External Finance and the Decision of Foreign Direct Investment:

Evidence from Privately-Owned-Enterprises in China

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Abstract

Using privately-owned-enterprises (POEs) data in China, we find that access to external finance is a statistically significant factor explaining their probability of undertaking foreign direct investment (FDI). The significance of external finance is magnified in industries featured by high external finance dependence, high technology, low tangibility, and high inventory. The external finance and FDI linkage is weaker for POEs with group affiliation, but stronger for those employing generous employment welfare practices.

Keywords: FDI decision; External finance; POEs; Group affiliation; Labor practices.

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1. INTRODUCITON

Although foreign direct investment (FDI) has been a salient aspect of economic globalization, undertaking FDI abroad remains a privilege of few firms. For example, Ottavaiano and Mayer (2007) report that across Europe, around 5% firms undertake FDI. This figure only improves marginally in Germany: one of the most developed economies in Europe. 5.5% of German firms are reported to have FDI activities (Buch, Kesternich, Lipponer, and Schnitzer 2009). It is plausible to assume that even fewer firms from emerging and transition markets are able to expand into foreign market in the form of FDI. In the view that outward FDI is a symbol of and a tool to fortify national competitiveness (Luo, Xue, and Han, 2010), and it also enables firms to diversify their assets and sustain risk-adjusted growth (Goldstein and Razin, 2006), it is imperative to understand firm level factors of internationalization.

Traditional industrial organizational view of FDI is primarily based on product or technology market imperfections but assumes frictionless financial markets (see a summary from Markusen, 2002). According to this view, changes in FDI flows are due to product market imperfections and incompleteness of contracts for intermediate goods. The purpose of current paper is to show that this view is incomplete at best. We concentrate on the micro foundations of external finance while abstract from questions of the existence of structural distortions or competitive effects of multinationals. We view that the decision of FDI at firm level involves a substantial fixed cost,

therefore firms' access to external finance has a significant impact on their ability to undertake FDI. Empirically, we focus on Chinese privately-owned-enterprises' (POEs') greenfield FDI data to test our hypotheses for several reasons. First, majority of outward FDI from China only commenced in early 2000s with the state campaign of encouraging outward FDI (Buckley et al., 2007). Our data starts from 1999 which well captures most firms' first time FDI decision. This enables us to more accurately examine the impact of external finance on firms' FDI decision. Second, the idiosyncratic institutional environment in China makes POEs not only more financially constrained than their state- and foreign-owned peers, but also among the most financially constrained in developing countries (Claessens and Tzioumis, 2006)[1]. But private sector contributes to over 50% of the country's GDP, and is increasingly more active in global markets. Third, we focus on greenfield FDI because fixed costs are the most relevant parameter for greenfield FDI decision as opposed to cross-border mergers and acquisitions (Davies and Kristjansdottir, 2010).

We have four important findings. We find that external finance is a statistically significant predictor of the probability of FDI decision for Chinese POEs. Its significance is magnified in industries that are featured by high external finance dependence, high technology, low tangibility, and high inventory. POEs with group association rely less on access to external finance than those without group association. By contrast, POEs employing more generous welfare provision are more vulnerable to credit market than their peers with poor labor welfare provision. This paper is among the first to examine the causal relationship between firms' access to external finance in their home market and their FDI decision. Our findings suggest that the home institutional environment shapes firms' opportunities to undertake FDI. We also contribute

to a deeper understanding of how firm strategies may vary their reliance on access to finance, which have both managerial and policy implications. We will discuss this in greater detail in conclusion.

We organize the remainder of the paper as follows. We outline earlier theoretical literature of FDI, and then explain how access to external finance can fill in the gap of previous theoretical discussions, which leads to hypothesis development. We explain our data and methodology in Section three. Our empirical results are reported and discussed in Section four. We conclude the paper in Section five.

2 LITETATURE REVIEW AND HYPOTHESIS DEVELOPMENT

In a world of perfect competition for goods and production factors, FDI cannot exist (Kindleberger, 1969: 13). Consequently, the theoretical development of FDI has since centered on various "market imperfections", which, in simple terms, are defined as impediments to the simple interaction of supply and demand to set a market price (Rugman, 1981). For example, Hymer (1976) proposes industrial structural distortion as a source of market power. Firms in oligopolistic industries enjoy the advantages of economies of scale and other characteristics that give them market power, which enable them to overcome the disadvantages of being foreign and compete with local rivals in the host country. Another influential theory, by contrast, emphasizes the role of transaction costs in explaining FDI (Buckley and Casson, 1976; Hennart, 1991). In this approach, it is argued that FDI arises as a response of failure in intermediate markets, such

as the market for intangible assets, which involves bringing under common ownership and control the activities linked by the market.

Recent theoretical development turns attention to the role of firms' productivity, suggesting that firms self-select into internationalization based on their productivity. Built on the seminal model of Melitz (2003), it is argued that the fixed cost barrier of export means that only more productive firms can overcome the barrier and less productive ones remain their business in their home market. But productivity is only one means by which firms may mitigate the constraints of high fixed costs; even most productive firms have to deploy external finance to support their export activities. This has been considered in recent research which embeds credit constraints into the heterogeneous firm model of trade of Melitz (2003). There are two premises of these models (Manova, Wei and Zhang, 2011; Manova, 2013). The first is that firms must sustain sizable fixed costs for entering a foreign market and that these costs must be paid up front. Hence, firms which wish to export must have enough liquidity at hand. The second premise is that firms cannot fully pledge the returns of foreign sales to investors. For example, information on foreign markets is not only hard to obtain for firms but also difficult to verify for creditors. Therefore, a creditor such as a bank could be unwilling to put its own money at risk. The fixed cost based view and the implications of external finance have been empirically examined in firm's export decision (Bernard and Jensen, 2004; Greenaway, Guariglia and Kneller, 2007; Muuls, 2008; Berman and Hericourt, 2010; Minetti and Zhu, 2011; Manova, Wei and Zhang, 2011).

