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Tobias Seidel

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Abstract

I show in this paper that incomplete contracts affect a firm's decision about serving foreign customers through exports or local sales from an affiliated plant. When contracts between two agents within a firm are too costly to write, the share of multinational firms may be higher or lower compared to a world without contractual frictions. Incomplete contracts also provide a novel explanation for why horizontal multinational activity may increase when trade costs fall - a result that is at odds with the proximity-concentration trade-off.

JEL-Code: F12, F15, F23.

Keywords: multinational firms, exports, incomplete contracts.

Tobias Seidel
ETH Zurich
Department of Management
Technology and Economics
WEH E4
Weinbergstrasse 35
8092 Zurich
Switzerland
seidel@kof.ethz.ch

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1 Introduction

Advancements in communication and computer technology allow firms to coordinate complex production processes within large organizational structures. It is common in modern manufacturing that a large number of agents contributes to a final product even within firm boundaries. While this development may lead to productivity gains, the increasing specificity of the tasks often renders intra-firm contracts between agents difficult to write. This is especially true if the characteristics of the intermediate inputs are only revealed after they have been produced. If agents cannot commit not to renegotiate an initial contract, the hold-up problem leads to a suboptimal outcome where agents may produce too little of the required inputs by not hiring enough workers or by providing too little effort.

In this paper, I show that incomplete contracts play a crucial role for the mode of foreign market entry. In a model where firms choose between foreign direct investment (FDI) to serve customers through local sales and exporting, contractual frictions may *encourage* or *discourage* FDI compared to a standard trade model where complete contracting prevails. It is even possible that the share of horizontal multinational firms decreases in trade costs. This finding is at odds with the well-known proximity-concentration trade-off (Markusen, 1984, Brainard, 1997) where more firms tend to prefer FDI at higher levels of trade barriers to save transport costs. The model thus suggests a novel mechanism explaining the increasing importance of FDI in times of falling trade barriers (Lommerud, Meland and Sørgard, 2003).

The paper builds on the notion that contracts are incomplete even within the firm. The so-called property-rights approach to the theory of the firm roots in seminal work by Williamson (1985) and Grossman and Hart (1986). They argue that ownership rights affect the bargaining position of agents which may increase or decrease profits of the integrated company thus determining the boundaries of the corporation. Antràs (2003) applied this idea to the vertical integration decision of multinational enterprises (MNE) to explain the pattern of intra-firm trade. In a similar vein, Antràs and Helpman (2004) derive determinants of global sourc-

ing decisions in a heterogeneous-firms model where incomplete contracts shape the organizational structure of multinational enterprises.[1] A recent empirical literature broadly supports the incomplete-contracting mechanism suggested in the theoretical work.[2]

This paper has nothing to say about the boundaries of the firm, but rather identifies incomplete contracts as a novel determinant for the mode of foreign market entry.[3] In contrast to the literature discussed above, firm boundaries are exogenous in my model by assuming that intermediate goods are solely fabricated in-house. Hence, both exporters and MNEs are vertically integrated and multinational companies would be established purely to serve customers locally instead of taking advantage of production cost differences for producing intermediate goods.

Nevertheless, incomplete contracts have implications for the attractiveness of FDI. Every firm (plant) consists of two units, a management unit and a component supplier each contributing an intermediate input for final assembly. The management owns the property rights of the component supplier and chooses the mode of foreign market entry. As no enforceable contract can be written between the two parties within the firm, each party underinvests according to the respective share they obtain of the joint surplus in the ex-post bargaining. The key idea is that the management has a stronger bargaining position in a multinational organization because it can at least partly service one market through exports from its plant in the other country in case the negotiations fail. Obviously, this effect becomes more pronounced at lower trade costs.[4]

However, a stronger bargaining position does not necessarily increase profits. If the revenue share of the management becomes larger, the ex-ante investment

[1] Other examples comprise Antràs (2005) and Carluccio and Fally (2010).

[2] See Bernard, Jensen, Redding and Schott (2010), Corcos, Iraq, Mion and Thisse (2009), Defever and Toubal (2007), Nunn and Trefler (2007) and Yeaple (2006).

[3] See Markusen (2002) and Barba Navaretti and Venables (2004) for a more detailed discussion of other potential determinants for FDI.

