Global banks, local financial development, and FDI

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Abstract

This paper contributes to an emerging literature on the financing decisions of a firm engaging in international trade. We extend previous models of multinational subsidiaries' financing to include external financial resources in the form of multinational banks. We find that the use of multinational banks drives increased export activity for multinational subsidiaries. Additionally, multinational banks are often better-suited than local banks, or the multinational parent, to monitor the exporting activities of the geographically distant subsidiaries. In contrast, we find that this multinational bank advantage does not extend to supporting the domestic activity of multinational affiliates. These findings are empirically tested using a firm-level panel of Central European exporters. Furthermore, there is a strong geographic bias to the choice of a multinational bank from the same country as a parent's subsidiary due to better access to multinational bank subsidiary services.

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1 Introduction

The international trade landscape has become increasingly complex worldwide. Multinational corporations seek to expand their operations across borders, a venture that requires large amounts of resources to accomplish. As a result, there has been a growing interest in understanding the financing decisions of firms that engage in international trade and foreign direct investment. The growth in foreign direct investment around the world in the last 30 years has also been accompanied by a parallel growth in financial globalization.

Financial globalization is a broad concept that is difficult to define academically, but can be measured by an increase in cross-border financial flows. A country electing to increase its financial integration will open itself up to international capital markets. Several emerging market economies have opted to participate in financial globalization by allowing multinational banks to establish a presence there. Multinational banks are a banks that operate in multiple countries, typically as part of a larger "banking group" with branches in several countries.

This paper explores the role of multinational banks in the financing decisions of multinational subsidiaries, linking the phenomena of both financial globalization and firm globalization. We extend prior research on firm financing by incorporating external banking resources in the form of multinational banks. In doing so, we are better able to capture the full scope of financing decisions available to firms. It is well-known that multinational subsidiaries have an exporting advantage relative to unaffiliated domestically-owned firms. Prior work on this topic has focused on internal financing of subsidiaries in the form of access to the parent corporation's resources. It is equally necessary to understand how a foreign-owned firm integrates itself into the local financial landscape.

We find that use of multinational banks is associated with increased export activity for multinational subsidiaries relative to domestically owned firms. A clear link between internationally owned exporting firms and internationally owned banks indicates that a country wishing to increase its presence in the global economy should be willing to allow foreign direct investment and financial development concurrently.

The multinational subsidiary's exporting advantage is a complex phenomenon driven by

various factors. Firstly, it stems from access to internal capital markets through its corporate parent, a finding in line with previous research. This provides multinational subsidiaries with greater access to funding for investment and growth. Secondly, multinational banks offer better access to international services compared to local banks or the multinational parent. Lastly, multinational banks are often better-suited to monitor the behavior of geographically distant subsidiaries, as they have greater experience and expertise in dealing with cross-border transactions and the local economy. However, it is important to note that this multinational bank advantage does not extend to supporting the domestic activity of multinational affiliates. Despite the advantages offered by multinational banks, they are not always the best option for domestic financing. Understanding these complex dynamics is critical for firms engaged in international trade to make informed financing decisions.

We are able to test these theoretical findings using a novel firm-level panel data from three Central European economies (CEE): Croatia, Estonia, and Hungary. All of which are European Union members, Estonia and Hungary having joined in 2004 and Croatia in 2013. These countries all experienced increased foreign investment during the 1990s through their EU accession period. They also experienced a reform of their banking sectors following the fall of the Iron Curtain during the transition from a planned economy to a market economy. We are able to thoroughly study the linkages between foreign-owned firms and multinational banks. We observe an exporting advantage amongst multinational subsidiaries using foreign banks. Additionally, we find a strong geographic preference to the choice of a multinational bank from the same country as a parent's subsidiary, provided a multinational bank from that country is available.

The remainder of this paper proceeds as follows: section two provides a review of literature, section three presents the theoretical framework, section four describes the data, section five presents the empirical results, and section six concludes and discusses avenues for further research.

2 Literature

2.1 Multinational activity and export under financial constraints

In their 2009 paper, Antras, Desai, and Fritz Foley study the effects of financial contracting and investor protections (imperfect capital markets) on a firm's decision to engage in FDI. The authors show theoretically that FDI flows and multinational activity arise endogenously for a parent company under financial frictions and imperfect monitoring in the host country. Multinational activity occurring as a workaround to imperfect capital markets indicates that there is an advantage to multinational firms over their domestic counterparts.

Other studies have found that when financial frictions are present, multinational affiliates are at an advantage compared to domestic firms. For example, Alfaro and Chen (2012) find that foreign owned firms fared much better during the 2008 global financial crisis than domestic firms, indicating an advantage of multinational affiliates during periods of economic hardship. Additionally, Desai, Fritz Foley, and Forbes (2008) find that U.S. multinational affiliates respond better to currency depreciations in a host country than domestic firms. In particular, multinational affiliates increase their sales and investment much more than corresponding domestic firms.

Lastly, a recent paper by Manova, Wei and Zhang (2015) addresses the question of multinational activity under financial constraints using Chinese micro-level customs data. Since they do not have balance sheet data available in their dataset, the authors cannot compute financial vulnerability at the firm level. Instead, they study financial vulnerability at the sector level. Their results show that while financial frictions (financially vulnerable industries) negatively affect exports, this effect is not as large for multinational affiliates. This suggests that MNEs have access to different means of financing than domestic firms, and thus can ameliorate the affect of domestic market imperfections.

There is also a recent, and growing, literature on the effects of credit constraints on international trade, particularly on a firm's ability to export. Importantly, studies have been conducted using firm level micro-data in different countries including Peru (Paravisini et al. (2014)), Italy (Minetti and Zhu (2011)), and China (Feenstra, Li, and Yu (2014)), all of which conclude that credit constraints affect exports both on the extensive and intensive

margin. The wide range of countries used in these studies gives credence to the significant role that credit constraints have on international trade, and that this phenomenon is not regionally concentrated.