However, few studies have investigated the relationship between external finance and firms' FDI decisions. But it warrants a systematic investigation because fixed cost requirement is higher for FDI than for export since it involves a setup of new facilities abroad instead of additional production based at home for export markets. It also takes a longer lead time for FDI project to recoup initial cost and reach breakeven. Helpman, Melitz and Yeaple (2004) argues that only firms with superior productivity can overcome the fixed cost barrier to undertake FDI. We suggest that although higher productivity will certainly give firms a strong position, even most productive firms have to rely on external finance to some extent to facilitate their FDI. Empirical evidence on the relationship between firms' access to finance and their FDI decisions remains scarce. A notable exception is Klein, Peek and Rosengren (2002) which shows an interesting linkage between Japanese banks' credit rating and the FDI decision of firms dependent on these banks. The study is in the context of yen's high appreciation against US dollars in the 1990s. Instead of observing more Japanese FDI into the US (e.g. a wealth-enhancing effect due to strong home currency), Japanese FDI in the US collapsed from its peak of 30% in 1990 to only 1% through much of the 1990s due to major banks across Japan experienced a dramatic collapse in the financial condition of its banking system in the period. It demonstrates the impaired FDI by Japanese firms as a direct consequence of Japanese banks' deteriorating credit position, which cannot be explained by traditional FDI theories.

In our study, we gauge the impact of external finance on the probability of FDI by focusing on POEs in China. Developing countries usually have distorted and under-developed financial markets. In particular, there are numerous criticisms of China's banking system including factors that inhibit it from providing finance to the private sector. These are reflected in the stylized facts

that banks are state controlled (almost 100% controlled by the government during the period of our study); carry out policy lending that follows government directives rather than commercial considerations; and discriminate against POEs (Brandit and Li, 2003; Cull and Xu, 2003). As support for the latter stylized fact, bank statistics show that although the private sector accounts for over 50% of the economy, its accounts for just 7% of bank lending (Firth, Lin, Liu and Wong, 2009), making Chinese POEs the most constrained among their peers in developing countries. In China, public ownership is regarded as a defining feature of socialism, which explains a deep-seated ideological prejudice against private ownership. The 15th Congress of the Chinese Communist Party in September 1997 lifted many legal and economic barriers to private sector growth. In 2004, the National Congress approved a constitutional amendment to protect private property rights, granting "private property" an equal legal status to "public property". Despite the constitutional changes and official encouragement of the private sector, the government's ownership of formal external financing sources inevitably leads to a biased capital allocation policy that discriminates against private business (Brandt and Li, 2003; Ge and Qiu, 2007). Therefore, POEs are more likely than others to be constrained by their access to external finance for their FDI activities. Thus we hypothesize:

H1: All else equal, there is a positive linkage between a POE's access to bank credit and its probability of undertaking FDI.

While access to external finance is important in all industries, some sectors depend considerably more on the financial system. Finance literature has identified several important determinants of sectors' financial vulnerability that are technologically determined, exogenous from the perspective of individual firms, and innate to the manufacturing process in an industry. First,

firms in some sectors have substantially greater liquidity needs because they face higher upfront sunk and/or fixed costs and thus require more external finance (Rajan and Zingales, 1998). For example, pharmaceutical industry relies heavily on external finance to facilitate high risk and costly investment in drug invention. DiMasi, Grabowski, and Vernon (2004) estimated that developing a new drug during the 1990s cost about $400 to $500 million on average, and the time required from project inception to commercial introduction of a new drug average four to ten years. Therefore, industries featured by high R&D investment tend to be more credit constrained. Second, industries also differ in their endowment of tangible assets that can be pledged as collateral (Brau, 2003; Claessens and Laeven, 2003). This explains that firms with fewer tangible assets usually face higher credit constrains (Beck, Demirguc-Kunt, and Maksinovic, 2005). In addition, external finance dependency can be heightened for industries with more inventories because inventory reflects the duration of the production process and the liquidity necessary to maintain inventories and meet market demand (Schiantarelli, 1995). Taking the arguments together, we suggest the following hypothesis:

H2: all else equal, the positive linkage between a POE's access to bank credit and its probability of undertaking FDI is stronger in industries having higher reliance on external finance.

To mitigate financial constraints owing to institutional and industry attributes, there are some alternatives that POEs can pursue, one of which is to join group association. A business group is a set of firms, which, though legally independent, are bound together by a constellation of formal and informal ties and are accustomed to taking coordinated actions (Khanna and Rivkin, 2001: 47). They are different from a multidivisional firm because its group affiliates are all independent legal entities. They are also different from a network of firms because they have

strong central coordination and strategic and financial controls among affiliates in the group (Yiu, Lau and Bruton, 2007). In the process of China's searching for suitable corporate forms since 1978, reformers studied Japanese and Korean business groups were impressed by their evident capacity to absorb new technologies, deliver stable financial performance, and achieve international competitiveness (Nee, 1992; Ma and Lu, 2005). As a result, the state signalled that it would favour the reorganization of SOEs into recognized business groups. What followed was a rampant business group fever, resulting in a dramatic growth in the number of business groups (Hahn and Lee, 2006). In the background of large scale of privatization, SOE managers were frequently able to buy-out their enterprises, often at very low prices, and *de novo* groups founded by private entrepreneurs appeared. In this fashion, numerous private business groups began to emerge on the fringe of the economy.

