also averaged over all subsidiary firms, remain significant.[16]

As a final robustness check of the determinants of transplantation, we present in Table 10 of Appendix B the regression results for alternative measures of transplanting the mode of organisation: *identical*, *identical or similar* and *identical, similar or partially different* level of decentralisation between the parent and subsidiary firm. As explanatory variables, we include all the main determinants of transplantation discussed so far. The results are mostly robust, though some effects tend to become weaker with the broad (third) measure of transplantation.

The Joint Decision: The Level of Decentralization (Reverse Transplanting)

The decision to tranplant the organisation and the choice of the level of decentralization of the whole multinational corporation under the 'transplant' strategy are jointly determined. In Figure 6 of the theory section we illustrate how changes in the home market conditions affect these choices. At weak competition firms transplant and choose a level of z which is closer to the host market conditions z_p^F. They decentralize. When competition toughens and crosses the threshold, the firm shifts to the‚no-transplant' strategy. Parent and subsidiary organisations become disconnected. We proceed to test this joint decision by determining the level of decentralization of the whole multinational corporation in response to the competitive conditions in the home and host market when the firm decides to transplant the organisation. From Proposition 1 we obtain the following prediction.

[16]Since one parent firm often has more than one subsidiary abroad, we would ideally run a regression with parent fixed effects to fully control for the characteristics of the parent firm, while exploiting the variation in organizational form across its subisidiaries (i.e. "within-firm" differences). However, there is not enough variation in our data to run the regression with parent fixed effects. This suggests that multinational firms often use the same organizational mode in their subsidiaries across host markets, although it might differ from the organizational form used by the parent firm.

Table 3: DETERMINANTS OF TRANSPLANTING THE LEVEL OF DECENTRALIZATION: ROBUSTNESS

Dependent variable: Similar or identical level of decentralisation	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Incentive salary in parent firm	0.64***	0.76***	0.93***	0.91***	1.00***	0.57***	0.61**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.04)
Log (distance)	-0.30***	-0.33***	-0.39***	-0.38***	-0.43***	-0.15*	-0.35**
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.06)	(0.02)
Technology is established	0.22	0.23	0.16	0.12	0.19	0.26**	
	(0.22)	(0.18)	(0.34)	(0.34)	(0.20)	(0.04)	0.35*
Technology is innovative	0.72***	0.70***	0.52***	0.60***	0.36***	0.89***	(0.64)
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Share of multinational, host market	0.03***	0.04***	0.04***	0.04***	0.05***		0.03
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)		(0.17)
Share of multinational, home market	-0.04**	-0.05***	-0.04***	-0.04**	-0.05***		-0.03
	(0.03)	(0.01)	(0.00)	(0.02)	(0.00)		(0.29)
Host market Lerner						0.03*	
						(0.10)	
Home market Lerner						-0.04**	
						(0.02)	
Intra firm trade					-0.43***	-0.19**	
					(0.00)	(0.04)	
Log (size of investment)					0.13***	0.05	
					(0.00)	(0.16)	
Observations	631	628	628	682	608	999	212
Pseudo R^2	0.0945	0.122	0.183	0.182	0.213	0.118	0.088
Firm size controls (2)	Y	Y	Y	N	Y	Y	Y
Survey controls (2)	Y	Y	Y	Y	Y	Y	Y
Host country dummies (15)	N	Y	Y	Y	Y	N	N
Home country dummies (1)	N	Y	Y	Y	Y	N	N
Industry dummies (7)	N	N	Y	Y	Y	N	N

Notes: * significant at 10%, ** significant at 5%, ***significant at 1%. Probit estimates with standard errors clustered by host country. P-values are reported in parentheses. The dependent variable *identical or similar* is a dummy that takes a value of one if each corporate decision was taken at the same level of decentralisation in the subsidiary firm as in the parent firm or if only one corporate decision differs. *Incentive salary in parent firm* is a dummy that takes a value of one if the parent firm rewards workers' performance through salary increases. *Distance* is the distance between parent and subsidiary firm in km. *Common spoken language* measures ease of communication between the home and host country. *Technology is established* and *technology is innovative* are dummy variables that indicate the nature of the technology transferred to a subsidiary firm, while *technology is outdated* is the omitted category. *Share of multinationals* is the share of multinational firms in total firms operating in the home/host market. *Home* and *host market Lerner* are defined as $1-(P-MC)/P$ and an increase indicates more competition. Firm size controls refer to the log of the number of employees in the parent and subsidiary firms. *Intra-firm trade* is a dummy that takes a value of one if intra-firm trade between the parent and the subsidiary firm takes place and zero otherwise. *Size of investment* refers to the value of parent firm's investment in a subsidiary firm (in EUR). Survey controls include two dummy variables, which indicate whether the survey respondend is an executive or a middle (i.e. division) manager respectively. Industry dummies are one-digit industry dummies for the subsidiary firm based on ISIC Rev. 3. See also Table 8 in Appendix B for more detailed definitions of the variables.

Prediction 5: (a) Under the 'transplant' strategy a multinational corporation is more decentralized when competition in the home market increases and (b) it is more centralized when competition in the host market increases.

To test for the prediction we employ the Heckman maximum likelihood model in Table 4 to jointly estimate (i) the decision to transplant the organisational mode (the selection equation) and (ii) the decision over the level of decentralization of the whole multinational corporation (the outcome equation), if the organizational mode is transplanted.[17] To identify the selection equation, we exclude (log) *distance* from the outcome equation. The rationale for selecting this variable for exclusion is that the theory predicts a strong effect of distance on the decision to transplant but no such effect on the decision over the level of decentralisation. The joint estimation allows us to take into account the possible correlation between the error terms in the two equations.

The estimated coefficients for the selection of the transplant strategy (Panel A) are similar to the results we obtained before. For the level of decentralization (Panel B) we have several new findings. First, we find that an increase in the share of multinational exposure in the host market of 10 percentage points reduces the level of decentralization in the multinational corporation by a rank of 0.2 to 0.4 on the scale between 1 and 5 which corresponds to a reduction in the the level of decentralization of 5 to 10 percent.[18] The move to a more centralised organization in responce to more competition in the host market is a novel finding, since the previous literature suggests that firms become more decentralised with more competition. Here, multinational firms become more centralised because they adjust the organization to fit the competitive conditions in the home market rather than the host market, when the host market becomes less profitable.

Second, we identify reverse transplanting in the data, in which the parent firms' organization is modified to be closer to the optimal organization of the subsidiary firm. An increase in the share of multinational exposure in the home market of 10 percentage points increases the level of decentralization of the multinational corporation by a rank of 0.4 to 0.7 which corresponds to an increase in the level of decentralization of 10 to 17.5 percent.