[4] The idea that globalization strengthens the bargaining position of multinational firms has also been emphasized in the trade union literature by Eckel and Egger (2009). As the organizational choice affects the wage level, unionization may work as an independent determinant for FDI. Lommerud, Meland and Sørgard (2003) argue in a different framework that trade liberalization may encourage foreign direct investment as the firm can thereby avoid higher union wages.

incentives of the component supplier become weaker while the management's underinvestment is attenuated. Technology then tips the scales. If the required share of management inputs is small, the more severe underinvestment of the component supplier tends to dominate the higher supply of management inputs resulting in a lower overall profit level. In that case, incomplete contracts *discourage* FDI. If technology requires a large input share from the management unit, however, contractual frictions *encourage* FDI as the implied stronger bargaining position of the management leads to higher profits.

As both the proximity-concentration trade-off and incomplete contracts operate in the model, a reduction in trade costs generally has two effects. (i) From the former channel, it makes exporting relatively more attractive compared to FDI, and (ii) incomplete contracts may stimulate either exporting (at low management intensity) or FDI (at high management intensity). It is thus possible that the second channel dominates the first when the management input share is large. This establishes a novel explanation for why FDI may increase in times of falling trade costs.

The paper is organized as follows. I present the model in Section 2 and study the role of incomplete contracts for foreign direct investment under trade liberalization in Section 3. Section 4 offers concluding remarks.

2 The model

Consider a world with two identical countries where labor is the only factor of production. Consumer preferences over a differentiated good X and a homogeneous commodity Y are described by the utility function

$$U = C_X^{\gamma} C_Y^{1-\gamma}, \qquad 0 < \gamma < 1 \tag{1}$$

where C_X and C_Y represent the respective consumption levels of each good with $C_X \equiv \left(\int_{v \in V} c_x(v)^{\alpha} dv\right)^{1/\alpha}$ being a CES-aggregator composed of a mass V of differentiated varieties. The parameter $0 < \alpha < 1$ governs the elasticity of substitution between any two varieties given by $\varepsilon = 1/(1-\alpha)$. Utility maximization delivers

demand for variety v

$$c_x(v) = \frac{\bar{p}(v)^{-\varepsilon}}{P}\gamma E, \tag{2}$$

where $P = \int_{v\in V} \bar{p}(v)^{1-\varepsilon} dv$ represents a consumer price index of the differentiated good, $\bar{p}(v)$ is the consumer price of variety v and E denotes total income. As individuals spend constant shares of their income on each good, we get $C_X = \gamma E/P$ and $C_Y = (1-\gamma) E/P_Y$.

One unit of labor is required to produce one unit of the homogeneous good being sold in a perfectly competitive market. As I assume zero transport costs for Y, I normalize its price, P_Y, to unity and choose it as numéraire. Labor mobility across sectors then pins down wages in both countries to one. In the X-sector, firms behave as monopolists facing a constant elasticity of substitution. They have to invest f units of labor to set up a plant in their domestic market. To serve customers abroad, firms can choose between exporting (subscript e) and foreign direct investment (subscript m). While the former implies iceberg transport costs such that $\tau > 1$ units have to be shipped for one unit to arrive at the final destination abroad, setting up a foreign affiliate requires a fixed investment of f_m units of labor.

Each company consists of two entities: (i) a management unit H supplying an intermediate input h and deciding about the organizational structure of the firm; and (ii) a component production unit Q supplying q. Both inputs are characterized by the same production technology as the numéraire good with one unit of labor required for one unit of output. To obtain a variety of the differentiated good, these two inputs need to be combined at zero costs according to the following technology

$$x(\varphi) = \varphi \left(\frac{h}{\eta}\right)^{\eta} \left(\frac{q}{1-\eta}\right)^{1-\eta}, \tag{3}$$

where η determines the relative importance of each input in the final assembly and φ denotes a firm-specific productivity level drawn from a commonly-known distribution function $G(\varphi)$.

To found a company, the management has to find a component supplier to engage

in a specific relationship. With an infinitely elastic supply of Q, the management offers a contract specifying a fee for the right to exclusively supply a component for the final variety.[5] Although both entities become part of the same company and the management owns the property rights of Q, each party decides about the output levels of h and q in an uncoordinated fashion. This notion is based on the property-rights approach to the theory of the firm postulating that contracting is incomplete even within organizational structures. According to seminal papers by Grossman and Hart (1986) and Hart and Moore (1999), agents cannot commit not to renegotiate about joint profits after intermediate outputs have been produced because the precise characteristics of the two goods are only revealed after the investment is sunk. As writing a contract specifying which intermediate good has to be delivered under each state of the world would be too costly, agents bargain ex post about the joint surplus of the relationship.