Private business groups, much alike their state counterparts, are characterized by a core firm known as the group company, which has equity, debt, personnel, and trading links with affiliate firms (Carney, Shapiro, and Tang, 2009). They are cross-industry, cross-regional entities with strong ties to the state (Keister, 1998; White, Hoskisson, Yiu, and Bruton, 2008). There are also strong social connections such as family and school ties among member firms in Chinese business groups (Keister, 2000; Luo and Chung, 2005). The institutional economics perspective suggests that organizational innovations emerge to fill institutional voids in response to market failures in emerging markets (Khanna and Palepu, 2000; Stark, 1996). Similarly, finance literature explains that business groups are a "mechanism for dealing with deficiencies in the markets for primary factors, risk, and intermediate products in developing countries" (Leff, 1978: 667). Group association therefore can facilitate POEs to access credits from other

members in the group operating in different industries and/or different regions so that group networks have the flexibility to shift a given amount of scarce capital between members (Stein, 1997). Therefore, group association provides members with an internal market to access finance at a much lower transaction cost than that in the marketplace. In addition, while the group members' business activities are diversified across sectors and regions, each will have different cash flow volatility. This will lower the bankruptcy risk and better access to credit for member firms (Lewellen, 1971; Stein, 2003). As a result, private firms with group association will be less vulnerable to external credit markets for their FDI activities. We suggest:

H3: all else equal, the positive linkage between a POE's access to bank credit and its probability of undertaking FDI is weaker for POEs with group association than those without.

Apart from joining group association to mitigate capital market frictions and institutional disadvantage, POEs can also adjust their internal labour practices to reduce their reliance on external finance for FDI. The interaction between labour practices and firms' financial position is an under-researched area (Berk, Stanton and Zechner, 2010), but previous studies have demonstrated that, for example, firms with rigid labour practices tend to have lower profitability than their counterparts with flexible labour practices (Hirsh, 1991; Bebchuk and Cohen, 2005); more rigid labour contracts limit firms' ability to deploy external finance (Butt-Jaggia and Thakor, 1994; MacKay, 2003); and labour intensive firms hold lower levels of debt to reduce bankruptcy risk that can be inflicted upon their employees (Berger, Ofek and Yermack, 1997; Kayhan, 2003). Therefore, labour practices have a wide range of implications on firms' finance decisions, performance, and investment behaviour.

We trace the potential channels through which firms' labour practices affect their ability and need to borrow externally, which in turn influences to what extent they will have adequate finance for FDI. Labour costs and associated employment welfare provision are a significant part of operation costs. When the employment contract between the employer and employees is rigid, labour costs have "quasi fixed" attributes (Oi, 1962), that is, the employer cannot fire his employees without significant cost. This will make the firm more conservative in its financial decisions, such as borrow less from banks even when bank loans are accessible. But if the contractual relations between the employer and its employees are relatively flexible, a firm can transform a portion of "quasi fixed" labour costs into variable ones, reducing overall operation rigidity. Reduced operation rigidity will generate twofold benefit. First, it will enable firms to acquire capacity to variations in the economic environment, downsizing or expanding as supply and demand conditions dictate. This will help firms retain higher cash flows and increase profitability (Bebchuk and Cohen, 2005). Second, more flexible labour practices also can reduce firms' bankruptcy risk of deploying external finance, therefore will not deter them from borrowing from banks (Butt-Jaggia and Thakor, 1994; MacKay, 2003). Both channels will convey finance flexibility to firms, which reduces their vulnerability to credit market imperfections. Hence, we suggest the following:

H4: All else equal, the positive linkage between a firm's access to bank credit and its probability of undertaking FDI is stronger (weaker) for POEs with rigid (flexible) labour practices.

Having presented our hypotheses, we proceed to explain our data and methodology in Section three.

3 DATA, ECONOMETRICS, AND MEASUREMENT

3.1 Research data

We use a rich unbalanced longitudinal dataset of Chinese manufacturing firms in Wuxi in 1999 to 2007 to test our hypotheses[2]. The city of Wuxi is located in southeast of China, about 80 miles from the commercial centre of mainland China – Shanghai. It's GDP per capita was USD$17,050 in 2011, making it top one in Jiangsu province, and top five in China. It is also twice the China's national GDP per capita, which was USD$ 8,387 in the same year. Internationally, its per capita is comparable to countries such as Turkey USD$ 14,393, Russia USD$ 16,736 and Lithuania USD$ 19,319. Our data comes from two government sources in Wuxi. The first is local Economic Statistics Bureau. The local Economic Statistics Bureau performs city level economic census annually to collect financial information of all firms in the city with annual turnover above 5 million RMB (approximately 600,000 USD). It is part of national economic census which has started since 1999. FDI data comes from another government body, the Bureau of Foreign Trade and Collaboration, which has the responsibility to archive all FDI approval information. By combining the two sources, we have obtained the dataset used in our analysis. It is an unbalanced longitudinal data that records firm level information including their FDI decision for firms with a minimum annual turnover of 5 million RMB.

One of the advantages of this dataset is that medium sized private firms are well presented. Although the cutoff point of the data of the former is 5 million RMB, it is still substantially lower than that used in commercial databases, from which only an iceberg of large Chinese firms' information is accessible. Another weakness of commercial databases is that there is no consistent matching between Chinese (parent) firms and their outward FDI information. The city of Wuxi is

known for its dynamic private sector. It is located in an economic region in China with the most dynamic private sector (the Changjiang Delta). Therefore Wuxi data, although limited, does facilitate our focus on POEs for which finance factors are most acute. We define POEs as firms with 51% or above equity held by private owners in the firm.