[17] Note that under the 'transplant' strategy, the level of decentralization of the parent and subsidiary are either identical or similar, depending on the tightness of our measure of transplantation.

[18] A reduction by 0.2 corresponds to $0.2/4 = 5$ percent in the possible 4-step range of the level of decentralisation between 1 and 5.

Table 4: JOINT DETERMINANTS OF TRANSPLANTATION AND DECENTRALISATION

	Panel A. Selection equation with dependent variable:		
	identical	identical or similar	Identical, similar or partially different
		level of decentralisation	
	(1)	(2)	(3)
Incentive salary in parent firm	0.39**	0.64***	0.23**
	(0.01)	(0.00)	(0.02)
Technology is innovative	0.78***	0.63***	0.49***
	(0.00)	(0.00)	(0.00)
Share of multinationals, host market	0.04***	0.03***	0.01
	(0.00)	(0.00)	(0.16)
Share of multinationals, home market	-0.04***	-0.02**	-0.02
	(0.00)	(0.01)	(0.22)
Log(distance)	-0.35***	-0.31***	-0.17***
	(0.00)	(0.00)	(0.00)
Panel B. Outcome equation with dependent variable: Decentralisation of multinational			
	(1)	(2)	(3)
Incentive salary in parent firm	-0.69***	-0.33*	-0.29***
	(0.00)	(0.10)	(0.00)
Technology is innovative	-0.34**	-0.46**	-0.46***
	(0.04)	(0.03)	(0.00)
Share of multinationals, host market	-0.04***	-0.02***	-0.02***
	(0.01)	(0.00)	(0.00)
Share of multinationals, home market	0.07*	0.05**	0.04***
	(0.06)	(0.01)	(0.00)
Observations (selected)	699 (94)	699 (145)	699 (198)
ρ	0.29	0.49	0.17
Wald test of indep. eqns. ($\rho = 0$)	(0.42)	(0.16)	(0.62)
Firm size controls	Y	Y	Y
Survey controls	Y	Y	Y

The dependent variable *identical or similar* is a dummy that takes a value of one if each corporate decision was taken at the same level of decentralisation in the subsidiary firm as in the parent firm or if only one corporate decision differs.

Notes: * significant at 10%, ** significant at 5%, ***significant at 1%. Heckman maximum likelihood estimates with standard errors clustered by host country. P-values are reported in parentheses. The dependent variables in the selection equation are dummy variables that indicate whether the level of decentralisation between the parent and subsidiary firms is *identical* (column 1), *identical or similar* (column 2) and *identical, similar or partially different* (column 3). Identical: all corporate decisions in the subsidiary and parent firm are at the same level of decentralisation; identical or similar: all corporate decisions in the subsidiary and parent firm except one are at the same level of decentralisation; identical, similar or partially different: all corporate decisions in the subsidiary and parent firm except two are at the same level of decentralisation. The dependent variable in the outcome equation is *decentralisation of multinational*, which is the mean of decentralisation of parent and subsidiary firm under the corresponding 'transplant' strategy. *Incentive salary in parent firm* is a dummy that takes a value of one if the parent firm rewards workers' performance through salary increases. *technology is innovative* is a dummy variables that indicates the nature of the technology transferred to a subsidiary firm, while *technology is established and outdated* are the omitted category. *Share of multinationals* is the share of multinational firms in total firms operating in a market. *Distance* is the distance between parent and subsidiary firm in km; it is excluded from the outcome equation. P-values are reported for Wald test for independent equations (i.e. the test that the correlation between the error terms in the selection and outcome equation denoted as ρ is 0). Firm size controls refer to the log of the number of employees in the parent and subsidiary firms. Survey controls include two dummy variables, which indicate whether the survey respondend is an executive or a middle (i.e. division) manager respectively. See also Table 8 in Appendix B for more detailed definitions of the variables.

6 Conclusion

In this paper we investigate the conditions under which multinational firms transplant the organizational form to the affiliate firms in host countries. In concluding, we want to return to the puzzle we raised in the introduction, that there is a surprisingly high proportion of multinational firms that do not transplant their mode of organisation to the host countries. In our analysis we found that three factors stand out as drivers of organisational transfer to host countries. First, multinational firms with a human resource policy in place are 21 percentage points more likely to transplant their organisational form to host countries. Firms which rely on human resources to reward workers for performance it is more costly to have different organisational routines in the parent and subsidiary firm. Among Austrian and German multinational firms in our data, however, only a minority (14 percent) are facing these organisational costs by having human resource policies in place incentivising their workers.

Second, multinational firms which transfer an innovative technology to affiliate firms in the host country are 24 percentage points more likely to export the level of decentralization to the affiliate firm. Our estimates suggest that technology transfer and organisational transfer go hand in hand. A new technology increases the training costs of production managers in the affiliate firms, making saving on these costs in a more centralised organisation in the affiliate firms more desirable. However, among the multinational firms in our sample, only very few (8 percent) describe the technology they transfer to host countries as innovative, while the majority of firms (60 percent) perceive the technology as established. Thus, the rare occurence of multinational firms with human resource policies and with innovative technologies have both contributed to the low frequency of transplanting the mode of organisation to the affiliate firms in eastern Europe.

Lastly, we find that market competition is an economically important driver of organisational transfer. Multinational firms investing in host countries with tough competition are more likely to export the organisational form to these countries, while multinational investors coming from a home market with tough competition are less likely to transplant the organisation. Thus, the tougher competitive environment in

rich countries due to globalization (during this period openess doubled in Austria and Germany) has also conributed to the low frequency of multinational firms' transplanting the firm organization.

Whether or not the host country benefits from organizational transfer is beyond the scope of this paper. But the paper suggests several trade-offs. When multinational firms transplant their organization to the subsidiary firm they will not operate at minimum costs and thus consumers will be hurt due to higher prices. At the same time organizational transfer makes the technology transfer more likey which may benefit the host country. Moreover, our analsis suggests that host countries may be able to influence technology and organizational transfer multinational firms will bring to the host country by designing an appropriate competition policy. Interestingly, our analysis indicates that organizational transfer within multinational corporations acts as a mechanism connecting market structures across countries that may seem fully segmented economically. Given the importance of multinational firms in the global economy, our analysis suggests that the implications of this dimension of firm organization for the design of appropriate competition policy in an international context may become a worthy line of investigation for future research.