This idea has been applied to the internalization decision of multinational firms choosing between in-house production and outsourcing.[6] As the choice of ownership affects ex-post outside options in the bargaining and thus ex-ante investment incentives of agents, incomplete contracting may give rise to arm's-length transactions or vertical integration – depending on industry characteristics. I deviate from this literature as ownership is not a choice variable in this model. Here, the management owns the component supplier under both exporting and foreign direct investment so that this channel cannot affect the agents' bargaining position. What does affect the bargaining power, however, is a combination of the organizational choice and trade costs. While the bargaining power of both agents within the firm is exogenous for exporting firms, foreign investment strengthens the position of the management. This is based on the idea that the management of the multinational firm can satisfy the demand of local customers to some extent $0 < \lambda < 1$ by imports from its foreign affiliate if negotiations fail. This leads to a strictly higher outside option for H under foreign direct investment than under exporting. For convenience, I normalize the fall-back option for component suppliers under both organizational forms and

[5]Note that in contrast to the production decisions, the "partnership contract" is complete.
[6]See, for example, Antràs (2003, 2005) and Antràs and Helpman (2004).

the fall-back option for the management under the exporting status to zero. Thus, parties negotiate about a smaller revenue level in a multinational firm than they would in the exporting regime.[7]

Labeling firm revenues by r and accounting for trade costs, the outside option of the MNE-management is $\lambda\phi r$ with $0 \leq \phi \equiv \tau^{1-\varepsilon} \leq 1$ denoting a trade freeness measure. Hence, H receives its outside option plus a fraction β of the quasi-rents, such that $\lambda\phi r + \beta(1-\lambda\phi)r$, while Q gets $(1-\beta)(1-\lambda\phi)r$. I follow the notion that a stronger bargaining power translates into a larger revenue share such that I use both terms to refer to β. The management revenue shares for both firm types can thus be summarized as follows:

$$\beta_m = \beta + \lambda\phi(1-\beta) \geq \beta_e = \beta. \tag{4}$$

It is evident from (4) that the bargaining weights are only identical for both firm types if trade costs are prohibitively high, that is $\phi = 0$, and that β_m exceeds β_e more at lower levels of trade costs.

The management unit chooses h to maximize $\beta_l r_l - h_l$ for each market while the component supplier Q maximizes $(1-\beta_l)r_l - q_l$ with respect to q, where $l = e, m$. Taking the inverse demand based on (2) to compute revenues and plugging in (3) allows us to derive the optimal supply levels of h_l and q_l from the two parties' perspectives.[8] We then obtain profits of exporters and multinational firms as

$$\begin{aligned}\pi_e(\varphi) &= (1+\phi)\frac{(1-\tilde{\alpha}_e)p_e^{1-\varepsilon}}{P}\gamma E - f \\ \pi_m(\varphi) &= 2\frac{(1-\tilde{\alpha}_m)p_m^{1-\varepsilon}}{P}\gamma E - f - f_m,\end{aligned} \tag{5}$$

where $\tilde{\alpha}_l = \alpha[\beta_l\eta + (1-\beta_l)(1-\eta)]$. Accounting for the incomplete contracting

[7]Note that I abstract from the case where H can seize the inputs q and fire the manager of the component supplying unit. This can be motivated by the notion that both parties have to be active in assembling the final good due to specific know-how. Beyond this, the assumption is innocent as the outside options of H would be identically affected under both organizational forms.

[8]See Appendix A for a derivation.

environment, the profit-maximizing producer price is given by

$$p_l(\varphi) = \frac{1}{\alpha\varphi\beta_l^{\eta}(1-\beta_l)^{1-\eta}}. \tag{6}$$

Following Do and Levchenko (2009), a fixed mass N of management units can potentially enter the market. Each management knows the firm-specific productivity level φ and selects the organizational structure that ensures maximum profits. With an infinitely elastic supply of component producers and a zero outside option of this agent, the fee that Q has to pay upfront to engage in the specific relationship with H equals the profit accruing to this agent. Hence, all profits fall onto the management unit in a subgame-perfect equilibrium.[9]

To see the impact of incomplete contracts on the organizational choice, it is useful to define $\Delta\pi(\varphi) \equiv \pi_m(\varphi) - \pi_e(\varphi)$. This yields

$$\Delta\pi(\varphi) = [2\Omega - (1+\phi)]\frac{(1-\tilde{\alpha}_e)p_e^{1-\varepsilon}}{P}\gamma E - f_m, \tag{7}$$