3.2. The model and measurement of variables

Our hypotheses lead us to have the following specification:

$$\begin{aligned}\Pr(\boldsymbol{FDI_{it}=1}) = {} & \beta_0 + \beta_1 \boldsymbol{Access\ to\ Credits}_{it-1} + \beta_2\, \boldsymbol{Access\ to\ Credits}_{it-1} \\ & * \boldsymbol{External\ Finance\ Dependence}_{jt} + \beta_3\, \boldsymbol{Access\ to\ Credits}_{it-1} * \boldsymbol{Group}_{it-1} \\ & + \beta_4\, \boldsymbol{Access\ to\ Credits}_{it-1} * \boldsymbol{Group\ core}_{it-1} + \beta_5\, \boldsymbol{Access\ to\ Credits}_{it-1} \\ & * \boldsymbol{Welfare}_{it-1} + \beta_6\, External\ Finance\ Dependence_{jt} + \beta_7\, Group_{it-1} \\ & + \beta_8\, Group\ core_{it-1} + \beta_9\, Welfare_{it-1} + \beta_{10} \sum_{1}^{11} Controls + \beta_{11} \sum_{1}^{34} Industry \\ & + \beta_{12} \sum_{1999}^{2007} year\end{aligned}$$

Where *i* is firm, *j* and *t* denote industry and year respectively. To control for simultaneity, we use lagged dependent variables except for year, industry dummies and industry-based controls. We measure FDI decision as a binomial variable with value "1" indicating FDI and "0" otherwise. Therefore, a logistic regression is employed to examine the impact of our dependent variables on the probability of firms' FDI decision. We adjust standard errors by clustering it on firm level in all regressions.

Measuring firms' access to external finance is a complex issue. The financing constraints literature has developed the *Q* theory of investment suggested by Tobin (1969), and the Euler equation for the capital stock (e.g. Love, 2003; Forbes, 2007). But these approaches cannot be

applied in our case because financial information needed for these estimates is limited. Current literature focusing on developing countries either uses questionnaire survey data (e.g. Beck, and Demirguc-Kunt, 2004; Clarke, Cull and Peria, 2006; Xiao and North, 2012), or measures it by the ratio of firms' long term credit to total assets (e.g. Claessens, Feijend, and Laeven, 2008; Gormley, 2010; Lin, 2011). Apart from our data availability that makes the latter proxy feasible for us to adopt, the proxy is also a suitable choice considering FDI is long-term investment, for which a firm's long-term access to external finance should matter most. Our focus on POEs within a region means that macro institutional factors that often affect firms' access to external finance in cross-country (or cross-region) context are not an issue in our measurement.

To test the asymmetrical impact of access to finance on POEs with various attributes, we measure external finance dependence of an industry with four proxies. The first is the net value of current assets minus current liability scaled by total assets. Technology intensity is the ratio of R&D expenses to total expenditure. Tangibility is the ratio of fixed assets scaled by the number of employees. We made modification of the measurement of Manova (2013) by using the number of employees because we do not have data on book-value assets. Finally, inventory is measured by the ratio of inventories to total sales (Manova, Wei, and Zhang, 2011). We code the industries based on the mean values of the proxies: when the industry's value is higher than the sample mean, we code it as "1"; otherwise "0". An exception is for asset tangibility. We reverse it by coding industries with lower tangibility than average with the value of "1"; otherwise "0". This is to ease the interpretation of our results. We expect the interactive variables of these industries proxies with access to finance to have a statistically significant and positive coefficient to support our hypothesis.

Group association is measured by two dummies. First, we measure all firms with group association with the value of "1", "0" otherwise. Secondly, since each group network has its core firm, we code the core firm with the value of "1"; "0" otherwise. The intuition is that the beneficial effect of accessing scarce resource may be more pronounced for core firms than the rest of the network. This would indicate a hierarchy-based power structure (Keister, 1988). Alternatively, all firms within the group association may benefit from the network, and the access to finance depends on a network-based coordination that aims to maximize the prosperity of the group as a whole. Usually, if the firm is an affiliated member of a business group, there is "fushu" (i.e. affiliated) in its name. When such information is absent or ambiguous, we check the location and history of the firm to judge whether it is the core firm of a business group or it is an affiliate[3]. We expect the interactive terms of the two variables with access to finance to have statistically significant and negative coefficients if our hypothesis were to be supported.

We measure firm's welfare provision with the natural log of the sum of three types of insurance provided by the firm per employee. They are unemployment insurance, medical insurance and housing benefit. Firms in China are obliged to provide full-time but not part-time employees with these benefits, so this measure can indirectly reflect to what extent the firm relies on part-time staff. Alternatively, even some firms choose to pay less welfare benefit to their full-time employees than they should in practice, welfare provision per person is a direct indicator of the generosity of employment conditions. The interactive term of welfare provision with firms' access to finance is expected to be statistically significant and positive if our hypothesis were to be supported.

