Financing Constraints and Firm Internationalization

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Abstract: Trade and investment increasingly constitute the main forms of firm internationalization. This paper develops a model for analyzing the effect of financing heterogeneity on firm export and investment. We introduce financing heterogeneity into a classic firm-level model, in which firms face a trade-off in their operational mode depending on external financing capacity: whether to serve foreign markets, and whether to do so through exports or local subsidiary sales. Our empirical analysis yields two major findings. First, only those firms with the strongest external financing capacity engage in foreign activities. Second, of those firms that serve foreign markets, only those with the strongest external financing capacity engage in foreign direct investment (FDI). These results have important policy implications for a country such as China that is highly dependent on exports for economic growth and yet suffers from weak financial institutions. They suggest that by reducing financing constraints and financial market frictions, efforts to build a more efficient, market-oriented, and flexible financial system could facilitate the internationalization of the most competitive and efficient Chinese firms, while at the same time enhancing China's international competitiveness and promoting the transformation of its mode of trade growth.

Keywords: Internationalization; Export; OFDI; Financing Heterogeneity

While trade represents a traditional form of firm internationalization, the deepening of the process of globalization has resulted in substantial growth in multinational sales and accentuated the importance of outward foreign direct investment (OFDI) as a means for firm international expansion. Drawing on firm-level data from China, this paper explores the determinants of firm internationalization behavior, in particular the factors that influence firms' decision to sell to the domestic market or to serve foreign markets through either exports or OFDI. China provides a suitable testing ground for our theoretical propositions because both exports and FDI have constituted important driving forces behind the country's dynamic economic growth during the past decades.[1]

Existing studies of firm heterogeneity and trade (e.g., Helpman et al. 2004; Melitz 2003) emphasize the importance of productivity for firm internationalization. For example, Helpman et al. (2004) suggest that due to the costs of entering a foreign market, only those firms which are sufficiently productive can overcome such constraints to engage in exports or foreign direct

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[1] For example, from 1978 to 2014, China's total export volume has increased exponentially, from $6.81 billion to $2.34 trillion. While the share of exports in GDP stood at only 4.59% in 1978, it has peaked at 34.93% in 2007, only to decline to 22.61% by 2014 due in large part to the recent global financial crisis. World Bank, World Development Indicators. Available at http://data.worldbank.org/indicator> (Accessed December 4, 2015). Just as important, while traditionally a capital importer, China has quickly emerged as a capital exporter as outward FDI by Chinese companies has become a relatively new but fast-growing feature of the global economy, with Chinese outward FDI stock soaring from $ 4.45 billion in 1990 to $730 billion in 2014. United Nations Conference on Trade and Development (UNCTAD) FDI statistics. Available at <http://unctad.org/en/pages/Statistics.aspx> (December 4, 2015).

investment (FDI). A number of studies (e.g., Melitz 2003; Bernard et al. 2003; Bernard et al. 2006; Head and Ries 2003) have yielded empirical evidence in support of the above theoretical conjecture. Grossman et al. (2006) extends the above insight to emphasize the importance of productivity for multinational firms' choice between horizontal, vertical, and export-platform FDI. More recent studies (e.g., Chang and Gayle 2009; Conconi et al. 2013) suggest that while productivity is important, it is not the only factor influencing firm internationalization. Factors such as uncertainty, demand volatility, and third country market potential may also need to be taken into consideration in explaining firm internationalization choice.

Our work contributes to the above literature by focusing on firms' choice between export and "horizontal" FDI, or an investment in a foreign production facility that is designed to serve the local market. Previous studies (e.g., Markusen 1984; Brainard 1997; Helpman et al. 2004) suggest that firms face a so-called proximity-concentration trade-off in their investment decisions, that is, "firms invest abroad when the gains from the reduction in trade costs outweigh the costs of maintaining capacity in multiple markets." (Helpman et al. 2004: 300). We extend this insight to argue that financing capacity may be another important factor besides productivity in influencing firm internationalization decisions and the proximity-concentration trade-off. We focus on financing capacity because, as developments in the aftermath of the 2008 global financial crises have shown, financial factors play an increasingly important role in influencing the real economy. As a growing number of studies have argued, the decline in global trade and FDI following the financial crisis may be attributed to not only reduced external demand, but also deteriorating external financial conditions. [2]

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[2] Chor and Manova (2012) provide convincing evidence to illustrate the impact of credit constraints on exports. Specifically, they show that financially vulnerable industries were more sensitive to the cost of

In highlighting how differences in firms' external financing capacity may influence the pattern of international trade and investment, we follow the lead of Helpman et al. (2004) and assume that each firm has to make a decision as to whether to serve foreign markets, and whether to do so through exports or local subsidiary sales. We further introduce financing heterogeneity into a classic heterogeneous model in which firms face proximity-concentration trade-offs. Our model yields the following predictions: (a) firms with the weakest external financing capacity should serve only the domestic market; (b) firms with relatively stronger external financing capacity should engage in exports; and (c) firms with the strongest external financial capacity should undertake FDI. Our empirical analysis of the export and FDI pattern of Chinese firms yield substantial evidence in support of the above sorting pattern. In confirming the predictions of the proximity-concentration trade-off, that is, firms tend to substitute FDI sales for exports when external financing capacity is strong, our results reveal the important role of financing capacity in influencing the "pecking order" in the pattern of firm internationalization.