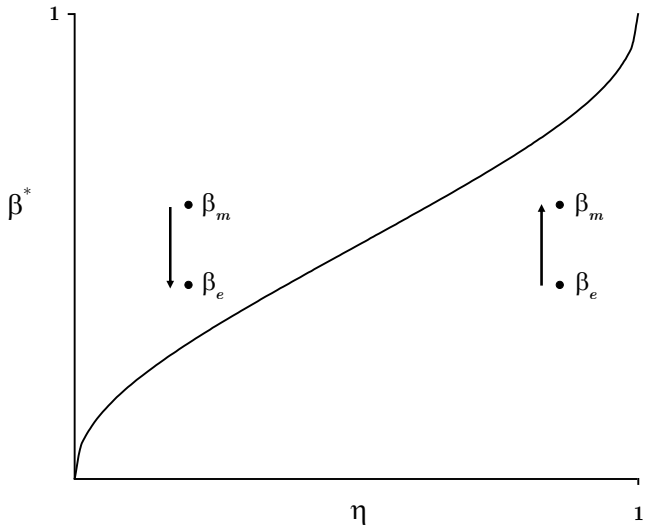
where

$$\Omega = \frac{1-\tilde{\alpha}_m}{1-\tilde{\alpha}_e}\left[\frac{\beta_m(1-\beta_m^{\eta})^{1-\eta}}{\beta_e(1-\beta_e^{\eta})^{1-\eta}}\right]^{\varepsilon-1}.$$

We observe from (7) that incomplete contracts give rise to an additional channel beyond the proximity-concentration trade-off influencing the foreign market entry mode decision. In the case of perfect contracts, $\Omega = 1$ and we obtain the standard result that more productive firms select foreign direct investment while those firms with a lower productivity level serve foreign customers through exports. The intuition for this outcome relates to the insight that high-productivity firms sell more and earn higher profits rendering the coverage of additional fixed costs for setting up a foreign affiliate relatively easier (see Helpman, Melitz and Yeaple, 2004). However, when contracts cannot be written between agents within the firm at reasonable costs, Ω deviates from unity. The direction of change can be both positive or neg-

[9]See Antràs and Helpman (2004) for a more detailed discussion of subgame perfectness in the Nash bargaining.

Figure 1: Profit-maximizing revenue shares



ative so that contractual frictions may encourage or discourage FDI. The value of Ω crucially depends on the interplay between the bargaining weights β_l and the technology parameter η.

If the management was able to choose the bargaining power (revenue share) that maximizes profits, referred to as β^*, it would select a higher β the higher its input contribution as measured by η. As illustrated in Figure 1, $\beta^*(\eta)$ is monotonically increasing in η with $\beta^*(0) = 0$ and $\beta^*(1) = 1$.[10] The positive slope of this function becomes intuitively clear if one focuses on the impact of an increase in the management's bargaining weight on the investment incentives for each party. Both agents produce inefficiently low levels of their intermediate goods as they only receive a fraction of the marginal returns to their investments. A higher β fosters the component supplier's underinvestment in q exerting a negative impact on joint output according to (3) while the incentives for the management work in the opposite direction. If the contribution of the component supplier is low (η is high), the management prefers a higher bargaining power to extract a higher share of joint

[10]This figure is borrowed from Antràs and Helpman (2004).

revenues because the more severe underinvestment in components weighs relatively little. On the contrary, if η is low and components make up for a large fraction of inputs in production, the management prefers a lower revenue share in the bargaining to avoid a severe underinvestment in components. I follow the literature in assuming that the management cannot choose the optimal level of β, but only has the choice between two bargaining positions by choosing the organizational structure of the firm. This can be rationalized by arguing that the management cannot commit not to take advantage of the outside option under foreign direct investment and the component supplier takes this behavior into account.

As interior solutions allowing for co-existence of both exporters and multinational firms are most interesting, I assume that the fixed cost of setting up a foreign affiliate is sufficiently high such that the least productive firm in the market earns strictly higher profits from exporting than foreign direct investment. Denoting by φ_e^* the productivity level associated with zero profits of the least productive firm, I use $\Delta\pi\left(\varphi_e^*\right) < 0$ to get the sufficient condition

$$f_m > \left[\frac{\Omega}{1+\phi} - 1\right] f$$

which is assumed to hold throughout the analysis.