2.2 Multinational Banking

In the previous section, we discuss the advantage that multinational affiliates face. This result could stem from better access to multinational banks (MNBs), and not just from resources afforded to them by the parent company. There is an extensive literature on the effects that multinational banking can have on an economy, and perhaps too much credit is given to multinational enterprises themselves, and not enough to banks.

However, the impact that international banks have can be ambiguous. Historically, international banks opening, or acquiring, existing banks in less financially developed countries has led to inefficiently run banks. In a 2010 paper, Weller argues that an increase in the number of multinational banks in Poland after 1991 actually led to a negative effect on business investments due to lower credit supplies by all Polish banks. This was an unintended consequence immediately following the transition process.

Chang, Hasan, and Hunter (2010) find that multinational banks are more inefficient than domestic banks, however, their study is conducted using the US banking sector. One would not expect the same dynamic to hold in less financially developed countries. Another paper by Lensink, Meesters, and Naaborg (2008) studies the relationship between foreign ownership and bank efficiency in Central Europe's post-transition period (1991-2003). The authors measure inefficiency in the standard way as expenses divided by revenue. During this time period, they studied over 2000 banks in over 100 countries scattered globally, including countries in Asia and Oceania. While they find inefficiency in foreign-owned banks is present, this inefficiency diminishes with the quality of host country governance and with the similarity between home and host country.

Additionally, De Haas and Van Lelyveld (2010) find multinational banks weather local financial crises better than domestic banks. The internal capital markets afforded to them by financially strong parent banks enable the subsidiaries to face minimal changes during periods

of local crisis[1]. Another paper by Havrylchyk and Jurzyk (2011) shows that Central and Eastern European banks acquired by multinational banking groups experience increases in market share and profitability following the turnover. These banks experience a transmission of knowledge from parent to subsidiary and are thus at an advantage over banks that remain domestically owned. A similar phenomenon is found between multinational enterprise parent companies and their affiliates.

3 Theory

We adapt the framework of Antrás and Helpman (2008) by adding a heterogeneous financial sector. Banks - both local and global - monitor the production activities of their borrowers to deter moral hazard.

3.1 Primitives

A multinational enterprise (MNE) uses headquarter services and an intermediate input from a supplier to produce a final good according to the technology below:

$$Q = \theta\left(\frac{\exp\left(\int_0^1 \log(x_h(i))di\right)}{\eta}\right)^{\eta}\left(\frac{\exp\left(\int_0^1 \log(x_m(i))di\right)}{1-\eta}\right)^{1-\eta} \tag{1}$$

Both the MNE and the supplier exert costly effort over a unit continuum of tasks in order to produce their respective intermediate goods. The effort choice for a fraction $\mu_k \in (0,1)$ of these tasks can be written into a contract and enforced costlessly for each party k. Due to contractual incompleteness, the remaining fraction $1-\mu_k$ of tasks are too complex or difficult to be specified in a written contract. After the MNE and the supplier come to an organizational arrangement (more or this soon) and agree to a contract outlining the desired effort levels for the contractible tasks, they will bargain over the surplus the supplier is to be paid by the MNE for investing in the noncontractible tasks.

1. These results do not extend to global crises (2008). De Haas and Van Lelyveld (2014) show that spillover effects existed between parent bank and subsidiary during the Great Recession.

For every Q units of final good sold, the MNE generates $Y = A^{1-\rho}Q^{\rho}$ units of revenues. It competes in a sectors with other final good producers, each producing their own variety of the final good; $\rho \in (0,1)$ represents the consumer elasticity of substitution between varieties while A indexes overall demand for the sector[2].

3.1.1 Financial Environment

The supplier may raise external debt from a bank by pledging some of its expected future surplus; however, its ability to raise external debt is constrained by the financial technologies available to its local debt market. First, the expected repayment value of the debt contract must cover the loan principal.

$$\gamma_g R_m \geq L \tag{2}$$

The supplier has a choice between two technologies. When the supplier chooses the Good technology, the project is successful with probability $\gamma_g \in (0,1)$. In contrast, if the supplier chooses the Bad technology, the project fails with certainty; however, choosing the Bad technology allows the supplier manager to consume a private benefit proportional to the project revenues. Thus, the contract must ensure:

$$\begin{aligned} \gamma_g(S_z - R_m) - W &\geq \gamma_L(S_z - R_m) - W + \Phi Y \\ \implies S - \frac{\Phi}{\Delta\gamma} Y &\geq R_m \end{aligned} \tag{3}$$

We assume that the private benefit Φ of a firm producing a good in market j for transformation and resale in market k takes the following functional form that is being monitoring by an agent b takes the following form:

$$\begin{aligned} \Phi &= \Gamma(c)(\Sigma_p \phi_{p,\text{src.}}^{\rho} + \Sigma_q \phi_{q,\text{dest.}}^{\rho})^{\frac{1}{\rho}} \\ \text{where } \phi_{\text{src.}} &= \phi(\zeta_j, \upsilon_{bj}), \frac{\partial \phi}{\partial \zeta} < 0, \frac{\partial \phi}{\partial \upsilon} > 0 \\ \phi, \zeta, \upsilon &\in \mathbb{R} \end{aligned} \tag{4}$$

2. We are making the standard assumption that consumers have CES preferences over goods varieties within a sector.

Monitors must work to validate that borrower activities are legitimate and consistent with the health operation of their venture as well as ensure the value of any pledged assets are not impaired through negligence or malfeasance. The ϕ terms capture the contribution of given market of operations on the borrower's marginal benefit. The monitor's geographic distance or a lack of familiarity with the market in question is captured by υ and is assumed to increase the borrower's outside option. However, the financial development ζ of the market itself is assumed to reduce the scope of the private benefit. As the geographic scope of a borrower's operations increases, the work required to functionally monitor the borrower increases.