The reminder of the paper is organized as follows. The next section provides the theoretical background for our empirical analysis. Section 3 describes the data, model, and key

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external capital in their export behavior than less vulnerable industries, and that this sensitivity rose during the 2008 global financial crisis. Based on their empirical analysis of Japanese firms, Amiti and Weinstein (2011) suggest that the deteriorating health of the financial institutions negatively affected firm-level exports during the crisis. Feenstra et al. (2011)'s study of Chinese firms finds that exporting firms face tighter credit constraints than those that only serve the domestic market. Their export volume further declined significantly as a result of the financial crisis. Haddad et al. (2010) find that U.S. import prices rose during the crisis. They suggest that while this phenomenon is inconsistent with falling demand, it can be explained by supply constraints, such as lack of export credits.

variables used in the analysis, while section 4 presents our main empirical findings. The last section concludes.

2. A Model of Credit Constraints on Firm Internationalization

For a rational firm to engage in exports, the expected profits from such activities need to exceed the entry costs. According to the theoretical framework of the new, new trade theory, the expected profits of exporting to country j for firm i in industry s depends on a few factors, including the target country's market size Y_j and prices P_j, the trade costs of exporting τ_j (which typically include transportation costs and tariffs), input prices (e.g., capital rent r and labor cost w), firm productivity a_i, and the production function of the given industry. Therefore the firm's profitability function can be expressed as follows: $\Pi = \Pi(a_i; Y_j, \tau_j, P_j; r, w; \eta_s, \mu_i)$, where η_s is the parameter of the production function for the given industry; μ_i is the disturbance term for firm profitability. Productivity a_i is the only firm-specific variable in the above equation. In order to simplify the analysis, we assume the following:[3]

$$\Pi_i = \Pi(a_i, Y_j, \tau_j, P_j, r, w, \eta_s, \mu_i) = \Pi^*(Y_j, \tau_j, P_j, r, w, \eta_s)\varphi(a_i)\mu_i \tag{1}$$

When other variables are held at their constant, the higher the firm productivity, the more likely it will be to capture greater profits through exports. Thus $\varphi'(a_i) > 0$. In the above equation, $\Pi^*(Y_j, \tau_j, P_j, r, w, \eta_s)$ does not depend on firm-specific coefficients.

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[3] Assuming that the utility function of the consumers in the target country can be represented by the Dixit-Stiglitz function, the per unit labor cost equals 1, and there exist constant returns to scale, then we can obtain the Melitz (2003) profitability function: $\Pi(a; S, P, \tau) = \frac{S(P\rho)^{\sigma-1}}{\tau^{\sigma-1}\sigma} a^{\sigma-1}$, where σ represents the elasticity of demand for two differentiated products, $\rho = \frac{(\sigma-1)}{\sigma}$.

Under normal circumstances, there exist significant differences in the export entry costs

for different target countries and industries. We set the firm's export entry costs to E_{js}. With

known firm profitability function and entry costs, its export conditions can be expressed as

follows:

$$\left(\frac{\Pi}{E_{js}}\right)_i = \frac{\Pi^*\left(Y_j, \tau_j, P_j; r, w; \eta_s\right)\varphi(a_i)\mu_i}{E_{js}} > 1 \tag{2}$$

Consistent with the new, new trade theory, productivity is the only factor influencing the

export decision of firms within the same industry in the above formula. However, the theoretical

assumptions of the above equation frequently depart from real situations, in particular those in

developing countries with under-developed financial markets where the firm's external financing

costs tend to exceed those of internal financing. In such situations, firms' varying levels of

external financing dependence should lead to different financing cost structures, which should in

turn affect their export decisions. As firms have to pre-pay for the costs of export market entry

similar to the upfront investment needed for firm expansion, including those incurred for market

research, marketing, the establishment of sales and distribution networks, and the entry of valid

agreements with local agents and intermediary trading firms, they have to raise sufficient capital

in order to engage in exports. The cost of such capital in turn hinges to a considerable degree on

the firm's external financing dependence.