3 Trade liberalization and FDI

To obtain closed-form solutions, I take advantage of Pareto-distributed productivity levels according to $G\left(\varphi\right) = 1 - \varphi^{-k}$. Without loss of generality, I have normalized the scale parameter (pinning down the lowest possible productivity level a firm can draw) to unity. Higher values of the shape parameter k indicate a higher probability of drawing a low φ. Obtaining the cutoff productivity of multinational firms from $\Delta\pi\left(\varphi_m^*\right) = 0$, the share of multinational companies is given by

$$\mu = \left(\frac{\varphi_e^*}{\varphi_m^*}\right)^k = \left[\frac{f}{f_m}\left(\frac{2\Omega}{1+\phi} - 1\right)\right]^{\frac{k}{\varepsilon-1}}. \tag{8}$$

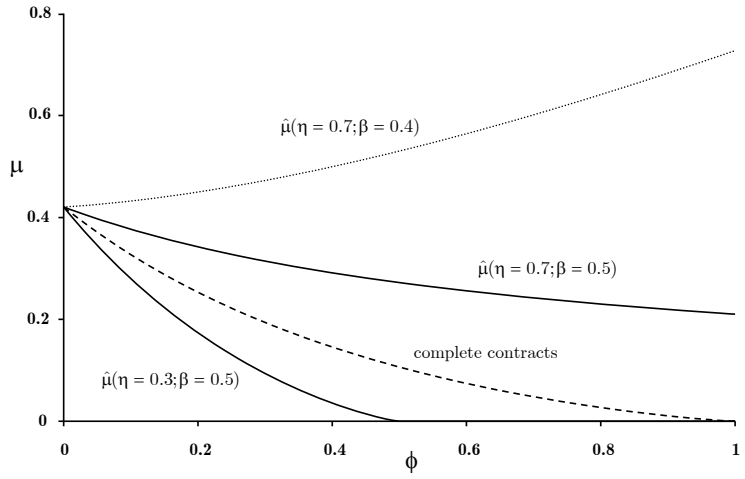
Since Ω can generally be smaller or larger than unity, incomplete contracts have an ambiguous effect on μ. Recall that firm profits increase in β whenever $\beta < \beta^*$ and vice versa. For illustrative reasons, I thus depict two distinct cases: (i) one where $\beta < \beta^*$ and (ii) another where $\beta > \beta^*$ as shown in Figure 1. The arrows in the figure indicate the direction of changes in β that are associated with increases in firm profits.

In component-intensive industries, the management would prefer a rather low bargaining power in order to avoid a severe underinvestment of the component supplying unit. However, choosing a multinational organizational structure moves the bargaining weight up compared to an exporter rendering profits under foreign direct investment *lower* for a larger number of firms. If β falls short of the profit-maximizing level, however, incomplete contracts provide a novel mechanism to increase firm profits: through a stronger bargaining position of the management vis-à-vis the component supplier. As a consequence, a *higher* number of firms prefers foreign direct investment to exporting. These two distinct cases are contrasted in Figure 2 with the benchmark case of no contractual frictions (dashed line) for the range from prohibitively high trade costs ($\phi = 0$) to free trade ($\phi = 1$).[11]

Note that the share of multinational firms is affected by two mechanisms in this framework: (i) the proximity-concentration trade-off, and (ii) incomplete contracts. The former channel in isolation causes μ to decline in ϕ because exporting becomes relatively more attractive at lower levels of trade costs. Obviously, horizontal multinational activity ceases when trade is free. When contracts are incomplete, multinational activity may be higher or lower compared to complete contracting, but coincides when trade costs are prohibitively high. The latter must be true because the outside option of the management is also zero under FDI as the management does not have the opportunity to serve one market from sales of its foreign plant such that $\beta_e = \beta_m$. Hence, becoming a multinational firm does not imply any additional advantage. Denoting by $\hat{\mu}$ the share of multinational firms under incomplete contracts and by μ the benchmark case, we can conclude that $\hat{\mu} < \mu$ whenever

[11] The parameters underlying Figure 2 are as follows: $\alpha = 0.8$, $\lambda = 0.1$, $f = 1$, $f_m = 2$, and $k = 5$.