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A Appendix: Theory

- **The optimal joint organizational form under the 'transplant' strategy**

Denote $\pi\left(c_D^H, c_D^F, z\right) = \frac{L^H}{4\gamma}\left[c_D^H - c_H^m(z)\right]^2 + \frac{L^F}{4\gamma}\left[c_D^F - c_F^m(z)\right]^2$. Then we know that the first order condition for this joint organizational form z is simply given from:

$$\frac{\partial \pi\left(c_D^H, c_D^F, z\right)}{\partial z} = -\frac{L^H}{2\gamma}\left[c_D^H - c_H^m(z)\right]\frac{\partial c_H^m}{\partial z} - \frac{L^F}{2\gamma}\left[c_D^F - c_F^m(z)\right]\frac{\partial c_F^m}{\partial z} = 0 \qquad (17)$$

We assume that for the relevant range of z the profit function $\pi\left(c_D^H, c_D^F, z\right)$ is strictly concave (ie. $\partial^2\pi\left(c_D^H, c_D^F, z\right)/\partial z^2 < 0$) in order to have a well defined maximization problem.

Moreover, we assume that the cost of communication δ between the headquarters and the subsidiary is sufficiently large that $z_p^H < z_p^F$. Under full adjustment to local conditions, the firm wants to implement more management autonomy in the subsidiary firm than in the parent firm. Given that z_p^H(resp. z_p^F) are the optimal organizational forms for the H market (resp. the F market), we have

$$\frac{\partial c_H^m}{\partial z}\left(z_p^H\right) = \frac{\partial c_F^m}{\partial z}\left(z_p^F\right) = 0$$

Given that $c_H^m(z)$ has its minimum at z_p^H, that c_F^m has its minimum at z_p^F and that $z_p^H < z_p^F$ then we have

$$\frac{\partial c_H^m}{\partial z}(z) > 0 \text{ for all } z \geq z_p^F \text{ and } \frac{\partial c_F^m}{\partial z}(z) < 0 \text{ for all } z \leq z_p^H$$

we then get

$$\begin{aligned}
\frac{\partial \pi\left(c_D^H, c_D^F, z\right)}{\partial z} &= -\frac{L^F}{2\gamma}\left[c_D^F - c_F^m(z)\right]\frac{\partial c_F^m}{\partial z}(z) > 0 \text{ for all } z \leq z_p^H \\
\frac{\partial \pi\left(c_D^H, c_D^F, z\right)}{\partial z} &= -\frac{L^H}{2\gamma}\left[c_D^H - c_H^m(z)\right]\frac{\partial c_H^m}{\partial z}(z) < 0 \text{ for all } z \geq z_p^F
\end{aligned}$$

Thus $\pi\left(c_D^H, c_D^F, z\right)$ necessarily reaches its maximum at an optimal joint organizational form z^* solution of (17) and such that $z_p^H < z^* < z_p^F$.

Differentiation of (17), we get

$$\begin{aligned}
\frac{\partial^2 \pi\left(c_D^H, c_D^F, z^*\right)}{\partial c_D^H \partial z} &= -\frac{L^H}{2\gamma}\frac{\partial c_H^m}{\partial z}(z^*) < 0 \\
\frac{\partial^2 \pi\left(c_D^H, c_D^F, z^*\right)}{\partial c_D^F \partial z} &= -\frac{L^F}{2\gamma}\frac{\partial c_F^m}{\partial z}(z^*) > 0
\end{aligned}$$

This is so because we assume that $z_p^H < z_p^F$ and therefore $z_p^H < z^* < z_p^F$ and thus $\frac{\partial c_H^m}{\partial z}(z^*) > \frac{\partial c_H^m}{\partial z}\left(z_p^H\right) = 0$ and $\frac{\partial c_H^m}{\partial z}(z^*) < \frac{\partial c_F^m}{\partial z}\left(z_p^F\right) = 0$.

From this we obtain that $z^*\underset{-}{\left(c_D^H\right)}, \underset{+}{c_D^F}$. The multinational corporation under the 'transplant' strategy is more decentralized the tougher is competition in the home market and it is more centralized the tougher is competition in the host market. From this follows that the marginal costs of production of the parent firm and the subsidiary firm are a function of the toughness of competition in H and in$F$ with the following signs:

$$\begin{aligned}
c_H^m(z^*) &= f^H(\underset{-}{c_D^H}, \underset{+}{c_D^F}) \\
c_F^m(z^*) &= f^F(\underset{+}{c_D^H}, \underset{-}{c_D^F})
\end{aligned}$$

QED.

- **Proof that** $c_H^m(z^*) < (1+\theta^*)\, c_H^m(z_p^H)$:

Recall that the threshold condition writes as:

$$L^H \left[(1+\theta^*)\, c_H^m(z_p^H) - c_H^m(z^*)\right] \left[c_D^H - \frac{c_H^m(z^*) + (1+\theta^*)\, c_H^m(z_p^H)}{2}\right]$$
$$= L^F \left[c_F^m(z^*) - c_F^m(z_p^F)\right] \left[c_D^F - \frac{c_F^m(z^*) + c_F^m(z_p^F)}{2}\right] \quad (18)$$

Note that $c_F^m(z^*) - c_F^m(z_p^F) > 0$. As well $c_D^F - c_F^m(z^*) > 0$ and $c_D^H > \max\left\{c_H^m(z^*); (1+\theta^*)c_H^m(z_p^H)\right\}$ in order to ensure that the multinational firms produce positive outputs in markets F and H. Thus $c_D^F - \frac{c_F^m(z^*)+c_F^m(z_p^F)}{2} > c_D^F - c_F^m(z^*) > 0$. Therefore, it follows from equation (18) that

$$c_H^m(z^*) < (1+\theta^*)\, c_H^m(z_p^H)$$

QED.

- **Proof of Proposition 3:**

i) Comparative statics for market size L^H :

The equilibrium threshold θ^* satisfies the following equation:

$$Z(L^H, L^F, c_D^H, c_D^F, z^*, \theta^*) = 0 \quad (19)$$

with

$$\begin{aligned} Z(L^H, L^F, c_D^H, c_D^F, z^*, \theta^*) &= \frac{L^H}{4\gamma}\left[c_D^H - c_H^m(z^*)\right]^2 + \frac{L^F}{4\gamma}\left[c_D^F - c_F^m(z^*)\right]^2 \\ &\quad - \frac{L^H}{4\gamma}\left[c_D^H - (1+\theta^*)\, c_H^m(z_p^H)\right]^2 - \frac{L^F}{4\gamma}\left[c_D^F - c_F^m(z_p^F)\right]^2 \end{aligned}$$