The variable c represents the organizational complexity of the borrower or the borrower's corporate group. When a borrower is a stand-alone entity, it is easier for a monitor to generate information about the scope of the borrower's activities, the risks the borrower faces, and the actions required to protect its debt investment in the borrower. In contrast, monitors must work harder to assess the activities of affiliate/subsidiary borrower in a complex corporate group for several different reasons.

The operational boundaries between a subsidiary and its corporate group are often quite porous, making it difficult to determine where the subsidiary ends and where the rest of the corporate group begins. Nothwithstanding the hazard risks posed by the borrower to the monitor, the monitor must now also assess the risk posed by the borrower's corporate parent/sister entities. Participation in corporate group as a subsidiary entity creates, ipso facto, the risk of illicit asset appropriation by key personnel within the broader corporate group under the cover of legitimate company operations. Assessing the actual risk of asset/income tunneling by entities within the corporate group requires investigating the quality of corporate governance and financial health for the both the group writ large as well as its constitutive entities.

3.1.2 Organizational Choice

The MNE can organize its relationship with the supplier in two ways: it can work the supplier at arm's length to conduct the joint project (outsourcing); or, it can integrate the supplier as a subsidiary within its broader corporate umbrella (integration).

Outsourcing We assume the outside option of both the supplier and the multinational enterprise are zero when the supplier retains property rights over the inputs it produces; however, as the inputs are entirely relationship specific, the value of these inputs to the supplier is 0 outside the joint project. After having produced the inputs, the supplier and the MNE bargain over how divide project net surplus.

In the event that Nash bargaining between the supplier and the MNE breaks down, we assume that the supplier defaults and its bank repossesses the finished inventory. Since the finished inventory only has value when used in the joint production process with the MNE, the bank and the MNE will engage in a second round of Nash bargaining over the sale price of the repossessed inventory.

We assume that, after MNE-supplier Nash bargaining fails but before the supplier defaults, the supplier can costlessly take an action that reduces the value of the finished inventory by a fraction $(1-\delta_H)^{\frac{1}{(1-\eta)\alpha}}$, $\delta_H \in (0,1)$. Since the MNE's bargaining share is increasing in the value of its outside option, the supplier can and will commit to destroying inventory value in the event that MNE-supplier Nash bargaining fails.

$$\begin{aligned} &\max_{S_B} \left\{ \left((1-\delta_H)Y - S_B)^{\xi}(S_B\}\right)^{1-\xi} \right\} \\ &S_B = (1-\xi(1-\delta_H))Y; \quad S_H = \xi(1-\delta_H)Y \end{aligned} \tag{5}$$

Using S_H as the MNE's outside option, we can now solve for the Nash bargaining share of the outsourced supplier:

$$\begin{aligned} &\max_{S} \left\{ \left(Y - S - \xi(1-\delta_H)Y)^{\beta}(S - R_m\}\right)^{1-\beta} \right\} \\ &S_{S,O} = (1-\beta)\underbrace{(1-\xi(1-\delta_H))}_{\psi_O} Y + \beta R_m \end{aligned} \tag{6}$$

Integration When the supplier is integrated as a subsidiary of the parent, Nash bargaining determines the share of surplus that accrues to the *manager* of the subsidiary-supplier. Since the manager has no property rights over the inputs produced by the subsidiary, their outside

option is zero, reflecting a payoff of separation from the MNE subsidiary. When the supplier is integrated and supplier-MNE Nash bargaining fails, the MNE chooses whether continue subsidiary operations or to have the subsidiary default on its debt obligations.

If the MNE chooses to continue subsidiary operations, it simply replaces the fired subsidiary manager with someone more quiescent that will transfer physical control over the subsidiary inputs. In this case, only a fraction $\delta_L \in (0,1),\ \delta_L < \delta_H$ of inventory value is destroyed, reflecting the ability of the integrated supplier's board of directors to fire and expel the former manager before they can destroy more inventory value. The cost $\delta_L Y$ reflects both the value lost from losing access to the original manager's human capital as well as the pecuniary compensation required to induce the new manager to comply with the directives of the MNE[3]. Beyond this cost of managerial transition, the corporate parent must settle the outstanding external debt obligations of its subsidiary.

$$\begin{aligned} &\max_{S} \left\{ (Y - S + [(1-\delta_L)Y - R_m])^{\beta_I} (S - R_m)^{1-\beta} \right\} \\ &S_{S,IC} = (1-\beta)\delta_L Y + R_m \end{aligned} \tag{7}$$

The MNE can also choose to have the integrated supplier simply default on its external debt in the event that Nash bargaining between the MNE and the supplier manager breaks down. As before, since the collateralized inventory of the supplier only has value when utilized by the MNE, the bank and the MNE will therefore bargain over the resale price of the repossessed inventory.

$$\begin{aligned} &\max_{S_B} \left\{ \left((1-\delta_L)Y - S_B)^{\xi} (S_B \} \right)^{1-\xi} \right\} \\ &S_B = (1 - \xi(1-\delta_L))Y; \quad S_H = \xi(1-\delta_L)Y \end{aligned} \tag{8}$$

3. We can think of δY containing the new manager's share of surplus from yet another Nash bargaining problem. In order for this conceptualization to work, the bargaining power of the parent must increase. There are two possible reasons for this.