Figure 2: The share of multinational firms

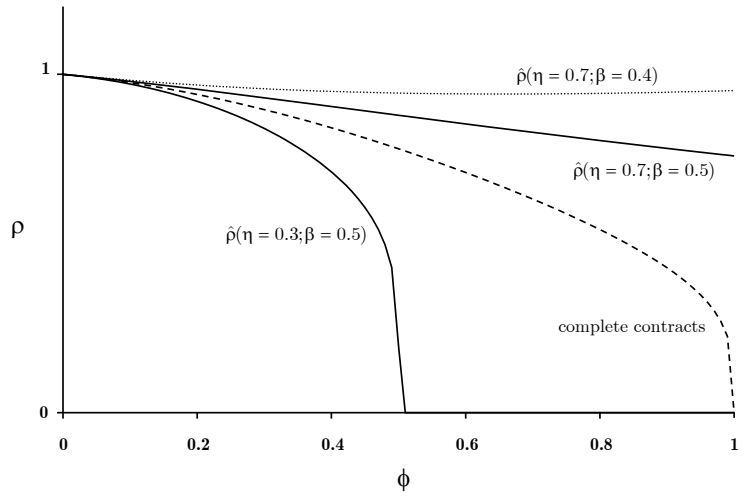


$\beta > \beta^*$. Choosing λ such that $\beta_m \leq \beta^*$ for all ϕ, we can further conclude that $\hat{\mu} > \mu$ whenever $\beta < \beta^*$. In that case, there is an incentive to engage in foreign direct investment even when trade is entirely free because the increase in operating profits due to a higher bargaining weight compensates for the additional fixed costs f_m.[12]

The model also allows for the case where the share of multinational firms increases when trade barriers fall. Starting from a scenario where $\beta < \beta^*$, a reduction in trade costs generally has two effects. First, profits of exporters strictly rise relative to those of multinational firms due to the proximity-concentration trade-off. While trade costs fall, the fixed costs of setting up a foreign affiliate remain unaffected. Second, as profits increase in the bargaining weight in this case, trade liberalization raises profits of multinationals relative to those of exporters since β_m monotonically grows in ϕ. Starting from a low level of β, a reduction in trade costs may raise the management's bargaining power sufficiently much such that the implied increase in profits from choosing FDI due to the bargaining channel dominates the relative increase in profits of exporting firms due to the proximity-concentration trade-off.

[12]Generally, when λ is sufficiently high such that an increase in ϕ boosts β_m beyond the profit-maximizing level β^*, the share of multinational firms may drop below the benchmark level under complete contracts for lower levels of trade costs.

Figure 3: The share of affiliate sales



What implications do incomplete contracts have for the share of affiliate sales in overall sales of foreign-owned firms in a given market? To shed light on this question, it is useful to calculate the ratio of export revenues relative to revenues of affiliated plants. Denoting this measure by $\tilde{\rho}$, we get

$$\tilde{\rho} = \phi \left[\frac{\beta_m^{\eta} (1-\beta_m)^{1-\eta}}{\beta_e^{\eta} (1-\beta_e)^{1-\eta}} \right]^{1-\epsilon} \left\{ \left[\left(\frac{2\Omega}{1+\phi} - 1 \right) \frac{f}{f_m} \right]^{\frac{\varepsilon-k-1}{\varepsilon-1}} - 1 \right\}. \tag{9}$$

It is then straightforward to calculate the value of affiliate sales relative to the sum of export and affiliate sales revenues as $\rho = 1/(1+\tilde{\rho})$. Figure 3 plots this ratio as a function of trade freeness for the same scenarios as in Figure 2. Obviously, the value of exports is zero at prohibitively high trade costs ($\phi = 0$), so $\rho = 1$. When contracts are complete, ρ is decreasing in ϕ with frictionless trade implying zero affiliate sales. This benchmark is represented by the dashed line in the figure. Note that two effects are responsible for this relationship: (i) a *price-demand effect* as a reduction in trade costs increases the value of exports; and (ii) a *selection effect* as exporting becomes the preferred mode of foreign market entry at lower levels of trade barriers. In the benchmark, both channels work in the same direction causing

a negative link between the share of affiliate sales and trade freeness.

How do incomplete contracts modify this relationship? If the revenue share of the management is above the profit-maximizing level β^* ($\eta = 0.3; \beta = 0.5$), an increase in ϕ implies a lower share of affiliate sales compared to the benchmark. First, trade liberalization affects the producer price of multinational firms under incomplete contracts according to (6). With $\beta < \beta^*$, an increase in ϕ increases the producer price of MNEs leading to both lower demand and profits. This in turn stimulates more firms to choose exporting as compared to foreign direct investment magnifying the selection effect of the proximity-concentration trade-off when trade costs decline. Recall that the share of multinational firms in the total number of operating firms falls short of the one under the benchmark scenario.

If the management's revenue share is smaller than the profit-maximizing level β^* ($\eta = 0.7; \beta = 0.5$), we observe a higher level of ρ. Trade liberalization would lead to a reduction in producer prices of multinational firms and higher profits. This creates incentives for more firms to organize as MNEs. Finally, if the share of multinational firms increases when trade costs decline, it is even possible that ρ remains constant or slightly increases for a certain range of trade costs (dotted line). Here, the countervailing effect of an increasing share of multinational firms at higher trade freeness is strong enough to prevent a decline in ρ.