Given that

$$\begin{aligned} \frac{L^H}{4\gamma}\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]^2 d\Lambda(c) &= F_H \quad \text{or } c_D^H = \sigma(\frac{4\gamma F_H}{L^H}) \\ \frac{L^F}{4\gamma}\int_{c_{\min}}^{c_D^F}\left[c_D^F - c\right]^2 d\Lambda(c) &= F_F \quad \text{or } c_D^F = \sigma(\frac{4\gamma F_F}{L^F}) \end{aligned}$$

From $\sigma(x)$ defined as the solution of the following equation

$$\int_{c_{\min}}^{\sigma} [\sigma - c]^2 \, d\Lambda(c) = x$$

we get by differentiation that

$$\frac{d\sigma}{dx} = \frac{1}{2\int_{c_{\min}}^{\sigma} [\sigma - c] \, d\Lambda(c)} > 0$$

and therefore $\sigma'(.) > 0$. Differentiation of (19) with respect to L^H and noting that $\frac{\partial Z}{\partial z^*}(L^H, L^F, c_D^H, c_D^F, z^*, \theta^*) = 0$ (as z^* is the optimal level of decentralization under the 'transplant' strategy), results in

$$\begin{aligned}
\frac{dZ}{dL^H} &= \frac{\partial Z}{\partial L^H} + \frac{\partial Z}{\partial c_D^H}\frac{dc_D^H}{dL^H} \\
\frac{dZ}{dL^H} &= \frac{1}{4\gamma}\left[\sigma(\frac{4\gamma F_H}{L^H}) - c_H^m(z^*)\right]^2 - \frac{1}{4\gamma}\left[\sigma(\frac{4\gamma F_H}{L^H}) - (1+\theta^*)\, c_H^m(z_p^H)\right]^2 \\
&\quad -\frac{2F_H}{L^H}\sigma'(\frac{4\gamma F_H}{L^H})\left[\sigma(\frac{4\gamma F_H}{L^H}) - c_H^m(z^*)\right] + \frac{2F_H}{L^H}\sigma'(\frac{4\gamma F_H}{L^H})\left[\sigma(\frac{4\gamma F_H}{L^H}) - (1+\theta^*)\, c_H^m(z_p^H)\right] \\
&= \frac{1}{4\gamma}\left((1+\theta^*)\, c_H^m(z_p^H) - c_H^m(z^*)\right)\cdot\left[\sigma(\frac{4\gamma F_H}{L^H}) - c_H^m(z^*) + \sigma(\frac{4\gamma F_H}{L^H}) - (1+\theta^*)\, c_H^m(z_p^H)\right] \\
&\quad +\frac{2F_H}{L^H}\sigma'(\frac{4\gamma F_H}{L^H})\left[c_H^m(z^*) - (1+\theta^*)\, c_H^m(z_p^H)\right]
\end{aligned}$$

The RHS rewrites as

$$\frac{1}{4\gamma}\left((1+\theta^*)\, c_H^m(z_p^H) - c_H^m(z^*)\right)\cdot\left[\left[c_D^H - c_H^m(z^*)\right] + \left[c_D^H - (1+\theta^*)\, c_H^m(z_p^H)\right] - \frac{8\gamma F_H}{L^H}\sigma'(\frac{4\gamma F_H}{L^H})\right]$$

The first term $\frac{1}{4\gamma}\left((1+\theta^*)\, c_H^m(z_p^H) - c_H^m(z^*)\right)$ is positive. Consider then the sign of second bracket term

$$\left[c_D^H - c_H^m(z^*)\right] + \left[c_D^H - (1+\theta^*)\, c_H^m(z_p^H)\right] - \frac{8\gamma F_H}{L^H}\sigma'(\frac{4\gamma F_H}{L^H})$$

Note that

$$\begin{aligned}\sigma'(\frac{4\gamma F_H}{L^H}) &= \frac{1}{2\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]d\Lambda(c)} \\ \text{and } \frac{8\gamma F_H}{L^H} &= 2\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]^2 d\Lambda(c)\end{aligned}$$

Therefore

$$\begin{aligned}&\left[c_D^H - c_H^m(z^*)\right] + \left[c_D^H - (1+\theta^*)\, c_H^m(z_p^H)\right] - \frac{8\gamma F_H}{L^H}\sigma'(\frac{4\gamma F_H}{L^H}) \\ &\qquad = \left[c_{\min} - c_H^m(z^*)\right] + \left[c_{\min} - (1+\theta^*)\, c_H^m(z_p^H)\right] + \\ &\qquad\qquad + 2\left(c_D^H - c_{\min}\right) - \frac{\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]^2 d\Lambda(c)}{\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]d\Lambda(c)} \quad (20)\end{aligned}$$

Now recall assumption T

Assumption T: $c_H^m(z^*) < c_{\min}$, $c_F^m(z^*) < c_{\min}$ and $\left(1+\overline{\theta}\right)c_H^m(z_p^H) < c_{\min}$

Under this assumption, the first two terms of the RHS of (20), $\left[c_{\min} - c_H^m(z^*)\right]$ and $\left[c_{\min} - (1+\theta^*)\, c_H^m(z_p^H)\right]$ are positive. The last two terms write as:

$$\begin{aligned}2\left(c_D^H - c_{\min}\right) - \frac{\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]^2 d\Lambda(c)}{\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]d\Lambda(c)} &= \frac{2\left(c_D^H - c_{\min}\right)\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]d\Lambda(c) - \int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]^2 d\Lambda(c)}{\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]d\Lambda(c)} \\ &= \frac{2\int_{c_{\min}}^{c_D^H}\left(c_D^H - c_{\min}\right)\left(c_D^H - c\right)d\Lambda(c) - \int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]^2 d\Lambda(c)}{\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]d\Lambda(c)}\end{aligned}$$

The denominator of this expression is positive. Similarly the numerator is also positve as $0 \le c_D^H - c \le c_D^H - c_{\min}$ for $c_{\min} \le c \le c_D^H$, and thus

$$\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]^2 d\Lambda(c) \le \int_{c_{\min}}^{c_D^H}\left(c_D^H - c_{\min}\right)\left(c_D^H - c\right)d\Lambda(c) < 2\int_{c_{\min}}^{c_D^H}\left(c_D^H - c_{\min}\right)\left(c_D^H - c\right)d\Lambda(c)$$

Consequently,

$$2\left(c_D^H - c_{\min}\right) - \frac{\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]^2 d\Lambda(c)}{\int_{c_{\min}}^{c_D^H}\left[c_D^H - c\right]d\Lambda(c)} > 0$$