Firms have two main channels through which to raise capital: (a) internal financing

which includes the firm's retained earnings, firm owners' equity funds, and low- or no-interest

loans from friends and family, etc.; and (b) external financing which refers to the credit provided

by financial intermediaries, mainly the banks.[4] As the majority of firms do not have sufficient

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[4] This paper chooses to focus on a simple credit market and leave out the complexities of capital markets.

internal financing to cover the costs of the initial investment, they need to raise the necessary capital for export through external funding sources. Consequently the firm's entry costs can now be written as: $f_X(E_{js}) = (1+r)A_i + (1+r_O)(E_{js} - A_i)$, where A_i represents the capital raised through internal sources and E_{js} represents the export entry costs. Under normal circumstances, the costs of external financing r_O exceeds the costs of internal financing r, suggesting that firms with greater internal financing capacity should have lower overall financing costs and greater profit margins and, as a result, should be more likely to engage in exports.

In order for our model to better proximate the economic reality in China, we also take into consideration the so-called "credit rationing" in China's financial market. We choose to simply describe the phenomenon of "credit rationing" instead of engaging in a detailed discussion of its sources because it is not the main focus of our analysis. We denote the likelihood that a firm will be able to successfully secure bank loans as m, with a larger value of m indicating stronger external financing capacity. When a firm cannot raise the needed capital from bank loans, it can turn to non-bank financial institutions and informal financial markets to satisfy its financing needs. However, under such circumstances, the costs of financing r_H should far exceed r_O and the fixed costs of exporting could be rewritten as follows: $f_X(E_{js}) = (1+r)A_i + (1+r_O)m(E_{js} - A_i) + (1+r_H)(1-m)(E_{js} - A_i)$. In order to simply the analysis, we assume that firms only raise the capital needed for export market entry through external sources. Therefore,

$$f_X(E_{js}) = [(1+r_H) - m(r_H - r_o)]E_{js} \qquad (3)$$

Plugging the above equation into the export decision equation yields the following:

$$\left(\frac{\Pi}{f_X}\right)_i = \frac{\Pi^*(Y_j, \tau_j, P_j; r, w; \boldsymbol{\eta_s})\varphi(a_i)\mu_i}{[(1+r_H) - m_i(r_H - r_o)]E_{js}} > 1 \tag{4}$$

Obviously, the greater a firm's external financing capacity, the more likely it will choose to export. Taking the log of the left side of the above equation thus allows us to express the firm's export decision equation as follows:

$$\ln\left(\frac{\Pi}{f_X}\right)_i > 0 \tag{5}$$

We further set the probability of firm export EX_i as a dummy variable, which takes on a value of "1" if the firm engages in exports, and "0" if otherwise. The average value of EX_i equals the probability of firm export. Consequently,

$$E(EX_i|a_i, m_i, \boldsymbol{Z_i}) = P\left[\ln\left(\frac{\pi_{EX}}{f_X}\right)_i > 0 \Big| a_i m_i, Z_i\right]$$
$$= P\left[\ln\mu_i > -\ln\Pi_{js}^* - \ln\varphi(a_i) + \ln\psi(m_i) \Big| a_i, m_i, Z_i\right] \tag{6}$$

$\boldsymbol{Z_i}$ represents the aggregate of the variables other than a_i and in the above inequation; $\psi(m_i) = [(1+r_H) - (1+\gamma_2)(r_H - r_o)m_i](1+\gamma_1)E_{js}$。 Assuming that $\ln\mu_i$ satisfies the conditions of the normal distribution where the mean value equals 0, then:

$$E(EX_i|a_i, m_i, Z_i) = \Phi\left[\ln\Pi_{js}^* + \ln\varphi(a_i) - \ln\psi(m_i)\right] \tag{7}$$

We write equation (8) to the following proximate form in order to facilitate our empirical analysis:

$$E(EX_{it} = 1|a_i, m_i, Z_i) = \Phi[\beta_0 + \beta_1 a_i + \beta_2 m_i + Z_i\delta] \tag{8}$$

In the above equation, $Z_i = (1, Y_i, R_i, S_i,)$，$Z_i\delta = \beta_0 + Y_i\delta_Y + R_i\delta_R + S_i\delta_S + C_i\delta_C$；$Y_i$，$R_i$ and S_i are the vectors of the dummy variables for year, region, and industry, respectively;

C_i is the vector of other control variables; β_i $(i = 0, 1,2)$ and δ_j $(j = Y, R, S, Z)$ represent the

coefficients of the variables to be estimated. The above analysis leads us to the following

predicted signs of the main parameters in the above equation:

Hypothesis 1: External financing capacity (m_i) should positively affect firm export decisions.

However, in reality firms can often choose between two different forms of

internationalization -- export or OFDI whereby firms establish subsidiaries in host countries and

directly sell to the host markets. Firms incur fixed costs f_j in order to enter foreign markets.