First, it may be the case that the very knowledge that one's predecessor was fired for driving too hard a bargain reduces one's bargaining power. The process of bargaining is littered with bluffs, feints, and ruses by each party in an attempt to elicit concessions from their counterparty; indeed, a key art of bargaining is knowing when to take your counterpart's statements seriously. With this in mind the successor of the fired manager comes into the employment relation knowing that the corporate parent is very serious.

Second, it may be the case that part of the parent's decision-making calculus in hiring a new subsidiary manager is the new manager's relative ability to bargain.

Using S_H as the MNE's outside option, we can now solve for the Nash bargaining share of the integrated supplier when the MNE opts to default in the event of bargaining failure:

$$\begin{aligned} &\max_S \left\{ \left(Y - S - \xi(1-\delta_L)Y\right)^{\beta} (S - R_m\}\right)^{1-\beta} \Big\} \\ &S_{S,ID} = (1-\beta)\underbrace{(1-\xi(1-\delta_L))}_{\psi_I} Y + \beta R_m \end{aligned} \tag{9}$$

Outside option choice under integration Clearly, the MNE will choose to default on the supplier debt if it can choose to renegotiate more advantageous repayment terms with the supplier's creditor:

$$\begin{aligned} \overbrace{[1-(1-\beta)\psi_I]Y - \beta R_m}^{\text{Debt renegotiation payoff}} &\geq \overbrace{[1-(1-\beta)\delta_L]Y - R_m}^{\text{Debt continuation payoff}} \\ (1-\beta)R_m &\geq (1-\beta)(\psi_I - \delta_L)Y \\ \iff \underbrace{\gamma_g R_m}_{\text{Exp. original debt payment}} &\geq \underbrace{\gamma_g(1-\xi)(1-\delta_L)Y}_{\text{Exp. renegotiated debt payment}} \end{aligned} \tag{10}$$

While this condition is clear enough, it nevertheless obscures an important consideration that will be key to understanding the organizational choice of the MNE: its ability to expropriate supplier profits through ex-ante transfers. When the MNE opts to inherit the supplier's original debt, we can rearrange its profits in order to obtain the following:

$$\begin{aligned} \pi_H &= \gamma_g[1-(1-\beta)\delta_L]Y - \gamma_g R_m - \int_0^1 x_h(i)di + T \\ \iff \pi_H &= \gamma_g[1-(1-\beta)\delta_L]Y - \int_0^1 x_h(i)di - \int_0^1 x_m(i)di + W \end{aligned} \tag{11}$$

The second line is obtained by noting that in equilibrium, we will have $\gamma_g R_m = L = \int_0^1 x_m(i)di + T - W$. So, when the MNE does not renegotiate the debts of its integrated supplier, the ex-ante transfer falls out of the MNE's profit term altogether. Intuitively, when the MNE implicitly subsidizes its subsidiary's debts, it cannot expropriate the subsidiary's profits by way of forced external borrowing.

Contrast the above with the MNE's expression for profits when the MNE renegotiates

its subsidiary's debts:

$$\begin{aligned} & \pi_H = \gamma_g[1-(1-\beta)\psi_I]Y - \beta\gamma_g R_m - c_H H + T \\ \iff & \pi_H = \gamma_g[1-(1-\beta)\psi_I]Y - \int_0^1 x_h(i)di - \beta\int_0^1 x_m(i)di + \beta W + (1-\beta)T \end{aligned} \tag{12}$$

When the MNE only commits to repaying a portion of the subsidiary's external debts, it can force the subsidiary to finance a transfer to the MNE through external borrowing. As such, the MNE will opt to repay the subsidiary's external debt only under very narrow circumstances.

3.2 Timing

As in Antrás and Helpman (2008), the timing proceeds as follows:

1. The final-good producer learns its type (productivity θ);

2. The final-good producer chooses between leaving the industry and producing;

3. The final-good producer makes a take-it-or-leave-it contract offer $C_R = \{\{x_h(i)\}_{i=0}^{\mu_h}, \{x_m(i)\}_{i=0}^{\mu_m}, T, Z\}$ to a supplier, where:

   - $\{x_h(i)\}_{i=0}^{\mu_h}$ specifies the investments the final-good producer will make in contractible activities;
   - $\{x_m(i)\}_{i=0}^{\mu_m}$ specifies the investments the supplier will make in contractible activities;
   - $T \in \mathbb{R}$ is the upfront payment the supplier makes to (receives from) the final-good producer; and
   - $Z \in \{O, V\}$ is the organizational form of the venture.

   Due to competition amongst suppliers, the supplier will accept the offer if the contract satisfies their participation constraint.

4. The supplier makes a financial contract offer $C_F = \{L, K, R_m\}$ to a bank, where:

- L is the loan principal;
- $K \in \{0, 1\}$ is an allocation of a security interest in the supplier's collateral (its inventory); and
- R_m is the loan repayment.

Due to competition amongst banks, the bank will accept the offer if the contract satisfies their participation constraint.

5. The supplier and final-good producer simultaneously choose their investment levels in the contractible and non-contractible activities.

6. The supplier chooses between the Good and Bad technologies.

7. Production of the intermediate good is completed. The supplier and final-good producer bargain over how to split the revenue proceeds.

8. Production of the final good is completed. The state of the world is revealed. If the project is successful, revenue Y is generated and divided between the final-good producer and the supplier according to their Nash Bargaining shares.

3.3 Equilibrium

We solve for the subgame-perfect Nash equilibrium by backward induction.