From this, one concludes that

$$\left[c_D^H - c_H^m(z^*)\right] + \left[c_D^H - (1+\theta^*)\, c_H^m(z_p^H)\right] - \frac{8\gamma F_H}{L^H}\sigma'(\frac{4\gamma F_H}{L^H}) > 0$$

and therefore $\frac{dZ}{dL^H} > 0$. Given that $\frac{dZ}{d\theta^*} > 0$, it follows that

$$\frac{d\theta^*}{dL^H} = -\frac{\frac{dZ}{dL^H}}{\frac{dZ}{d\theta^*}} < 0$$

Thus the equilibrium threshold θ^* goes down and multinational firms tranplant the level of decentralization more in a larger domestic market L^H

ii) Comparative statics for market size L^F : Similarly differentiation of RHS of (19) with respect to L^F gives:

$$\begin{aligned}
\frac{dZ}{dL^F} &= \frac{\partial Z}{\partial L^F} + \frac{\partial Z}{\partial c_D^F}\frac{dc_D^F}{dL^F} \\
\frac{dZ}{dL^F} &= \frac{1}{4\gamma}\left[\sigma(\frac{4\gamma F_F}{L^F}) - c_F^m(z^*)\right]^2 - \frac{1}{4\gamma}\left[\sigma(\frac{4\gamma F_F}{L^F}) - c_F^m(z_p^F)\right]^2 \\
&\quad -\frac{2F_F}{L^F}\sigma'(\frac{4\gamma F_F}{L^F})\left[\sigma(\frac{4\gamma F_F}{L^F}) - c_F^m(z^*)\right] + \frac{2F_F}{L^F}\sigma'(\frac{4\gamma F_F}{L^F})\left[\sigma(\frac{4\gamma F_F}{L^F}) - c_F^m(z_p^F)\right] \\
&= \frac{1}{4\gamma}\left(c_F^m(z_p^F) - c_F^m(z^*)\right)\cdot\left[\sigma(\frac{4\gamma F_F}{L^F}) - c_F^m(z^*) + \sigma(\frac{4\gamma F_F}{L^F}) - c_F^m(z_p^F)\right] \\
&\quad +\frac{2F_F}{L^F}\sigma'(\frac{4\gamma F_F}{L^F})\left[c_F^m(z^*) - c_F^m(z_p^F)\right]
\end{aligned}$$

this rewrites as:

$$\frac{1}{4\gamma}\left(c_F^m(z_p^F) - c_F^m(z^*)\right)\cdot\left[\left[c_D^F - c_F^m(z^*)\right] + \left[c_D^F - c_F^m(z_p^F)\right] - \frac{8\gamma F_F}{L^H}\sigma'(\frac{4\gamma F_F}{L^F})\right] < 0$$

We have $c_F^m(z_p^F) - c_F^m(z^*) < 0$. Assumption T and an argument similar to the one for the comparative statics for L^H, provides

$$\left[c_D^F - c_F^m(z^*)\right] + \left[c_D^F - c_F^m(z_p^F)\right] - \frac{8\gamma F_F}{L^H}\sigma'(\frac{4\gamma F_F}{L^F}) > 0$$

Consequently $\frac{dZ}{dL^F} < 0$ and

$$\frac{d\theta^*}{dL^F} = -\frac{\frac{dZ}{dL^F}}{\frac{dZ}{d\theta^*}} > 0$$

Thus the equilibrium threshold θ^* goes up and multinational firms transplant less in a larger foreign market L^F

iii) Comparative statics for F_H (fixed costs of local domestic firms or index of local competition)

Differentiation of RHS of (19) with respect to F_H gives :

$$\begin{aligned}
\frac{dZ}{dF_H} &= \frac{\partial Z}{\partial c_D^H}\frac{dc_D^H}{dF_H} \\
&= \sigma'(\frac{4\gamma F_H}{L^H})\left[\sigma(\frac{4\gamma F_H}{L^H}) - c_H^m(z^*)\right] - \sigma'(\frac{4\gamma F_H}{L^H})\left[\sigma(\frac{4\gamma F_H}{L^H}) - (1+\theta^*)\, c_H^m(z_p^H)\right] \\
&= \sigma'(\frac{4\gamma F_H}{L^H})\left[(1+\theta^*)\, c_H^m(z_p^H) - c_H^m(z^*)\right] > 0
\end{aligned}$$

as $\sigma'(\frac{4\gamma F_H}{L^H}) > 0$ and $(1+\theta^*)\, c_H^m(z_p^H) - c_H^m(z^*) > 0$. Thus

$$\frac{d\theta^*}{dF_H} = -\frac{\frac{dZ}{dF_H}}{\frac{dZ}{d\theta^*}} < 0$$

θ^* goes down and multinational firms transplant the level of decentralization more in a home market with weaker competition (larger F_H)

iv) Comparative statics for F_F (fixed costs of local foreign firms or index of local competition)

Similarly differentiation of RHS of (19) with respect to F_F gives

$$\begin{aligned}
\frac{dZ}{dF_F} &= \frac{\partial Z}{\partial c_D^F}\frac{dc_D^F}{dF_F} \\
&= \sigma'(\frac{4\gamma F_F}{L^F})\left[\sigma(\frac{4\gamma F_F}{L^F}) - c_F^m(z^*)\right] - \sigma'(\frac{4\gamma F_F}{L^F})\left[\sigma(\frac{4\gamma F_F}{L^F}) - c_F^m(z_p^F)\right] \\
&= \sigma'(\frac{4\gamma F_F}{L^F})\left[c_F^m(z_p^F) - c_F^m(z^*)\right] < 0
\end{aligned}$$

as $\sigma'(\frac{4\gamma F_F}{L^F}) > 0$ and $c_F^m(z_p^F) - c_F^m(z^*) < 0$. Thus

$$\frac{d\theta^*}{dF_F} = -\frac{\frac{dZ}{dF_F}}{\frac{dZ}{d\theta^*}} > 0$$

Therefore θ^* goes up and multinational firms transplant the level of decentralization less in a host market with weaker competition (larger F_F)

v) Finally, the effect of changes in L^H, L^F, F_H and F_F on the level of decentralization under the 'transplant' strategy z^* is deduced from the fact that according to proposition 1, $z^*$is a decreasing function of c_D^H and an increasing function of c_D^F and the fact that c_D^H (resp. c_D^F) is an decreasing function of L^H (resp. L^F) and an increasing function of F_H (resp. F_F).

QED.