$j = EX$ represents the fixed costs of exporting; while $j = OFDI$ represents the fixed costs of

undertaking OFDI. Without loss of generality, we assume that $f_{\text{OFDI}} > f_{\text{EX}}$. In other words, the

fixed costs of engaging in OFDI should be greater than the fixed costs of exporting. This is

because the fixed costs of exporting include those incurred in order to assess the profitability of

the potential export markets; engage in market and product customization; settle

disputes; and establish and maintain distribution networks in the foreign country. However, with

OFDI, firms have to defray a set of additional costs related to firm management such as R&D

expenditures, product innovation, market research, advertising, and investment in fixed capital,

etc. Similarly, we can express the firm's expected OFDI profits as follows:

$$E(OFDI_i | a_i, m_i, Z_i) = P\left[\ln\left(\frac{\pi_{OFDI}}{f_{\text{OFDI}}}\right)_i > 0 \middle| a_i m_i, Z_i\right]$$

$$= P\left[\ln \mu_i > -\ln \Pi_{js}^* - \ln \varphi(a_i) + \ln \psi(m_i) \middle| a_i, m_i, Z_i\right]$$

Hypothesis 2: External financing capacity (m_i) should positively affect firm FDI decisions.

In such situations, firms have to overcome the constraints imposed by higher fixed costs

in order to undertake OFDI and thus have higher demand for both productivity and external

financing capacity. In other words:

$$E(OFDI_i|a_i, m_i, Z_i) - E(EX_i|a_i, m_i, Z_i)$$

$$= P\left[\ln\left(\frac{\pi_{OFDI}}{f_{OFDI}}\right)_i > 0 \Big| a_i m_i, Z_i\right] - P\left[\ln\left(\frac{\pi_{EX}}{f_X}\right)_i > 0 \Big| a_i m_i, Z_i\right]$$

Further solving the above equation yields the following:

$$\frac{d\,\hat{a}_{OFDI>EX}}{dm} > 0$$

Hypothesis 3: _With all else being equal, firms with stronger external financing capacity should be more likely to choose to invest abroad, while those with weaker external financing capacity should choose to export._

3. Data and Estimating Equation

This section describes the data and variables used in the empirical analysis as well as the model specification.

3.1 Firm-level data

We test our theoretical propositions drawing on data from both the _Foreign-Invested Enterprise List_ collected by China's Ministry of Commerce and the _Chinese Industrial Enterprise Database_ maintained by the National Bureau of Statistics. The _Foreign-Invested Enterprise List_ provides information on the names of Chinese companies investing in foreign markets. The _Chinese Industrial Enterprise Databas_e in turn contains the financial information of 300,000 firms, including both state-owned enterprises (SOEs) and non-SOEs whose annual sales exceed five million RMB (or about $770,000 under the current exchange rate). According to the Generally Accepted Accounting Principles (GAAP), we clear noisy data (i.e. mis-reported or mis-measured data). Specifically, we remove those firms with missing key financial variables

(such as total asset, net value of fixed assets, sales, and gross value of industrial output) or have

fewer than 20 employees. We further delete an observation if any of the following rules are

violated: (1) the firm's total assets are greater than its liquid assets, total fixed assets, and the net

value of the fixed assets; (2) there is a valid establishment time; (3) the firm has a unique

identification number; (4) the firm's sales volume is greater than five million RMB; (5) the

firm's total assets, interest payment, employee number, intermediary investment, and fixed

assets have non-negative values. This procedure yields a sample composed of 299,340 firms,

including 2,288 OFDI firms and 62,076 exporting ones.[5] Since we also consider the influence of

regional financial development on firm internationalization in our empirical analysis, we further

merge the above data with the index of regional financial environment available from the

Assessment of China's Regional Financing Environment (2007) and data on an industry's

external financing sources provided by China's *Fixed Assets Statistical Yearbook* (2010) to

arrive at our final estimation sample.

3.2 Empirical specification

　　While many existing studies (Muûls 2008; Greenaway, 2007; Feenstra et al., 2011;

Héricourt and Poncet, 2009) analyze the impact of financing capacity on export or OFDI, they do

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[5] It should be noted that the primary motivations for firms to invest abroad is either to acquire more resources or to

expand market access. This raises the question of the extent to which our model focusing on productivity as a major

source of OFDI is compatible with our data and model specification. In reality, however, both types of FDI may be

subsumed under our theoretical framework. First, by focusing on Chinese manufacturing enterprises, we are able to

exclude resource-seeking FDI from our empirical analysis. Second, market driven FDI should have as its main

goals profit maximization through both sales increases and cost reduction. Increased productivity is indispensable to

the achievement of these goals.

not pay sufficient attention to the relationship between the two. In this paper, we use the multinomial logit (or Mlogit) model to analyze firms' choice among the three operational modes, i.e., sale to domestic market, export, or OFDI. Compared to either the probit or the logit model, the multinomial logit model can be used to analyze more than two discrete outcomes. In the Mlogit model, $j = 1$ represents the control group. The sum of the probabilities of each of the choices should be equal to "1".