In stage 7, production is completed for the intermediate goods, and the supplier and final-good producer bargain over how to split revenue proceeds. In stage 6, the supplier chooses between the Good and Bad technologies, selecting whichever yields the better payoff. In stage 5, the supplier chooses investment levels to maximize its profits, subject to the constraints of the contractible investment levels stipulated by its contract with the final-good producer and its financial resources:

$$\begin{aligned}
&\max_{\{x^z_{mn}(i)\}^1_{i=}} \{\gamma_g S_z - \int^1 x^z_{mn}(i)di\} \\
&\text{subject to} \\
&\int_0^1 x_m(i)di \leq W + L - T \\
&S_z = (1-\beta)Y + \beta R_m
\end{aligned} \tag{13}$$

For its part, the final-good producer chooses investment levels to maximize its profits, subject to the constraints of the contractible investment levels stipulated by its contract with the supplier as well as the incentive compatibility constraint of the supplier.

$$\begin{aligned}
&\max_{\{x_{hn}(i)\}^1_{i=}} \{\gamma_g(Y - S_z) - \int^1 x_{hn}(i)di\} \\
&\text{subject to} \\
&\gamma_g\left(S - \frac{\Phi Y}{\Delta\gamma}\right) \geq \gamma_g R_m \\
&S_z = (1-\beta)Y + \beta R_m
\end{aligned} \tag{14}$$

In stage 4, the supplier strikes a contract with a bank that maximizes its expected profits and satisfies the bank's participation constraint. Since use of the Bad technology will generate losses for the bank with probability one, the supplier only offers contracts that induce use of the Good technology.

$$\max_L \{\gamma_g(S_z - R_m) + L - \int_0^{x^*_{mc}} (i)di - \int^1 x_{mn}(i)di - T\}$$

$$\begin{aligned}
&\text{subject to} \\
&L \leq \gamma_g R_m \\
&\int^1 x_{mn}(i)di = L + W - T - \int_0^1 x^*_{mc}(i)di \\
&\gamma_g\left(S_z - \frac{\Phi Y}{\Delta\gamma}\right) \geq \gamma_g R_m \\
&S_z = (1-\beta)Y + \beta R_m
\end{aligned} \tag{15}$$

In stage 3, the final-good producer chooses a organizational form and contractual arrangement that maximizes its expected profits subject to the best-response functions for the non-contractible activities x_{kn} for all k and the incentive compatibility constraint of the supplier.

The optimal transfer will require the supplier to transfer the entirety of its expected ex-post profits to the final-good producer. To accomplish this, the supplier's pledgeable income must be sufficiently large enough to cover the transfer itself as well as the supplier's investments. As such, the incentive compatibility constraint must not bind. If this is the case, the final good producer substitutes the supplier's expected profits into its objective function in place of the transfer T, solving the following maximization program:

$$\max_{\{x^z_{mc}(i)\}_{i=0},\{x^z_{hc}(i)\}_{i=0}} \{\gamma_g Y - \int_0^1 x^z_m di - \int_0^1 x^z_h di\} \tag{16}$$

When instead the incentive compatibility constraint binds, the final-good producer cannot extract the full value of the supplier's expected profits through an ex-ante transfer; it must compensate the supplier for forgoing the option of using the Bad technology - a hazard premium. As such, the optimal constrained transfer is obtained by having the incentive compatibility constraint bind with equality and solving for transfer T. In this case, the final good producer substitutes this new expression for the transfer T into its objective function, yielding:

$$\max_{\{x^z_{mc}(i)\}_{i=0},\{x^z_{hc}(i)\}_{i=0}} \{\gamma_g \left(1 - \frac{\Phi}{\Delta\gamma}\right) Y - \int_0^1 x^z_m(i) di - \int_0^1 x^z_h(i) di\} \tag{17}$$

Thus, in setting the investment levels for the contractible activities, the final-good producer internalizes their contribution to the magnitude of the supplier's hazard premium. As such, the presence of credit rationing will lower optimal investment levels in contractible activities for both parties.

After obtaining the optimal contractible investment levels under outsourcing and inte-

gration, the final-good producer chooses the organization mode that yields higher profits.

In stage 2, the final-good producer chooses to leave the industry if the best contract it can offer in stage 3 that a supplier will accept generates strictly negative profits.

3.4 Estimating equation

For semi-constrained firms, export sales are given as:

$$\begin{aligned} \text{Exports} &= \left(-\frac{\Phi}{\Delta\gamma(1-\beta)} \right) A\theta^{\frac{\alpha}{1-\alpha}} \left[\alpha^{-} \left[\frac{1-\frac{\Phi}{\Delta\gamma}-\alpha\Sigma_\ell\beta_\ell\omega_\ell}{1-\alpha\omega} \right]^{+} \right]^{\frac{\alpha}{1-\alpha}} \\ \log(\text{Exports}) &= \log\left(-\frac{\Phi}{\Delta(1-\beta)} \right) + \left[\frac{1-\alpha\omega}{1-\alpha} \right] \log\left(1-\frac{\Phi}{\Delta\gamma(1-\beta)} \right) + C \end{aligned} \tag{18}$$

$$\frac{\partial \log(\text{Exports})}{\partial v(p,b)} = -\left[\frac{\Phi(1-\alpha\omega)}{(1-\alpha)((1-\beta)-\frac{\Phi}{\Delta\gamma})(1-\frac{\Phi}{\Delta\gamma}-\Sigma_\ell\beta_\ell\omega_\ell)} \right] \left(\frac{\phi_p}{\Phi} \right)^{\rho} \frac{\partial\phi_p}{\partial v_{p,b}} > 0 \tag{19}$$

4 Data

The data in this paper comes from three sources: the AMADEUS subset of ORBIS, the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII), and the Bank for International Settlements (BIS).