- **Proposition 4: comparative statics on communication costs**

- Comparative statics with respect to δ:

Following the same line, differentiation of RHS of (19) with respect to δ gives

$$\begin{aligned} Z(L^H, L^F, c_D^H, c_D^F, z^*, \theta^*) &= \frac{L^H}{4\gamma}\left[c_D^H - c_H^m(z^*)\right]^2 + \frac{L^F}{4\gamma}\left[c_D^F - c_F^m(z^*)\right]^2 \\ &\quad -\frac{L^H}{4\gamma}\left[c_D^H - (1+\theta^*)\, c_H^m(z_p^H)\right]^2 - \frac{L^F}{4\gamma}\left[c_D^F - c_F^m(z_p^F)\right]^2 \end{aligned}$$

$$\frac{\partial Z}{\partial \delta} = -\frac{L^F}{2\gamma}\left[c_D^F - c_F^m(z^*)\right]\frac{\partial c_F^m(z^*)}{\partial \delta} + \frac{L^F}{2\gamma}\left[c_D^F - c_F^m(z_p^F)\right]\frac{\partial c_F^m(z_p^F)}{\partial \delta}$$

which is proportional to

$$\begin{aligned} & -\left[c_D^F - c_F^m(z^*)\right]\left[1 - F(z^*)\right] + \left[c_D^F - c_F^m(z_p^F)\right]\left[1 - F(z_p^F)\right] \\ = \;& c_D^F\left(F(z^*) - F(z_p^F)\right) + c_F^m(z^*)[1 - F(z^*)] - c_F^m(z_p^F)[1 - F(z_p^F)] \end{aligned}$$

or

$$\left[c_D^F - c_F^m(z^*)\right]\underbrace{\left(F(z^*) - F(z_p^F)\right)}_{-} + \underbrace{\left(c_F^m(z^*) - c_F^m(z_p^F)\right)}_{+}[1 - F(z_p^F)] \gtrless 0$$

The sign is ambiguous. However when z_p^F is close to 1 (subsidiary firm is very decentralized) and/or $c_F^m(z^*) - c_F^m(z_p^F)$ is small (not much loss of productive efficiency of a subsidiary firm which is subject to the 'transplant' strategy), then the second term is small and we get a negative sign for the expression above. In this case, an increase

in communication costs tends to reduce multinational transplanting in the industry. **QED.**

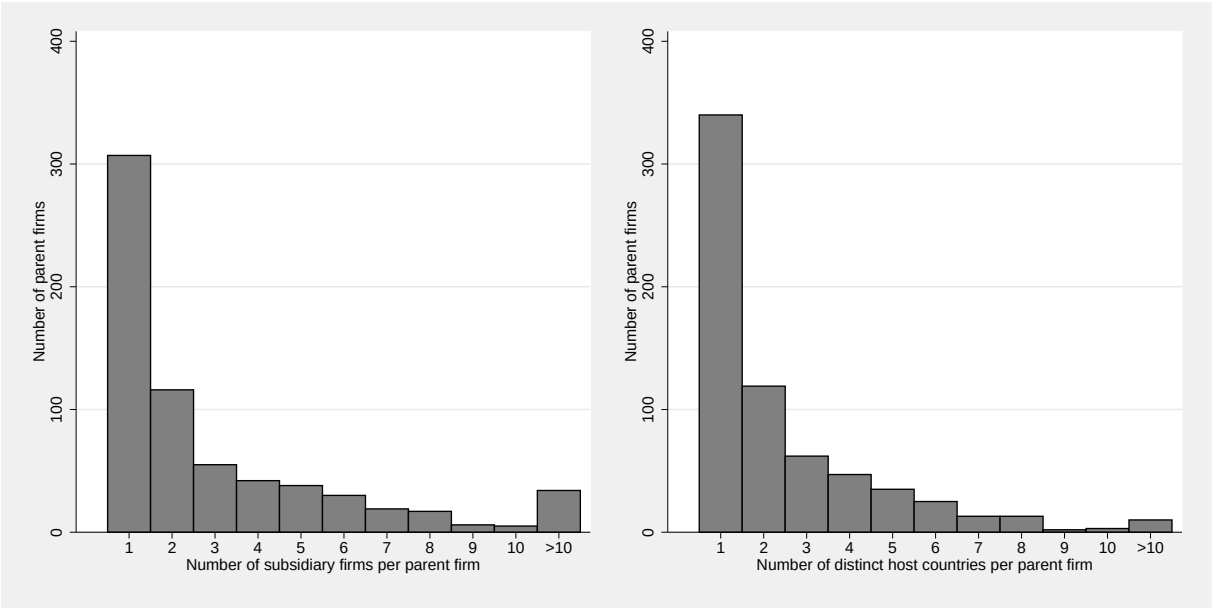
B Appendix: Data and Results

Table 5: The distribution of parent firms across industry sectors

	Parent firm in Austria	Parent firm in Germany
1. Manufacturing	46%	63%
Machinery and equipment n.e.c. (ISIC: 29)	*17%*	*15%*
Motor vehicles, trailers and semitrailers (ISIC: 34)	*0%*	*11%*
Electrical machinery and apparatus n.e.c (ISIC: 31)	*6%*	*9%*
Fabricated metal products (ISIC: 28)	*6%*	*8%*
Food products and beverages (ISIC: 15)	*8%*	*7%*
Other non-metallic mineral products (ISIC: 26)	*13%*	*6%*
Chemicals and chemical products (ISIC: 24)	*9%*	*6%*
Rubber and plastics products (ISIC: 25)	*9%*	*6%*
Paper and paper products (ISIC: 21)	*9%*	*0%*
Other manufacturing subsectors	*23%*	*32%*
2. Wholesale and retail trade	20%	11%
3. Real estate, renting and business activities	9%	10%
4. Financial intermediation	12%	6%
5. Transport, storage and communications	5%	6%
6. Construction	4%	3%
7. Electricity, gas and water supply	1%	1%
8. Hotels and restaurants	1%	0%
9. Mining and quarrying	1%	0%
10. Other	1%	0%
Total	100% (208 firms)	100% (461 firms)

Notes: Based on ISIC rev.3 industrial classification. For the main (numbered) sectors, the table shows percentages of all Austrian and German parent firms respectively. For the manufacturing sub-sectors (in italics), the table shows percentages of all manufacturing Austrian and German parent firms respectively. The (sub-)sectors are sorted from the most to the least frequent (sub-)sector of parent firms in Germany. N.e.c. stands for "not elsewhere classified".