Taking a look at stylized facts, we observe from Table 1 that the share of local sales by US affiliates relative to total US sales in the respective country or region

Table 1: Share of local sales of US affiliates

	1997	2002	2008
All countries	60.2	63.5	64.6
Canada	48.3	53.5	58.1
Europe	76.9	78.1	76.9

Notes: This table reports the share of local sales of US affiliates relative to the sum of US exports to that country and local sales of US affiliated plants. The ratios are computed from US Census data.

stayed constant (for Europe) or slightly increased (for All countries and Canada) over the time period 1997-2008. There are certainly a number of potential explanations for this trend. But assuming that trade costs declined over those twelve years, the incomplete-contracting mechanism suggested in this paper is in line with these stylized facts and might have contributed to the overall development. It remains an empirical question to evaluate the role of incomplete contracts as a causal determinant for the share of affiliate sales.

One alternative explanation for this trend has recently been highlighted in the trade union literature. Lommerud, Meland and Sørgard (2003) argue that foreign direct investment helps avoiding higher union wages giving rise to a novel determinant for serving the foreign market locally. While this insight is derived in a model where one monopolist operates in each country, Eckel and Egger (2009) stress the role of union wage bargaining in a heterogeneous-firms model with co-existence of exporters and MNEs. In their analysis, the fall-back profits increase through foreign direct investment causing lower negotiated wages for multinational firms compared to exporters. This cost-saving effect provides an additional incentive for setting up a foreign affiliate and can dominate the trade-cost-saving effect of choosing exporting.

4 Concluding remarks

In this paper, I have highlighted the role of incomplete contracts for the mode of foreign market enty. Beyond the well-understood proximity-concentration trade-off, hold-up problems may encourage or discourage foreign direct investment compared to a complete contracting environment. This depends on the interplay between the technologically required contribution of each agent in the production process and the respective bargaining weights of the negotiating parties. By choosing the organizational form, the management can influence its bargaining power vis-à-vis the in-house component supplier. Under foreign direct investment, the management obtains a higher outside option than under exporting as it can threat the component supplier to satisfy demand on one market through supplies from its affiliate in the other country if negotiations fail. Provided the management-related input share is

high, a higher bargaining power increases overall profits. This gives rise to a novel determinant for foreign direct investment. On the contrary, if the management-related input share is low, the management rather prefers exporting to foreign direct investment to keep the ex-ante underinvestment of the component supplier at a minimum.

Incomplete contracts also provide a novel explanation for why foreign direct investment may increase when trade costs fall. This outcome occurs whenever the profit gain due to a higher bargaining power of the management unit outweighs the profit loss of multinational firms relative to exporters when trade costs fall. This result is at odds with the implications of a model purely based on the proximity-concentration trade-off and in line with stylized facts on the share of local sales by US affiliated companies. It remains an open issue for future empirical research to evaluate the incomplete-contracting mechanism as a determinant for the mode of foreign market entry.

Appendix

A Derivation of optimal supply levels h and q

Combining the inverse demand function with the production function (3), we get revenues

$$r_l(\varphi) = \varphi^{\alpha} \left(\frac{h_l}{\eta}\right)^{\alpha\eta} \left(\frac{q_l}{1-\eta}\right)^{\alpha(1-\eta)} \left(\frac{\gamma E}{P}\right)^{1-\alpha}$$

Solving $\partial\left(\beta_l r_l(\varphi) - h_l\right)/\partial h_l = 0$ and $\partial\left(\left(1-\beta_l\right) r_l(\varphi) - q_l\right)/\partial q_l = 0$, we get

$$\frac{h_l}{\eta} = \alpha^{\frac{1}{1-\alpha}} \left(\beta_l\right)^{\frac{1-\alpha(1-\eta)}{1-\alpha}} \left(1-\beta_l\right)^{\frac{\alpha(1-\eta)}{1-\alpha}} \frac{\gamma E}{P} \varphi^{\frac{\alpha}{1-\alpha}}$$

$$\frac{q_l}{1-\eta} = \alpha^{\frac{1}{1-\alpha}} \left(\beta_l\right)^{\frac{\alpha\eta}{1-\alpha}} \left(1-\beta_l\right)^{\frac{1-\alpha\eta}{1-\alpha}} \frac{\gamma E}{P} \varphi^{\frac{\alpha}{1-\alpha}}$$

Using these insights, we can compute operating profits $r_l - h_l - q_l$ and finally obtain the profit functions as given in (5).