$$\Pr[y_i = j|x] = \begin{cases} \dfrac{\exp(x_i'\beta_k)}{1 + \sum_{k=2}^{J} \exp(x_i'\beta_k)} & (j = 2,..J) \\ \dfrac{1}{1 + \sum_{k=2}^{J} \exp(x_i'\beta_k)} & (j = 1) \end{cases}$$

Our theoretical model suggests that each firm has to make a decision about whether to serve a foreign market, and whether to do so through exports or local subsidiary sales. Consequently there should exist three different types of firms at any given point in time: those that only serve the domestic market; those that export to foreign markets but undertake no OFDI; and those that engage in OFDI. Indeed, firms' internationalization activities show that there exists a strong relationship between exports and FDI. Thus, we take the Mlogit model as our main empirical method. In addition to considering the influence of productivity, we focus on how firms' internal and external financing capacity may influence their pattern of overseas activities. In addition, we take into consideration a set of other factors that may influence firm internationalization. This leads to our basic regression specification as presented below:

$$\Pr(y_i = j) = \varphi(\beta_0 + \beta_1 lnTFP_i + \beta_2 Exfin_i + \beta_3\ Infin_i + Z_i) \quad (j = 1,2,3)$$

Where j=1,2,3 represents three different types of firms based on their level of internationalization: sale to domestic market, export, and OFDI. We measure a firm's productivity ($lnTFP$) using the method for estimating total factor productivity (TFP) developed by Levinsohn and Petrin

(2003).[6] A firm's internal financing capacity ($Infin$) is represented by the ratio of its cash flows to total assets.[7]

Following the lead of Feenstra et al. (2011), we measure external financing capacity ($Exfin$) as the share of interest expenses in the firm's sales revenue. Since there exists considerable debate over the best measure of financing constraints, we also follow Manova (2013)'s approach by developing multiple indicators of financing constraints. First, collateral loans continue to represent the main mode for firms to access credit funds. We thus follow the approach adopted by Braun (2003) and use the ratio of liquid assets (i.e., the sum of fixed assets and inventory) to sales revenue as a proxy for a firm's external financing capacity. Second, financial credit can provide firms with more flexible and convenient financial support, especially in underdeveloped financial systems or under conditions of tight monetary policy. Djankov et al. (2009) point out that due to China's imperfect financial market, financial credit actually represents the funds that firms with easy access to business loans provide to those without such

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[6] We estimate the production function for each of the 2-digit industry separately and then adjust our estimates for inflation using the producer price index for manufacturing industries available from the *China Statistical Yearbook*.

[7] Liquid assets typically include cash, short-term investments, notes receivable, accounts receivable, and inventories, etc. Since the *China Industrial Statistical Yearbook* does not contain any data on notes receivable, we use the difference between total liquid assets on the one hand, and the sum of accounts receivable and inventories on the other to derive the a firm's net assets in cash. We then add this figure to short-term investments to obtain the firm's cash stock. Furthermore, we are unable to directly calculate a firm's cash flows based on its cash flow statement given the lack of data on depreciation and amortization. Consequently, we use the following formula to calculate firm cash flows: cash flow = "net profit" + "financial expenses" + "depreciation and amortization" + "inventory（-）" + "receivables（-）"+"payables（+）".

access. We therefore follow Petersen and Rajan (1994)'s approach by using the ratio of accounts receivable to sales revenue as a measure of the size of a firm's financial credits.

In addition, our theoretical model suggests that external conditions may also play an important role in influencing a firm's internationalization behavior. Therefore, we incorporate the industry's external financing dependence and the level of regional financial development into our original analytical framework to more systematically analyze how the firm's financing capacity may interact with its external conditions to influence its internationalization choices. First, we expect that differences in industry characteristics may lead some sectors to be more dependent on external financing than others (Rajan and Zingales 1998；Manova et al. 2011; Chor and Manova 2012). Following the approach of Rajan and Zingales (1998), we include the share of financial allocations and that of bank credit in an industry's total assets, respectively, in our model in order to control for the effect of industry external financing dependence on firm internationalization.[8] Second, in order to control for the potential influence of regional financing development on the internationalization behavior of enterprises with different external financing capacity, we draw on the regional financial development index available from the *Assessment of China's Regional Financial Environment* to compute the regional financial segmentation index.[9] We then add the interactive terms between firm external financing capacity and regional financial development to our baseline models and re-run the analysis.

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[8] Data for this variable are drawn from the *China Fixed Assets Statistical Yearbook*.

[9] More detailed discussion about how the regional financial segmentation index is calculated can be found in the following section on the influence of regional characteristics on firm internationalization decisions.

Furthermore, Z_i, which represents a set of other factors that may also affect firm internationalization, is composed of the following variables: firm age,[10] the potential impact of international exposure on firm internationalization decisions (measured as the share of foreign-invested capital in total paid-in capital), a firm's ability to engage in technological innovation and product development (measured as a dummy variable for new product development), market power (measured as the share of prime operating revenue in total assets), and the level of internationalization in an industry or region (measured as the number of export enterprises at the industry-region level).