Figure 6: The distribution of the number of subsidiary firms and distinct host countries per parent firm



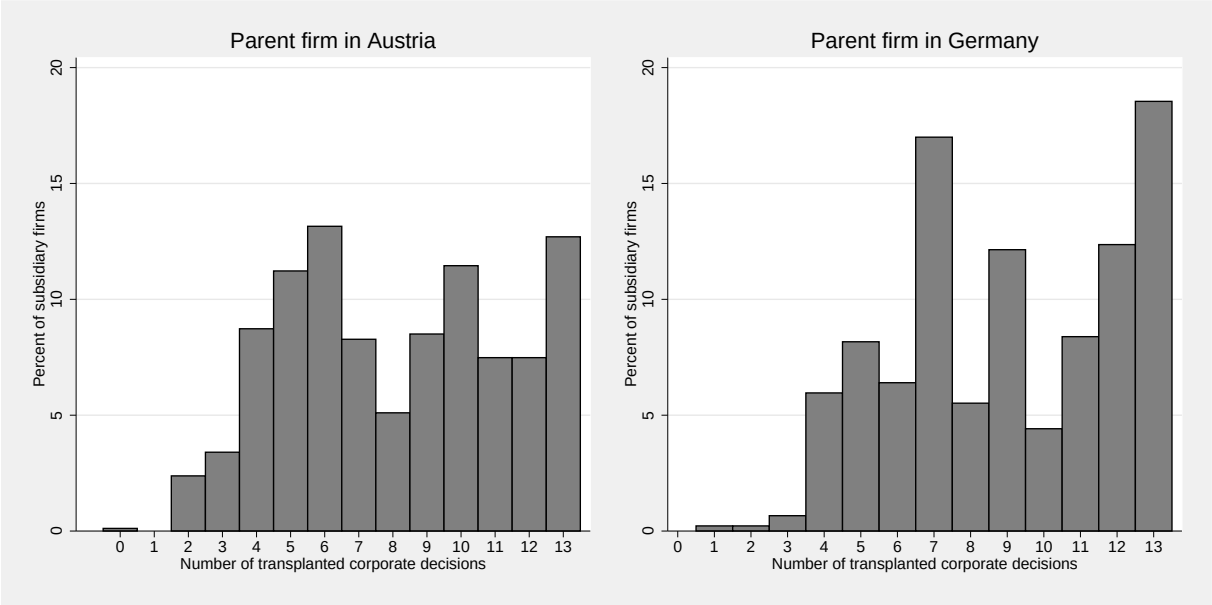
Notes: On average, a parent firm has 3.2 subsidiary firms that are located in 2.5 distinct Eastern European countries.

Table 6: The distribution of subsidiary firms across host country regions

	Parent firm in Austria		Parent firm in Germany	
1. Central Eastern Europe[1]	73%		67%	
Czech Republic		*20%*		*22%*
Hungary		*20%*		*14%*
Poland		*13%*		*23%*
Slovakia		*11%*		*6%*
Slovenia		*7%*		*2%*
2. Southern Eastern Europe[2]	20%		11%	
Croatia		*7%*		*2%*
Romania		*7%*		*5%*
3. Baltic states[3]	1%		5%	
4. Other former Soviet Republics[4]	6%		17%	
Russia		*3%*		*10%*
Total	937 (100%)		1185 (100%)	

Notes: The table shows column percentages. Individual countries are reported only if the column percentage for either Austrian or German parent firms (or both) exceeds 5%.
[1] The Czech Republic, Hungary, Poland, Slovakia and Slovenia.
[2] Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania and Serbia.
[3] Estonia, Latvia and Lithuania.
[4] Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan.

Figure 7: THE FREQUENCY OF TRANSPLANTING THE LEVEL OF DECENTRALIZATION



Notes: Using the information on the level of decentralization of individual corporate decisions in the parent and affiliate firms, three aggregate measures of transplantation are contructed. The dummy variable *identical* indicates whether or not all 13 corporate decisions are taken at the same level of decentralisation in the subsidiary firm as in the parent firm. The dummy variable *identical or similar* takes a value of one if the level of decentralisation is the same for each corporate decision or if it differs for one of the decisions. Finally, the dummy variable *identical, similar or partially different* takes a value of one if the level of decentralisation is the same for each corporate decision with up to two exceptions.

Table 7: Corporate Decisions in Subsidiary and Parent Firms

Corporate decision[1]	Subsidiary firms with the same level of decentralisation as parent firms[2]	Mean level of decentralisation[3]	
		Subsidiary firms	Parent firms
on acquisitions	78%	1.41	1.34
to hire a new secretary	70%	4.65	4.15
to hire two new workers	64%	4.26	3.67
to change a supplier	61%	3.23	3.09
on transfer prices	61%	2.43	2.45
on budget	60%	2.72	2.70
to hire 20 new workers	59%	2.82	2.51
to introduce a new product	55%	2.80	2.76
on wage increase	55%	4.10	3.45
on product price	54%	3.75	3.48
on a new strategy	54%	1.88	1.90
financial decisions	52%	2.54	1.90
on R&D expenditure	51%	2.58	2.79

[1] 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 similar decisions in affiliate firms compared with parent firms to the least similar decisions.
[2] Percentage of subsidiary firms in which a particular decision is taken at the same level of decentralization as in parent firms.
[3] Mean over the rank of one to five with one (centralised) meaning only the headquarters of the parent firm takes the decision, and five (decentralised), the decision is delegated to the divisional manager (parent firm) or to the subsidiary manager (subsidiary firm).

Table 8: Description of Variables and Data Sources

Variable	Description
Corporate Organization	
Identical	dummy that takes a value of one if all corporate decisions are taken at the same level of decentralisation in the subsidiary as in the parent firm and zero otherwise
Identical or similar	dummy that takes a value of one if all corporate decisions are either taken at the same level of decentralisation in the subsidiary as in the parent firm or if the level of decentralisation of one decision differs and zero otherwise
Identical, similar or partially different	dummy that takes a value of one if the level of decentralisation is the same for each corporate decision with up to two exceptions and zero otherwise
Decentralisation of parent firm	mean of ranking between one (centralised) and five (decentralised) of several corporate decisions depending on whether the headquarters (centralised) or the divisional manager of the parent firm (decentralised) makes the decision; see Table 7 for a listing of corporate decisions
Decentralisation of subsidiary firm	mean of ranking between one (centralised) and five (decentralised) of several corporate decisions depending on whether the headquarters of the parent firm (centralised) or the subsidiary manager (decentralised) makes the decision; see Table 7 for a listing of corporate decisions
Decentralisation of multinational	mean of decentralisation of parent and subsidiary firm under the 'transplant' strategy (three versions of this variable are derived, depending on whether the 'transplant' strategy refers to (i) identical, (ii) identical or similar or (iii) identical, similar or partially different level of decentralisation between the parent and subsidiary firm)
Human resource policy	
Incentive salary in parent firm	dummy that takes a value of one if the parent firm rewards workers' performance through salary increases and zero otherwise
Communication costs	
Distance	distance between the cities where the parent and the subsidiary firms are located (in km)
Common spoken language	measure of common spoken language as developed by Melitz and Toubal (2014) (measures ease of communication)
Technology	
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
Market Competition	
Share of multinationals, host market	ratio of the number of enterprises or establishments with inward FDI activity to the total number of enterprises and establishments at the two-digit ISIC Rev.3 level in host market (in percent), reference year: 2000