B Cutoff productivities and the number of firms

In this Appendix, I close the model and derive the productivity cutoffs of exporters and multinational firms as well as the equilibrium number of operating firms in sector X. For this, it is useful to derive the productivity level of the average firm in the market. Average productivity is derived to meet $P = 2Mp_e(\tilde{\varphi})^{1-\varepsilon}$. The price index is given by

$$P = N(1+\phi)\int_{\varphi_e^*}^{\varphi_m^*} p_e(\varphi)^{1-\varepsilon}\, dG(\varphi) + 2N\left(\frac{\beta_m^\eta(1-\beta_m)^{1-\eta}}{\beta_e^\eta(1-\beta_e)^{1-\eta}}\right)^{\varepsilon-1}\int_{\varphi_m^*}^{\infty} p_e(\varphi)^{1-\varepsilon}\, dG(\varphi)$$

Using $p_e(\varphi) = (\tilde{\varphi}/\varphi)\, p_e(\tilde{\varphi})$ together with $N = M/[1-G(\varphi_e^*)]$ and the Pareto parametrization yields

$$\tilde{\varphi} = \left[\frac{k}{2(k-\varepsilon+1)}\right]^{\frac{1}{\varepsilon-1}} \left\{(1+\phi) + \left[2\left(\frac{\beta_m^\eta(1-\beta_m)^{1-\eta}}{\beta_e^\eta(1-\beta_e)^{1-\eta}}\right)^{\varepsilon-1} - (1+\phi)\right]\mu\left(\frac{\varphi_m^*}{\varphi_e^*}\right)^{\varepsilon-1}\right\}^{\frac{1}{\varepsilon-1}} \varphi_e^*$$

to meet the initial definition of the price index. In a final step, we make use of the cutoff productivities φ_e^* and φ_m^* obtained from solving $\pi(\varphi_e^*) = 0$ and $\Delta\pi(\varphi_m^*) = 0$ to get

$$\tilde{\varphi} = \left[\frac{(1+\phi)\,k}{2(k-\varepsilon+1)}\left(1+\mu\delta\frac{f_m}{f}\right)\right]^{\frac{1}{\varepsilon-1}} \varphi_e^* \tag{B.1}$$

where

$$\delta \equiv \frac{2\left(\frac{\beta_m^\eta(1-\beta_m)^{1-\eta}}{\beta_e^\eta(1-\beta_e)^{1-\eta}}\right)^{\varepsilon-1} - (1+\phi)}{2\Omega - (1+\phi)}.$$

Using $r_e(\tilde{\varphi}) = (\tilde{\varphi}/\varphi_e^*)^{\varepsilon-1} r_e(\varphi_e^*)$ together with the zero profit condition of the marginal exporting firm yields revenues of the average firm as

$$r_e(\tilde{\varphi}) = \frac{(1+\phi)k}{2(k-\varepsilon+1)} \frac{f+\mu\delta f_m}{1-\tilde{\alpha}_e}.$$

Aggregate expenditures consist of labor income L and aggregate profits

$$\begin{aligned}\Pi =& M\left[(1-\tilde{\alpha}_e) r_e(\tilde{\varphi}) - (f+\mu f_m)\right] \\ =& M\left[\frac{k(1+\phi)(f+\mu\delta f_m)}{2(k-\varepsilon+1)} - (f+\mu f_m)\right].\end{aligned}$$

Noting that $\gamma E = \gamma(\Pi + L) = 2M r_e(\tilde{\varphi})$, the number of firms obtains as

$$M = \frac{(k-\varepsilon+1)\gamma L}{(1+\phi)k\left(\frac{1}{1-\tilde{\alpha}_e} - \frac{\gamma}{2}\right)(f+\mu\delta f_m) + (k-\varepsilon+1)\gamma(f+\mu f_m)}.$$

Plugging M into $\varphi_e^* = (M/N)^{-1/k}$ delivers the productivity cutoff for exporting firms which in turn can be used in (B.1) to obtain the productivity of the average firm.

Finally, indirect utility can be expressed as

$$V = \gamma^\gamma (1-\gamma)^{1-\gamma} P^{\frac{\gamma}{\varepsilon-1}} \frac{E}{L}.$$

It turns out that welfare is strictly increasing in the trade freeness measure ϕ, but on a lower level if contracts are incomplete compared to a frictionless world. Furthermore, the welfare level decreases the further β deviates from the profit-maximizing bargaining weight β^*.

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