We control for several firm attributes. First, we include fixed assets, measured by the ratio of fixed assets to total assets. On the one hand, higher level of fixed assets is a proxy for the amount of collateral (tangibility) that a firm can pledge, thereby influencing firm's financial position; on the other, is also indicates the potential of economies of scale, which may motivate firms to expand abroad (e.g. Markusen and Venable, 1998). We consider firm size, measured by the natural log of employee number. Larger firms are more likely to invest abroad; but once the firm becomes a multinational enterprise, size has less influence on the firm's further foreign expansion (e.g. Markusen, 1995). We include this variable since we focus on firms' first time FDI decisions. Firm age is measured by the number of years since the firm's operation started. Past research argues that older firms are more likely to become foreign direct investor (Blomstrom and Lipsey, 1991), but Asiedu and Esfahani (2001) find ambiguous impact of age on FDI. Firms need time to accumulate experience, resources, and develop competitiveness; yet, the rate of accumulation can be diminishing over time (Asiedu and Esfahani, 2001). Therefore, it could have a non-linear effect on the probability of FDI. To consider this, we also include its squared term in our regression. We have R&D dummy, which is coded by "1" if the firm has expenses in R&D activities, "0" otherwise. This measurement considers the fact that 91% of firms in our sample having zero R&D expenses. One of the most stylized facts about multinational corporations is that they have high levels of R&D compared to their peers. R&D is often used as the indicator of firm-specific advantage that motivate firms' internationalization decision (Calvet, 1981; Belderbos and Sleuwaegen, 1995).

We also include export in our regression. The relationship between FDI and export is uncertain a priori. According to the horizontal FDI model (Markusen, 1984), they substitute each other to serve a foreign market, that is, export may reduce firms' incentive to engage in FDI. But export may increase firms' incentive to undertake FDI, which then helps them withdraw export, since most firms start with export rather than FDI. This is the central tenet of product life cycle theory (Vernon, 1966). The gradual expansion from export to FDI may make export a strong (positive) predictor of firms' FDI decision. Second, some FDI projects are set up to enhance exports from home to the host country by facilitating distribution, sales and after-sales services (Krautheim, 2013). In such cases, export may motivate firms to set up FDI abroad, which then enhances firms' export to the market. Third, in the above two scenarios, an implicit assumption is that the destination of FDI and export market are the same country, hence the potential substitution between the two. But in reality, firms may choose to export to some countries, but undertake FDI in others. For example, in our sample, a Wuxi-based textile POE had been exporting to the Japanese and European markets for over ten years before it had its first FDI in Mongolia in 1999. The reason, according to the general manager, was that Mongolia has a more relaxed quota system[4], which enables them to increase their export volume to their export markets (e.g. Japan and Europe). In such case, there is no substitute effect since the export markets and the location of FDI do not coincide[5]. To capture the precise relationship between export and FDI, information on the export market, the destination of FDI, and their timings is needed. Unfortunately, although we have data on firms' export, we do not have information of the export market/s or the timing. Therefore, we simply add export status as a control. We code it with the value of "1" if the firm has export; "0" if the firm is not an exporter. This is to consider that only 16.8% of firms report positive value of export in our sample. We include state

ownership and foreign ownership as additional controls. This is to consider that some of POEs have minority state or/and foreign shareholding. To control for the influence of state and foreign equity, we code them as two dummy variables respectively.

We include total factor productivity (TFP) in the estimation. TFP is an important determinant of a firm's value added. It provides a broader gauge of firm level performance than some of the more conventional measures, such as labour productivity or firm profitability. For example, profitability captures only the part of the value added; an inefficient firm can achieve high profitability merely because it has access to low cost labour, capital or materials[6]. It is advantageous to use TFP because it is estimated based on multiple input measures of firm performance. TFP is usually measured as the Solow residual, defined as the difference between the observed output and its fitted value calculated via OLS. However, this method suffers from two biases: simultaneity bias and selection bias. The first bias results from potential correlation between productivity and input choices. The second bias is a 'survival' bias meaning that low productive firms are absent in the sample because they shut down and exit the market. Therefore firms covered in the sample are not randomly selected, which is the 'survival' bias. There are two methods addressing these concerns. One is developed by Olley-Pakes (1996) and the other Levinsohn-Petrin method (2003). We opt for the latter because of data-driven benefit that it offers. To correctly estimate TFP using Olley-Pakes method, one needs to use investment as a proxy. However, it is not uncommon that a large proportion of firms in developing countries report zero investment (Petrin, Poi and Levinsohn, 2004). This is the case in our sample, in which 84% of firms have zero long-term investment and 97% of firms had zero short-term investment. Therefore, we opt to use Levinsohn-Petrin which relies on value added measured by

gross-output net of immediate inputs to estimate the production function. TFP is estimated in three stages with this method. First, we estimate the coefficient of labor and combined coefficient of material and capital by substituting a third-order polynomial approximation in capital and material. Second, we isolate the coefficient of capital and labor. Third, we insert the estimated coefficient of labor and capital to the data to estimate individual firm's TFP.

We have two industry variables. One is entry rate measured by the number of new entries by industry. This may indicate the dynamics and competition of the industry. The other is the sales volatility, measured by the ratio of sales to sales of previous year by industry. This can indicate the demand uncertainty of industries. We choose these control variables based on previous studies on FDI decision (Buch, Kesternich, Lipponer, and Schnitzer, 2009; Lee, 2010; Todo, 2011). Table 1 provides detailed explanation of our key variables, their measurement, and descriptive statistics. The correlation matrix of key variables is presented in Table 2. We proceed to report our results in the next section.