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Variable	Description
Share of multinationals, home market	ratio of the number of enterprises or establishments with inward FDI activity to the total number of enterprises and establishments at the two-digit ISIC Rev.3 level in home market (in percent), reference year: 2000
Many domestic competitors, subsidiary	dummy that takes a value of one if the subsidiary firm faces many competitors at the domestic market and zero otherwise
Many domestic competitors, parent	dummy that takes a value of one if the parent firm faces many competitors at the domestic market and zero otherwise
Many world competitors, subsidiary	dummy that takes a value of one if the subsidiary firm faces many competitors worldwide and zero otherwise
Many world competitors, parent	dummy that takes a value of one if the parent firm faces many competitors worldwide and zero otherwise
Host market Lerner	the inverse of the original Lerner index calculated as $1-(P-MC)/P = MC/P$ where P is the market price of a product as proxied by sale revenues and MC are the marginal costs of production as proxied by personnel costs; averaged for all subsidiary firms at the one-digit ISIC Rev.3 level (in percent)
Home market Lerner	calculated as host market Lerner but using data of all parent firms at the one-digit ISIC Rev.3 level
$\longrightarrow$ *Source of FDI data: Activity of Multinationals (OECD, 2012)*	
$\longrightarrow$ *Source of data on total number of firms: Structural Analysis database (OECD, 2009)*	
Firm size controls	
Size of parent firm	number of employees of parent firm
Size of subsidiary firm	number of employees of subsidiary firm
Survey controls	
Respondent is an executive	dummy that takes a value of one if the respondent to the survey was an executive and 0 otherwise
Respondent is a middle manager	dummy that takes a value of one if the respondent to the survey was a middle manager (i.e. divisional manager) and 0 otherwise
Other controls	
Intra-firm trade	dummy that takes a value of one if intra-firm trade between the parent and the subsidiary firm takes place and zero otherwise
Size of investment	the value of parent firm's investment in a subsidiary firm (in EUR)
Home country dummy	dummy that takes a value of one if the parent firm is located in Germany and 0 otherwise
Host country dummies	country dummies for the location of subsidiary firm
Industry dummies	one-digit industry dummies for the subsidiary firm based on ISIC Rev.3

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 9: Descriptive Statistics

Variable	Obs.	Mean	Min	Max	Std. Dev.	Obs. with dummy = 1
Corporate Organization						
Identical	1335	0.15	0	1	0.35	196
Identical or similar	1335	0.24	0	1	0.43	318
Identical, similar or partially different	1335	0.32	0	1	0.47	422
Decentralisation of parent firm	1472	2.81	1	5	0.84	.
Decentralisation of subsidiary firm	1388	2.95	1	5	0.69	.
Decentralisation of multinational under						
↪ identical	196	2.94	1	4.44	0.75	.
↪ identical or similar	318	3.03	1	4.73	0.69	.
↪ identical, similar or partially different	422	2.99	1	4.73	0.67	.
Incentive salary in parent firm	1549	0.14	0	1	0.34	210
Communication Costs						
Distance	2122	903.04	17	6000	799.24	.
Technology						
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
Market Competition						
Share of multinationals, host market	1281	1.79	0	27.6	4.47	.
Share of multinationals, home market	1862	1.31	0	18.45	3.13	.
Many domestic competitors, subsidiary	1978	0.46	0	1	0.50	900
Many domestic competitors, parent	2058	0.46	0	1	0.50	940
Many world competitors, subsidiary	1938	0.29	0	1	0.45	563
Many world competitors, parent	2010	0.73	0	1	0.45	1463
Host market Lerner	2122	17.35	8.87	54.55	5.89	.
Home market Lerner	2122	24.01	13.22	32.48	6.15	.
Firm size controls						
Size of parent firm	1993	6970.20	1	233000	25233.78	.
Size of subsidiary firm	1921	346.61	1	49000	1660.02	.
Survey controls						
Respondent is an executive	2122	0.19	0	1	0.40	411
Respondent is a middle manager	2122	0.08	0	1	0.27	162
Other controls						
Intra-firm trade	2122	0.33	0	1	0.47	692
Size of investment (in EUR million)	2030	16.7	0.001	3270	95.5	.
Subsidiary firms and distinct host countries per parent firm						
Number of subsidiaries per parent	669	3.17	1	41	3.64	.
Number of host countries per parent	669	2.47	1	17	2.30	.

Table 10: Determinants of Transplanting the Level of Decentralization

Dependent variable:	(1)	(2)	(3)
Level of decentralization	Identical	Identical or similar	Ideantical, similar or or partially different
Human resource policy			
Incentive salary in parent firm	0.30*	0.64***	0.29**
	(0.07)	(0.00)	(0.01)
Communication costs			
Log (distance)	-0.34***	-0.30***	-0.21***
	(0.00)	(0.00)	(0.00)
Technology			
Technology is established	0.37	0.22	0.22*
	(0.29)	(0.22)	(0.05)
Technology is innovative	1.01***	0.72***	0.60***
	(0.00)	(0.00)	(0.00)
Market competition			
Share of multinationals, host market	0.03***	0.03***	0.01
	(0.00)	(0.01)	(0.15)
Share of multinationals, home market	-0.07***	-0.04**	-0.03*
	(0.00)	(0.03)	(0.06)
Observations	631	631	631
Pseudo R^2	0.112	0.095	0.070
Firm size controls (2)	Y	Y	Y
Survey controls (2)	Y	Y	Y

Notes: * significant at 10%, ** significant at 5%, ***significant at 1%. Probit estimates with standard errors clustered by host country. P-values are reported in parentheses. The dependent variables are dummy variables that indicate whether the level of decentralisation between the parent and subsidiary firms is *identical* (column 1), *identical or similar* (column 2) and *identical, similar or partially different* (column 3). *Incentive salary in parent firm* is a dummy that takes a value of one if the parent firm reward workers' for performance through salary increases. *Distance* is the distance between parent and subsidiary firm in km. *Technology is established* and *technology is innovative* are dummy variables that indicate the nature of the technology transferred to a subsidiary firm, while *technology is outdated* is the omitted category. *Share of multinationals* is the share of multinational firms in total firms operating in a market. Firm size controls refer to the log of the number of employees in the parent and subsidiary firms. Survey controls include two dummy variables, which indicate whether the survey respondend is an executive or a middle (i.e. division) manager respectively. See also Table 8 in Appendix B for more detailed definitions of the variables.