ORBIS provides detailed balance sheet data for firms of all sizes. In this paper we have firm level data for exporting firms in Hungary, Croatia, and Estonia– three Central European EU members. Importantly, ORBIS provides detailed ownership information on each firm including the country of the global ultimate owner, and an independence indicator showing how much autonomy a firm has. We use this information to determine whether a firm is considered a multinational affiliate. Following the work of Cravino and Levchenko (2017), a firm is considered a multinational affiliate (MNA) if its global ultimate owner (GUO) country that differs from its home country, and it has an independence indicator of "D". The independence indicator means that the GUO (and thus international) shareholders have over 50% direct ownership of the firm. These firms have more direct access to the parent

companies and their resources, and are therefore at an advantage over other internationally owned firms with less direct control.

ORBIS also includes the entities from which a firm borrows. This is presented as a list of firm "advisors". Advisors can be banks, private individuals, or other means of financing. This information was used to construct measures of a firm's international bank exposure on a micro level. Measuring a firm's multinational bank exposure is a multifaceted task. Firms could use banks in their parent country, domestic country, or any other country. In order to code which banks a firm uses, we compiled a list of the largest banks in a country along with the country of ownership, and created an indicator for each bank the firm lists in their "Advisor" column. This required scraping the column for the name of the bank (sometimes in the original language) since the "Advisor" variable is simply a list of names and sometimes up to 15 banks were listed. We then aggregated the individual banks to the bank-country level, which allows for a direct comparison of bank borrowing behavior to multinational affiliate ownership country (e.g. one can see if an Italian owned firm in Hungary borrows from an Italian bank etc.). We then constructed indicators to determine if a firm borrowed exclusively from domestically owned banks, exclusively from international banks, or from a combination of domestic and international banks.

The Bank for International Settlements (BIS) provides country-level data on the international banking sector in different countries[4]. This data was used to construct a country's share of the international banking sector, which we could then compare to the observed banking behavior of firms in ORBIS. A country's annual share was computed as the yearly average of Amounts Outstanding or Stocks[5] for a country as a percentage of the total across all foreign banks in Hungary, Estonia, or Croatia.

Lastly, data from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) was used to construct various measures of distances for the firms. Using aggregate data at the country level, we were able to compute the distance between a multinational bank and a firm's parent country, as well as between a multinational bank and a subsidiary in Hungary, Croatia, or Estonia. We could then analyze the correlation between distance

4. This data is available for both member and non-member countries as Croatia, Estonia, and Hungary are not member countries

5. Using Claims on an immediate counterparty basis

and export revenue. We pull measures of R and D intensity across industries from the OECD Taxonomy of Economic Activities Based on R&D Intensity.

5 Empirical Results

Table 1 presents the summary statistics for the banking behavior of the firms in the data set. It is imperative to look across the three countries as there are idiosyncrasies in the banking sector in each country and this could lead to different borrowing patterns. In addition, the financing options available to firms in different countries are unique. For example, in Estonia only 437 firms borrow from an Estonian bank, because the domestic banks are much smaller and tend to cater to households and not firms. Thus, when firms borrow, they more likely choose multinational banks. Conversely, Hungary has several large and competitive domestic banks (OTP), along with many large multinational banks (ING) which gives exporters more options. This is seen in the Hungarian column of the table where firms have more diversity among the banking options (Foreign Borrower (excl.), Foreign Borrower (comb.), and Domestic Borrower (excl.)). Estonia and Croatia have similar shares among the three variables since the domestic banks tend to be small, rendering multinational banking more attractive.

Table 6 lists the most frequent banks for each country. There are 46 unique banks across the three countries in the dataset, with a good mix of domestic banks and multinational banks. Table 2, Table 3, and Table 4 list all the banks and owner countries for the exporting panel separated across country. Although the multinational bank country options are different for Croatia, Hungary, and Estonia, there is a clear geographic link between the countries that establish a banking presence in the three economies.

While this geographic link between banking presence and destination country is quite strong, there is even stronger evidence of distance playing a role in the FDI location decision of multinational enterprises. Table 5 shows the most frequent foreign ownership country across the three countries. Most of the countries listed are Western European EU members, many of which border the countries in the sample. This is a striking finding, but corroborates

previous research[6] that following the fall of the Iron Curtain when several Central European Economies were EU candidates, there was a huge influx of Western European FDI. While this occured during the 1990s and early 2000s, the effects lasted throughout our sample period ending in 2017.

Table 7 shows that for foreign owned firms that have a multinational bank available to them with a headquarter country matching their own, they are more likely to use that bank than another multinational bank. The share of multinationals from each country using a matching country bank is much larger than that country's share of the international banking market, with the exception of Swedish-owned firms in Estonia. Furthermore, Table 8 shows that multinational affiliates make up a higher share of firms in medium-high and high R and D intensity industries.

6 Conclusions

This paper explores the complex dynamics of multinational subsidiaries' financing decisions and the role multinational banks play in this process. Our findings highlight the importance of incorporating external banking resources in understanding the full scope of financing decisions available to firms. The use of multinational banks is associated with increased export activity for multinational subsidiaries, indicating the need for countries wishing to increase their presence in the global economy to allow foreign direct investment and financial development concurrently. However, it is important to note that the multinational bank advantage does not extend to supporting the domestic activity of multinational affiliates.

Our work also highlights the geographic preference for multinational banks from the same country as a parent's subsidiary. Understanding these complex linkages between foreign-owned firms and multinational banks is critical for firms engaged in international trade to make informed financing decisions. Our novel firm-level panel data from three Central European economies provides empirical evidence for our theoretical findings.

Overall, our paper contributes to the literature on financial globalization and firm globalization by providing a better understanding of the role of multinational banks in the

6. e.g. Bevin and Estrin (2004)

financing decisions of multinational subsidiaries. Our findings have important implications for policymakers and multinational corporations seeking to navigate the immense landscape of international trade and finance.