(INSERT TABLE ONE ABOUT HERE)

(INSERT TABLE TWO ABOUT HERE)

4 EMPIRICAL RESULTS

We report our results in a step-wise manner first, and then provide a full regression that presents results of all hypotheses in Table 3. We run logistic regressions with industry and time fixed effects in all estimates. The standard errors are adjusted by clustering it on firm level. Both year and industry fixed effects are included in estimates. In Model 1, we find that access to finance

has a statistically significant and positive coefficient, supporting our first hypothesis. The coefficient is 0.151, indicating that for a one unit increase in access to finance, the expected increase in odds ratio of having FDI is approximately 16% (1-e^(0.151)). Moving to Model 2, we find that the interactive term of external finance dependence and access to finance is a statistically significant and positive estimator. But the magnitude is small: a one-unit increase in access to finance yields an increase in log odds of 0.346 (0.303+0.043) for higher external finance dependence industries compared to 0.303 for those lower ones. This is equivalent to an increase of 41% (1-e^ (0.346)) in odds ratio for the former and 35% (1-e^ (0.303)) for the latter. We then use high technology as an alternative proxy for high external dependence in Model 3. The coefficient of the interactive term is now 0.349, and statistically significant. This means that for firms in high technology industries, a one unit change of access to finance yields a difference of 0.592(0.243+0.349) in log odds, which is about 81% increase in odds ratio. In comparison, for firms in low technology industries, the coefficient is 0.243, which is equivalent to only 28% increase in odds ratio. Next, we interact (low) tangibility with access to finance as another proxy for high finance dependence in Model 4. Its coefficient is positive and statistically significant, indicating that firms in lower tangibility industries rely on access to finance more than those in higher ones. For the former, a one-unit increase in access to finance means 0.580(0.184+0.396) increase in log odds, which is nearly 79% increase in odds ratio; for the latter, a one-unit increase only yields a 20% increase in odds ratio. The final interactive term is based on high inventory and access to finance in Model 5. Its coefficient is quite small: 0.085, albeit significant. This yields approximately 35% increase in odds ratio for high inventory sectors (1-e^ (0.303) and 24% for low inventory sectors. Our industry-based analysis supports the second hypothesis that

innate industry differences affect firms' probability of undertaking FDI, although the magnitude appears to be particularly large for industries with high technology intensity and low tangibility.

Moving to Model 6, the group association reduces firms' reliance on external finance by log adds of 0.079, or about 8% in odds ratio (1-e^ (-.0.79). Since access to finance receives a coefficient of 0.335, a one-unit increase of access to finance increases the odd ratio for associated firms by 28%, but 39% for those without association, indicating that the reliance for non-associated firms is higher. Meanwhile, the interactive term of association core and access to finance has a coefficient of -0.125, which represents approximately 12% drop in odds ratio. Taking the coefficient of access to finance together, this means that a one unit increase of access to finance increases the odds of core firms of undertaking FDI by 22%, but for those not being the core firms, this odd ratio is 39%. We performed a separate Wald test, which shows that the difference between the two coefficients is statistically significant at 10% level (e.g. $\beta_3 \neq \beta_4$). This confirms that the dependence on external finance is weaker for all associated firms, but the magnitude in the drop is larger for core firms.

(INSERT TABLE THREE ABOUT HERE)

Finally, we report the results on all hypotheses in Model 7. The coefficient of access to finance is almost doubled than that on in Model 1. The coefficient is 0.335, equivalent to 1.40 in odds. This means that for a one-unit increase in access to finance, the odds increase from one to 1.40 (i.e. 40% increase). We keep external finance dependence as the industry level interaction as a conservative way of testing our hypotheses since it attains a lowest coefficient among the four

industry-based proxies. The coefficient received (0.051) is close to that in Model 3 (0.043). The two group related interactive terms also receive qualitatively unchanged results in Model 7 compared to those in Model 6. The interactive term of welfare and access to finance receives a coefficient of 0.105, which is statistically significant at 10% level, lending support to our fourth hypothesis that more generous labour welfare provision increases firms' reliance on external finance for their FDI decision. To sum up the results in Model 7, all our hypotheses are supported in our estimates.

(INSERT TABLE FOUR ABOUT HERE)

In interpreting interactive terms, the coefficients of the interactive terms in logistic regressions like ours may mask the distribution of its real effects across the sample space, therefore could be misleading. This is because the marginal effect of a change in both interacted variables is not equal to the marginal effect of changing just the interaction term. This is compounded by the fact that the interaction effect is conditional on covariates in logistic (non-linear) regressions. Therefore, we adopt the method suggested by Norton, Wang, and Ai (2004) to calculate the estimated *cross-partial derivative* to correctly estimate the interactive terms. We report the results in Table 4, which is derived from Model 7 in Table 3. Overall, none of the results contradicts our previous interpretations. For example, the mean interaction effect of access to finance and industry finance dependence is positive, with z-value of 7.28. The mean interaction effect of access to finance and group association is -9.47, and that for core firms is -14.06. Both group associated firms in general and core firms in specific rely less on external finance to support their FDI activities. Finally, the mean interaction effect of access to finance and welfare

provision attains a z-value of 11.58, confirming our hypothesis that generous provision of welfare increases firm's vulnerability to external finance.

We assess our results with two robustness checks. First, we use an alternative measure of access to finance: the sum of long-term and short-term credit scaled by total assets. Some past studies have used this proxy to indicate firms' access to external finance (e.g. Claessens, Feijen, and Laeven, 2008; Du and Girma, 2007; Huang, et al., 2011). The regression results using this as the indicator generated qualitatively unchanged results as those reported above. We then used the method suggested by Norton, Wang, and Ai (2004) to check the distribution of the interaction effects across the entire sample space. The results are remarkably consistent. All interactive effects are shown to have either a positive (H2, and H4) or negative (H3) distribution, confirming the results obtained in Model 7 of Table 3. Second, since our dependent variable is quite skewed: only 1.21% of the sample has FDI in the observed period of time. The rareness of our interested variable may generate bias in logistic regressions because the probability density distribution of "1s" tends to be overshadowed by very large number of "0s". We use weighting as a strategy to correct the estimation bias. Following the method recommended by Tomz, King and Zeng (1999), we estimate the models by specifying the weights of "1s" (where FDI occurs) as 0.05% and 1.3% respectively since this is the range of FDI in our sample. The rationale of this method is to correct the bias of short tail associated with the probability of the rarer event (King and Zeng, 2001a: 704). Therefore, this method maximizes the weighted log-likelihood instead of the log-likelihood in normal logistic regressions. It is particularly suitable when a large sample (i.e. exceeding twenty thousand) is available for estimates (King and Zeng, 2001b). We have

obtained qualitatively similar results when we use either indicator to proxy access to credits. We do not report the robustness results for the sake of brevity. But they are available upon request.