4. Empirical Results

We begin our analysis with the impact of firms' external financing heterogeneity on their internationalization behavior. Empirical results lend strong support to our hypothesis that external financing capacity is an important determinant of firm internationalization. Our results hold after controlling for other potentially confounding factors as well as regional and industry fixed effects. Our analysis further takes into account a number of other factors that may influence external financing capacity such as industry external financing dependence and the level of regional financial development. While these variables exert some influence on firm external financing capacity itself, their addition does not affect our central findings regarding the influence of external financing capacity on firm internationalization. Finally, we conduct several robustness checks in order to ensure the appropriateness of our model specification and to address potential endogeneity problems caused by measurement error and sample selection bias.

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[10] In order to avoid estimation biases caused by input errors, we choose to leave the firm age blank for those firms that were established before 1949 or after 2007.

4.1 Financing Constraint, Export, and OFDI

We first consider the heterogeneity of external financing capacity caused by the firm's own characteristics. By way of gradually adding control variables, we test the fitness of our theoretical model and the validity of our hypotheses. The results are reported in Table 1. For each regression, we first present our estimates of firm export behavior on the left-side column and then report estimates for firm decision to engage in OFDI on the right-side column.

Model 1 presents the effect of only the external and internal financing capacity variables on firm internationalization behavior. Estimation results show that financing capacity is an important factor affecting both firm exports and OFDI as both variables demonstrate positive and statistically significant relationships with the dependent variables. A one unit increase in external financing capacity will lead to a 5% increase in the probability that a firm will engage in exports (relative to sale to the domestic market) and an 8% increase in the probability that it will choose foreign direct investment. These results lend strong support to our hypotheses that firms with greater external financing capacity should be both more likely to engage in foreign activities and to demonstrate a higher level of internationalization. The results additionally suggest that internal financing capacity also plays some role in promoting firm internationalization, although this effect is weaker than that of external financing capacity.

Model 2 adds to Model 1 TFP calculated according to the LP method in order to control for the potential impact of productivity. External financing capacity continues to exert a positive and significant effect on firm exports and OFDI in this set of analysis. In particular, external financing capacity increases the likelihood that a firm will choose OFDI over exports by 3 percent. Also important is the result that productivity influences exports and OFDI in a way that is consistent with existing research (e.g., Helpman et al. 2004).

Since firms' internationalization behavior may also be influenced by unobserved industry- or region-specific characteristic such as the degree of regional economic openness, the enforcement of the government's "Going Abroad" policy, and the degree of administrative control, we include industry- and region-specific fixed effects in Model 3. Test results once again lend strong support to our main hypotheses.

Model 4 adds a set of additional control variables to Model 3. This set of tests confirms the robustness of our baseline model and reinforces above findings about the role of external financing capacity in promoting exports and OFDI. While a one unit increase of external financing capacity will enhance the probability of OFDI by about 7 percent, it only results in a 4 percent increase in the likelihood that a firm will engage in exports. This result suggests that firms with stronger external financing capacity have greater potential for integration into the international market.

Turning to the control variables, our results suggest that firm age, the share of foreign capital, new product development, market power, and the concentration of international businesses in an industry all exert a positive and statistically significant effect on firm internationalization behavior. These results are largely in line with our theoretical expectations.

<insert Table 1 here>

4.2 Industry- and Region-Specific Characteristics

In addition to considering the effect of financing heterogeneity arising from the firm's internal characteristics, we incorporate those external factors that may similarly influence financing heterogeneity into our analytical framework to examine how external financing capacity may be reinforced by different external environment to affect firm internationalization.

We first analyze the impact of industry external financing dependence on firm internationalization choice (see Table 2). Given the cross-industry variation in the channels of external financing, we use two alternative measures of an industry's external financing dependence: dependence on bank loans and government subsidies. Estimation results show that our results hold even after controlling for industry- and region-specific factors. However, the external environment does not necessarily influence firm internationalization choice as posited by the "pecking order" hypothesis. On the contrary, externally induced financing heterogeneity seems to negatively affect both exports and OFDI and this effect is particularly pronounced with the former.

Model 1 adds to the baseline models the interactive term between external financing dependence and the share of bank loans in an industry's total assets. The results show that while external financing capacity still plays an important role in explaining firm internationalization, the degree of firm internationalization does not necessarily correspond directly to the degree of external financing dependence. Instead, a one unit increase in external financing capacity will lead to a higher propensity (by about 3 percent) that a firm will engage in exports rather than OFDI. Meanwhile, the negative coefficients of the interactive terms between external financing capacity and industry external financing dependence indicate that external financing capacity is less likely to promote exports or OFDI in industries with a higher level of dependence on external finance.