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7 Tables and Figures

Table 1: Summary Statistics- Banking Characteristics

Variable	**Full Sample**	**MNA**	**Domestic**	**Hungary**	**Estonia**	**Croatia**
Same Country	0.02	0.16	0.00	0.04	0.01	0.02
Foreign Borrower (excl.)	0.63	0.76	0.61	0.55	0.34	0.88
Foreign Borrower (comb.)	0.10	0.06	0.11	0.28	0.01	0.09
Domestic Borrower (excl.)	0.05	0.02	0.05	0.16	0.00	0.02
# of Non-Bank Advisors	1.09	1.72	1.01	3.06	0.80	0.29
Number of Banks	1.21	1.26	1.20	1.73	0.48	1.50
Austrian Bank	0.29	0.26	0.30	0.27		0.53
Belgian Bank	0.06	0.05	0.06	0.24		
Chinese Bank	0.00	0.00	0.00	0.00		
Croatian Bank	0.05	0.02	0.05			0.11
Danish Bank	0.03	0.05	0.02		0.08	
Estonian Bank	0.00	0.00	0.00		0.01	
French Bank	0.01	0.03	0.00	0.03		
Finnish Bank	0.00	0.00	0.00		0.00	
German Bank	0.01	0.05	0.01	0.06		
Hungarian Bank	0.15	0.11	0.15	0.44		0.11
Italian Bank	0.34	0.34	0.34	0.35	0.00	0.59
Korean Bank	0.00	0.00	0.00	0.01		
Latvian Bank	0.00	0.00	0.00		0.00	
Dutch Bank	0.01	0.04	0.01	0.04		
Russian Bank	0.02	0.02	0.02	0.04		0.03
Swedish Bank	0.11	0.13	0.10		0.32	
US Bank	0.02	0.06	0.02	0.09		
Number of Observations	190,581	21,773	168,808	43,596	63,797	83,188

Table 2: List of Banks–Hungary

Bank	**HQ Country**
Bank of China	China
BNP Paribas	France
Budapest Bank	Hungary
CIB Bank	Italy
Citi Bank	USA
Commerzbank	Germany
Deutsche Bank	Germany
Erste & Steiermärkische	Austria
Gránit Bank	Hungary
ING Bank	Netherlands
K&H Bank	Belgium
KDB	South Korea
Kinizsi Bank	Hungary
Központi Bank	Hungary
MagNet Bank	Hungary
Merkantil Bank	Hungary
MKB	Hungary
Oberbank	Austria
OTP	Hungary
Polgári Bank	Hungary
Raiffeisenbank	Austria
Sberbank	Russia
UniCredit Bank	Italy

Table 3: List of Banks–Estonia

Bank	**HQ Country**
AS Citadele	Latvia
Big Bank	Estonia
Coop Pank	Estonia
Danske Bank	Denmark
LHV Pank	Estonia
Luminor Bank	Sweden
Marfin Pank	Estonia
OP Corporate	Finland
SEB Bank	Sweden
Svenska Handelsbanken	Sweden
SwedBank	Sweden
Tallinna Aripank	Estonia
UniCredit Bank	Italy

Table 4: List of Banks–Croatia

Bank	**HQ Country**
Addiko	Austria
Banka Kovanica	Croatia
Croatia Banka	Croatia
Erste & Steiermärkische	Austria
Hrvatska Poštanska	Croatia
Istarska Kreditna Banka	Croatia
Karlovača Banka	Croatia
OTP	Hungary
Podvravska Banka	Croatia
Primorska Banka	Croatia
Privrenda Bank	Italy
Raiffeisenbank	Austria
Sberbank	Russia
Splitska Bank	Hungary
UniCredit Bank	Italy

Table 5: Most frequent foreign owners for MNA

Croatia	Estonia	Hungary
1. Slovenia	1. Finland	1. Germany
2. Germany	2. Sweden	2. USA
3. Austria	3. Latvia	3. France
4. Italy	4. USA	4. Switzerland
5. USA	5. UK	5. Italy
6. B&H	6. Germany	6. Austria
7. UK	7. Lithuania	7. UK
8. Switzerland	8. Norway	8. Japan
9. Hungary	9. Russia	9. Sweden
10. Serbia	10. Denmark	10. Netherlands

Notes: Countries in red represent a bordering country (by land)
Countries in blue represent a maritime border

Table 6: Most Frequent Banks for Multinational Affiliates

Croatia	Estonia	Hungary
1. Raiffeisenbank (Austria)	1. Swedbank (Sweden)	1. UniCredit (Italy)
2. UniCredit (Italy)	2. SEB Pank (Sweden)	2. Citibank (USA)
3. Privredna Banka (Italy)	3. Luminor Bank (USA)	3. K&H (Belgium)
4. Erste & Steiermärkische (Austria)	4. Danske Bank (Denmark)	4. Raiffeisenbank (Austria)
5. Splitska Banka (Hungary)	5. LHV Pank (Estonia)	5. ING Bank (Netherlands)
6. Addiko Bank (Austria)	6. Svenska Handelsbanken (Sweden)	6. BNP Paribas (France)
7. Sberbank (Russia)	7. Coop Pank (Estonia)	7. OTP Bank (Hungary)
8. Hrvatska Poštanska (Croatia)	8. OP Corporate Bank (Finland)	8. CIB Bank (Italy)
9. Istarska Kreditna Banka (Croatia)	9. AS Citadele (Latvia)	9. Deutsche Bank (Germany)
10. Podravska Banka (Croatia)	10. Tallinna Aripank (Estonia)	10. Commerzbank (Germany)