5 DISCUSSIONS AND CONCLUSIONS

We have analysed whether or not access to bank credit plays a role in firms' FDI decision. We find confirmatory results that the importance of external finance is significant for Chinese POEs to expand overseas in the form of Greenfield FDI. The importance is heightened if the POE operates in financially dependent industry; if it has no group association; or if it adopts generous welfare provisions for its employees. Our findings provide new evidence that access to external finance, as a factor overlooked in traditional FDI theories, is an important antecedent of firms' FDI decision.

Traditional MNCs from developed countries are usually more capital intensive than domestic firms (e.g. Chen, 2011). More developed financial markets have facilitated these MNCs' global expansion. It is without doubt that the more aggressive internationalization of state-owned-enterprises in China is in part driven by their easy access to state finance. Therefore, it is imperative for the Chinese government to continue to reform the credit market and create a level play field for POEs to access necessary finance to support their FDI projects, which will further promote China's integration into the global market. POEs can also become, given adequate finance to expand, important strategic partners of state-owned-enterprises investing in overseas market. Considering that group association significantly alleviates POEs' vulnerability to credit

market, POEs may consider promoting association with not only domestically-owned but also foreign-invested-firms in China, which usually have easy access to finance from their headquarters or other international sources. Alliances with foreign firms can also facilitate POEs' collaborations with foreign-invested-firms in overseas market in which they have had establishments.

Our research also finds that providing generous employee welfare benefits will make POEs more vulnerable to credit market. We do not suggest firms should finance their overseas ambitions at the expense of their employees. Human resource is critical intangible asset for firms' long-term growth. Although employee welfare may be seemingly in conflict with firms' need to invest as both require capital allocation, POEs in China may be better off by seeking more fundamental ways to improve their access to external finance, such as by improving their accounting standards, corporate governance, and transparency. These measures may improve their access to external finance without trading off the welfare of the firm with the employees. The effectiveness of the market-oriented mechanism in allocating finance will ultimately depend on to what extent the state will limit their interference in the credit market and allow the invisible hand to coordinate and discipline the capital allocation. This goes back to the point that we make earlier: it is critical for the Chinese government to continue to reform the credit market. From firms' point of view, their first FDI decision may carry significant implications on their long-term growth because once their FDI projects start operation in the foreign market, they will be gradually able to access external finance directly in the foreign credit or equity market, thereby reducing their reliance on home country finance. This, however, does not substitute the need for deeper financial market reforms in China.

Endnotes

1. Based on the World Business Environment Survey (WBES) of the investment climate, conducted in 80 countries over 1999–2000, 80% of private firms in China cite financing constraints as a major obstacle. This figure, which is twice the median figure over the whole sample (38.5%), ranks China as the most financially constrained country in the sample, beating Haiti (74.4%) and the Kyrgyz Republic (66.7%) The figure computed by Claessens and Tzioumis (2006) excludes firms with state or foreign ownership since they probably enjoy preferential access to finance.

2. Although the "Go-Global" campaign was initiated in 1999 in China by the central government to promote Chinese business abroad, Chinese firms started to undertake FDI as early as the 1980s. The Wuxi local statistics bureau explained that most early FDI undertakes were state-owned-enterprises, which went abroad to promote local traditional industries (such as textile) as well as infrastructure related projects. Local statistics bureau also shared with us the FDI data in 1980s and early 1990s. But we are unable to include them in our analysis because there is a lack of firm level information. Nation-wide data collection of firm level information in China only started in 1999.

3. We triangulate our data in two ways. First, we hired two PhD students, both native Chinese, to search and code the data independently. Second, we sought help from Global Business, GTA Information Technology (GTA), a commercial data company based on Hong Kong to verify and amend our data.

4. The interviewed company was specialized in producing men's shirts for the Japanese and Western European market. Its move to Mongolia was driven in part by the Multi Fibre Agreement (MFA), which was eventually dismantled in 2005. We conducted twelve interviews with ten firms that had FDI abroad in 2011 during the data collection process in Wuxi, China.

5. The relationship between export and FDI can be more complex if the assumption of single product is relaxed. When the multiple products refer to intermediate and final products, firms may export the former and undertake FDI for the latter (for assembly, testing, customer service, etc) to serve a foreign market. For example, Japanese automobile firms had to export intermediate components to the US market to support their assembly line in the US in their early years of (FDI) operation in the US. Alternatively, if the multi-products are genuinely different products supplied by, for example, a conglomerate, the decision of whether to export or to undertake FDI depends on the difference of factor endowments between the home and host country, transportation costs, trade barriers, to what extent the product requires close-to market support, and the size of the market, etc. For example, Tata is one of the largest exporters for various metal materials, footwear, garments and leather products in India, but it undertakes foreign direct investment in other sectors, such as supermarket, automobiles, and defence around the world. To more accurately capture the relationship between export and FDI, the analytical unit needs to be narrowed down to the firm-product-market level. The paucity of data has made it difficult to trace the precise relationship. Prior country level studies usually point to a positive relationship between and two, indicating that complementary usually outweighs substitution.