As some studies (e.g., Allen et al., 2005) have pointed out, the Chinese government has played an active role in promoting firm internationalization via exports and OFDI through preferential lending, subsidies, and other measures in the past decades. While such policies help to compensate for the lack of corporate external financing capacity, they also exacerbate the

financing heterogeneity between subsidized and non-subsidized firms. In Model 2, we replace an industry's dependence on bank loans with its dependence on government subsidies, or the share of government subsidies in the industry's total assets. The results confirm the positive role of external financing capacity in boosting exports as well as the positive correlation between external financing capacity and the level of firm internationalization. Interestingly, a higher proportion of government subsidies tends to reinforce the role of corporate external financing capacity in promoting internationalization. That is to say, a higher level of dependence on government subsidies may to a large extent compensate for the lack of external financing capacity in hindering internationalization behavior.

Finally, we examine the mechanisms through which financing constraints may affect firm internationalization in regions with different levels of financial market development. We use the financial environment index ranking of each of the 30 provinces, autonomous regions, and cities available from the *Assessment of China's Regional Financing Environment* (2007) to measure the level of regional financial development.[11] Specifically, we use the difference between the regional financial development index and the ideal regional financial environment status which is indexed at 1 to measure regional financial fragility. The higher the index, the lower the level of the development of regional financial markets.

Estimation results from Model 3 indicate that our hypothesis about the role of external financing capacity in affecting the "pecking order" of firm internationalization holds regardless of the level of regional financial development. In addition, the fragility of regional financial

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[11] The regional financial environment index ranking is available for each of the years between 2006 and 2010. Since the rankings have remained relatively constant during this period, we only use the 2006 ranking as the benchmark for dividing the sub-samples.

market may seriously impede the ability of external financing capacity in promoting firm internationalization through either exports or OFDI.

<center><insert Table 2 here></center>

4.3 Robustness Checks

A set or robustness checks are conducted to ensure the validity of our results and to avoid potential endogeneity problems caused by measurement error and sample selection bias. First, considering the possible reverse causality or measurement error associated with the variable used to proxy external financing capacity (i.e., the share of interest expenses in sales revenue), we re-estimate the models using a couple of alternative measures of external financing capacity, including tangible assets ratio and accounts payable ratio. Test results show that the use of neither of these alternative measures alters our central finding regarding the importance of external financing capacity in fostering firm internationalization. However, while test results continue to support the "pecking order" hypothesis when we use tangible assets ratio as a proxy for external financing capacity, we do not find the same pattern when using account payable ratio as a proxy. In the model where accounts payable ratio is used as the proxy, external financing capacity exerts a greater impact on exports than on OFDI. It is possible that exporting firms may be more likely to be affected by credit relationships with both upstream and downstream trading partners, while OFDI firms may be less dependent on such relationships due to a higher level of internal business integration.[12]

Second, in order to address possible sample selection bias, we rank the enterprises included in the sample according to the number of employees and examine sub-samples

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[12] These results are available from the authors upon request.

in the first, second, and third quartile of the dataset, respectively. Estimation results again lend substantial support to our main hypotheses as all of the main variables have the expected signs and have achieved statistical significant at the $p<0.01$ level. Third, we test the robustness of our results removing the outliers. Our main variables of interests have once again sustained this exercise.

Finally, since firms may engage in exports and OFDI simultaneously, we estimate bivariate probit models in order to deal with the joint distribution between these two variables. Estimation results once again corroborate our main hypotheses regarding the positive relationship between external financing capacity and the probability as well as the level of firm internationalization. Importantly, in models examining the interactive effect between external financing capacity and the firm's external environment, a high level of industry dependence on external financing will significantly hinder firm exporting behavior, but its impact on OFDI is not prominent. In comparison, a more fragile regional financial environment will significantly constrain the role of external financing capacity in promoting internationalization and such a constraining effect is especially pronounced with respect to exports.

5. Conclusion

This paper develops a model for analyzing firm behavior in international trade and investment, specifically the choice between serving the domestic market, export, or OFDI. We posit that firms may take on different organizational forms depending on their external financing capacity. Firms with the weakest external financing capacity are limited to sale to the domestic market because the costs of export or FDI are likely to exceed the expected income from such activities. In contrast, firms with intermediate and high levels of external financing capacity

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should be more likely to engage in exports and OFDI, respectively. Our findings thus point to a potential new interpretation of the "proximity-concentration trade-off" phenomenon in firms' international operations. That is to say, financing heterogeneity may lead corporations with the strongest external financing capacity to opt for OFDI instead of export as their main international business model.

Our empirical analysis based on firm-level export and OFDI data from China lends substantial support to our main theoretical propositions. Our results sustain the use of alternative measures, different sample selection, and the inclusion of region- and industry-specific variables that may potentially confound our findings. Our findings thus have significant implications for China's "Going Abroad" strategy. They suggest that by reducing financial frictions and firm financing constraints, efforts to build a more efficient, market-oriented, and flexible financial system may promote the internationalization of the highly productive and competitive Chinese firms, therefore enhancing Chinese companies' international competitiveness and facilitate the transformation of the country's model of trade growth.