Table 7: Multinational Affiliate's Banking Patterns

Country	Share of International Bank Network	Share of total MNA	Share of MNA Same Bank Country
Hungarian Firms			
Austria	28%	5.2%	50%
Belgium	13%	2.6%	71%
France	5%	7.1%	30%
Germany	16%	18%	25%
Italy	22%	6.5%	74%
South Korea	0.5%	1%	19%
United States	7%	14%	33%
Croatian Firms			
Austria	39%	13%	76%
Italy	44%	10%	66%
Estonian Firms			
Sweden	84%	14%	46%

Table 8: R and D intensity of firms

R and D Intensity	All Firms	MNA	Domestic
Low	0.7%	.2%	.7%
Medium Low	55.0%	53.6%	55.2%
Medium	31.8%	29.9%	32%
Medium High	10.7%	13.5%	10.4%
High	1.8%	2.7%	1.7%

8 Appendix

$$\max_{x_h(i)}\{\gamma_g(1-(1-\beta))\underbrace{A^{1-\alpha}q^{\alpha}}_{Y}-\gamma_g\beta(R_m+R_h)+L_h-I_h+T\}$$

s.t.

$$\begin{aligned} &I_h = c_h\int_0^1 x_h(i)di \leq L_h+E_h; \quad E_h \leq W_h; \quad \gamma_g R_h \leq L_h \\ &I_m = c_m\int_0^1 x_m(i)di \leq L_m+E_m; \quad E_m \leq W_m; \quad \gamma_g R_m \leq L_m \\ &\gamma_g\left((1-\beta)-\frac{B}{\Delta\gamma(1-\beta}\right)Y \geq \gamma_g(R_m+R_h) \end{aligned} \tag{20}$$

$$q=\theta\left(\frac{\exp\left(\int_0^1\log(x_h(i))di\right)}{\eta}\right)^{\eta}\left(\frac{\exp\left(\int_0^1\log(x_m(i))di\right)}{1-\eta}\right)^{1-\eta} \tag{21}$$

8.1 Input Demand

Unconstrained Noncontractible Activities

$$\begin{aligned} x_{kn} &= \left[\ \right]\alpha Y \\ x_{kn} &= \left[\alpha A^{1-\alpha}\theta^{\alpha--}\left(\ \right)^{1-\alpha}\left(\ \right)^{\alpha}\exp\left(\int_0^{\mu_\ell}\log(x_\ell(i))di\right)\right]^{\frac{1}{1-\alpha\omega}} \end{aligned} \tag{22}$$

Unconstrained Contractible Activities

$$
\begin{aligned}
x_{kc} &= \left[\frac{(1-\alpha\Sigma_\ell\beta_\ell\omega_\ell)}{(1-\alpha\omega)}\right]\alpha Y \\
x_{kc} &= K_c\left[\frac{1-\alpha\Sigma_\ell\beta_\ell\omega_\ell}{1-\alpha\omega}\right]^{\frac{1-\alpha\omega}{1-\alpha}}\Big(\Big)^{1+\frac{\alpha}{1-\alpha}}\Big(\Big)^{\frac{\alpha}{1-\alpha}}
\end{aligned}
\tag{23}
$$

where

$$
K_c = \left[\alpha A^{1-\alpha}\theta^{\alpha-\alpha-\alpha}\Big(\Big)^{\alpha}\Big(\Big)^{\alpha}\right]^{\frac{1}{1-\alpha}} \tag{24}
$$

Unconstrained Output and Profits

$$
\begin{aligned}
Y &= A\theta^{\frac{\alpha}{1-\alpha}}\left[\alpha^{-}\left[\frac{1--\alpha\Sigma_\ell\beta_\ell\omega_\ell}{1-\alpha\omega}\right]^{+}\right]^{\frac{\alpha}{1-\alpha}} \\
\pi_h &= (1-\alpha)A\left[\theta\alpha^{--}\left[\frac{1-\alpha\Sigma_\ell\omega_\ell\beta_\ell}{1-\alpha\omega}\right]^{\frac{1-\alpha\omega}{\alpha}}\right]^{\frac{\alpha}{1-\alpha}}
\end{aligned}
\tag{25}
$$

Semi-constrained Contractible Activities

$$
\begin{aligned}
x_{kc} &= \left[\frac{(1-\frac{\Phi}{\Delta\gamma}-\alpha\Sigma_\ell\beta_\ell\omega_\ell)}{(1-\alpha\omega)}\right]\alpha Y \\
x_{kc} &= K_c\left[\frac{1-\frac{\Phi}{\Delta\gamma}-\alpha\Sigma_\ell\beta_\ell\omega_\ell}{1-\alpha\omega}\right]^{\frac{1-\alpha\omega}{1-\alpha}}\Big(\Big)^{1+\frac{\alpha}{1-\alpha}}\Big(\Big)^{\frac{\alpha}{1-\alpha}}
\end{aligned}
\tag{26}
$$

where

$$
K_c = \left[\alpha A^{1-\alpha}\theta^{\alpha-\alpha-\alpha}\Big(\Big)^{\alpha}\Big(\Big)^{\alpha}\right]^{\frac{1}{1-\alpha}} \tag{27}
$$

Semi-constrained Output and Profits

$$
\begin{aligned}
Y &= A\theta^{\frac{\alpha}{1-\alpha}}\left[\alpha^{-}\left[\frac{1-\frac{\Phi}{\Delta\gamma}-\alpha\Sigma_\ell\beta_\ell\omega_\ell}{1-\alpha\omega}\right]^{+}\right]^{\frac{\alpha}{1-\alpha}} \\
\pi_h &= (1-\alpha)A\left[\theta\alpha^{--}\left[\frac{1-\frac{\Phi}{\Delta\gamma}-\alpha\Sigma_\ell\omega_\ell\beta_\ell}{1-\alpha\omega}\right]^{\frac{1-\alpha\omega}{\alpha}}\right]^{\frac{\alpha}{1-\alpha}}
\end{aligned}
\tag{28}
$$