The above findings additionally underscore the importance of further financial reform for the integration of Chinese businesses into the global market. Against the background of growing global economic integration, the development of a sound financial system that offers diversified credit channels may better help companies achieve their internationalization potential. At a time of growing trade frictions between China and developed countries, such policies may also help China better realize the transition from an export-oriented development model to one that places greater emphasis on foreign direct investment, thus contributing to the country's more balanced growth in the long-term.

In addition, our results suggest that firms in industries with a higher level of dependence on government subsidies or financial allocations tend to have stronger external financing capacity, which in turn exerts a positive effect on firm internationalization. In China's transition economy, excessive government intervention in the economy has resulted in distorted resource allocation that undermines the effective functioning of the market. While such distortions are not necessarily incompatible with economic prosperity in the short-term, they often come at the expense of the other sectors or the long-term development of the economy as a whole. Indeed, more recent government policies increasingly emphasize the need to adjust the relationship between the government and the market and to elevate the importance of the latter in resource allocation. By adjusting the allocation of financial resources such as bank credit, such policies may help to address the overcapacity in certain traditional industries and increase the funds available for the highly efficient firms, thus boosting the overall productivity and promoting the internationalization of Chinese firms.

Table 1: Financing Constraints and Firm Internationalization

Dependent Variable	(1)		(2)		(3)		(4)	
	Exporter	OFDI firm	Exporter	OFDI firm	Exporter	OFDI firm	Exporter	OFDI firm
External financing capacity	4.669***	7.549***	4.537***	7.639***	4.712***	7.775***	4.150***	6.868***
	(20.02)	(20.22)	(15.97)	(16.38)	(15.70)	(15.99)	(13.46)	(14.30)
Internal financing capacity	0.629***	1.246***	0.610***	1.283***	0.443***	1.163***	0.377***	1.110***
	(29.58)	(15.08)	(22.59)	(12.97)	(15.86)	(11.62)	(11.92)	(10.24)
TFP			0.259***	0.411***	0.273***	0.411***	0.147***	0.276***
			(38.09)	(14.06)	(40.82)	(14.17)	(21.78)	(10.61)
Age							0.382***	0.480***
							(34.89)	(12.50)
Foreign capital ratio							2.125***	1.347***
							(124.66)	(20.74)
R&D							1.431***	2.041***
							(72.92)	(36.88)
Market power							0.00008***	0.0001***
							(8.18)	(7.76)
Internationalization ratio							0.0004***	0.0003**
							(46.83)	(7.91)
Constant	-1.517***	-5.011***	-2.110***	-6.025***	-1.585***	-5.630***	-3.054***	-6.997***
	(-217.39)	(-163.35)	(-92.71)	(-59.60)	(-69.61)	(-53.74)	(-92.23)	(-52.98)
Sector fixed effect	No		No		Yes		Yes	
Region fixed effect	No		No		Yes		Yes	
Observations	299,340		179,917		179,917		179,807	
Pseudo R^2	0.005		0.016		0.067		0.191	

Note: Robust standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 2: Financing Constraints and Frim Internationalization: Industry- and Region-specific Characteristics

Dependent Variable	(1)		(2)		(3)	
	Exporter	OFDI firm	Exporter	OFDI firm	Exporter	OFDI firm
External financing capacity	12.50***	9.561***	3.539***	5.658***	11.35***	11.52***
	(11.61)	(6.23)	(8.49)	(8.39)	(15.46)	(10.98)
Internal financing capacity	0.397***	1.122***	0.402***	1.125***	0.411***	1.153***
	(12.56)	(10.35)	(12.73)	(10.38)	(13.02)	(10.66)
TFP	0.111***	0.245***	0.111***	0.247***	0.141***	0.268***
	(16.92)	(9.14)	(16.83)	(9.28)	(20.88)	(10.23)
External financing capacity * Dependence on bank loans	-0.898***	-0.264				
	(-8.75)	(-1.77)				
External financing capacity * Dependence on subsidies			1.194*	2.231*		
			(1.99)	(2.26)		
External financing capacity * Regional financial development					-21.01***	-11.17***
					(-12.62)	(-4.96)
Constant	-3.191***	-7.141***	-3.195***	-7.148***	-3.324***	-7.268***
	(-97.46)	(-54.42)	(-97.32)	(-54.51)	(-103.30)	(-56.28)
Control variables	Yes		Yes		Yes	
Sector fixed effect	No		No		Yes	
Region fixed effect	Yes		Yes		No	
Observations	179,807		179,807		179,807	
Pseudo R^2	0.187		0.187		0.182	

Note: Robust standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

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