6. See Lieberman and Kang (2008) for a case study of a Korean steelmaker for the differences between TFP and profitability in measuring firm performance.

References

Asiedu, Elizabeth, and Haidi S. Esfahani. 2001. Ownership structure in foreign direct investment projects. *Review of Economics and Statistics* 83(4): 647–662.

Bebchuk, Luaian and Alma Cohen. 2005. The costs of entrenched boards. *Journal of Financial Economics* 78, 409-433.

Beck, Thorsten, Asli Demirguc-Kunt and Vojislav Maksimovic. 2005. Financial and Legal Constraints to Firm Growth: Does Firm Size Matter? *Journal of Finance* 137-177

Beck, Thorsten, Asli Demirguc-Kunt and Vojislav Maksimovic. 2004. Bank competition and access to finance: International evidence. *Journal of Money, Credit, and Banking* 36(3): 628-648.

Belderbos, Rene, and Leo Sleuwaegen. 1996. Japanese firms and the decision to invest abroad: Business groups and regional core networks. *Review of Economics and Statistics* 214-220.

Berger, Philip, Eli Ofek and David Yermack. 1997. Managerial entrenchment and capital structure decisions. *Journal of Finance* 52, 1411-1438.

Berk, Jonathan, Richard Stanton and Josef Zechner. 2010. Human Capital, Bankruptcy, and Capital Structure. *The Journal of Finance* 3, 891-926.

Berman, Nicolas, and Jerome Hericourt. 2010. Financial factors and the margins of trade: evidence from cross-country firm level data. *Journal of Development Economics* 93, 206-217.

Bernard, Andrew, and Bradford Jensen. 2004. Why Some Firms Export. *Review of Economics and Statistics* 86(2): 561-69.

Blomstrom, Magnus, and Robert Lipsey. 1991. Firm Size and Foreign Operations of Multi-nationals. *Scandinavian Journal of Economics* 93(1): 101-7.

Brandt, Loren and Hongbin Li. 2003. Bank Discrimination in Transition Economies: Ideology, Information or Incentives? *Journal of Comparative Economics, 31,* 486-502.

Braun, Matias. 2003 *Financial contractibility and asset hardness,* mimeo Harvard University.

Buch, Claudia, Iris Kesternich, Alexander Lipponer and Monika Schnitzer. 2009. Financial Constraints and the Margins of FDI. *IAW Discussion Papers*.

Buckley, Peter, and Mark Casson. 1976. *The Future of Multinational Enterprise*. London: The Macmillan Press.

Buckley, Peter, Jeremy Clegg, Adam Cross, Xin Liu, Hinrich Voss, and Ping Zheng. 2007. The determinants of Chinese outward foreign direct investment. *Journal of International Business Studies* 38: 499-518.

Butt-Jaggia, Priscilla, and Anjar Thakor. V. 1994. Firm-specific human capital and optimal capital structure, *International Economic Review* 35, 283-308.

Calvet, Augustin, L. 1981. A Synthesis of Foreign Direct Investment Theories and Theories of the Multinational Firm. *Journal of International Business Studies* 12, 43-60

Carney, Michael, Daniel Shapiro and Yao Tang. 2009. Business Group Performance in China: Ownership and Temporal Considerations. *Management and Organization Review* 5(2): 167-193.

Chen, Cheng. 2011. Information, incentives and multinational firms. *Journal of International Economics* 85, 147-158.

Claessens, Stijn, Konstantinos Tzioumis. 2006. Measuring Firms' Access to Finance. *Mimeo*, World Bank, Washington, DC.

Claessens, Stijn. and Luc Laeven. 2003. Financial development, property rights and growth, *Journal of Finance* 58(6): 2401-2436.

Claessens, Stijn, Erik Feijend and Luc Laeven. 2008. Political connections and preferential access to finance: the role of campaign contributions. *Journal of Financial Economics* 88:554–580

Clarke, George, Robert Cull, and Maria.S. Peria. 2006. Foreign bank participation and access to credit across firms in developing countries. *Journal of Comparative Economics* 34, 774-795.

Cull, Robert, and Linxin C. Xu. 2003. Institutions, ownership, and finance: the determinants of profit reinvestment among Chinese firms. *Journal of Financial Economics* 77, 117-146.

Davies, Ronald and Helga Kristjánsdóttir. 2010. Fixed Costs, Foreign Direct Investment, and Gravity with Zeros. *Review of International Economics* 18(1): 47-62.

DiMasi Josef, Henry G. Grabowski, and John Vernon. 2004. R&D costs and returns by therapeutic category. *Drug Information Journal* 38(3): 211–223.

Du, Julan, and Sourafel Girma. 2007. Finance and Firm Export in China. *Kyklos* 60(1): 37-54.

Firth, Michael, Lin Chen, Liu Ping and Sonia M. Wang. 2009. Inside the Black Box: Bank Credit Allocation in China's Private Sector. *Journal of Banking & Finance* 33, 1144-1155

Forbes, Kristin. 2007. One Cost of the Chilean Capital Controls: Increased Financial Constraints for Smaller Traded Firms. *Journal of International Economics* 71:294-323.

Ge, Ying, and Jiaping Qiu. 2007. Financial development, bank discrimination and trade credit. *Journal of Banking & Finance*, 31(2): 513-530.

Goldstein, Itay, and Assaf Razin, 2006. An Information-Based Trade Off between Foreign Direct Investment and Foreign Portfolio Investment, *Journal of International Economics* 70: 271-295.

Gormley, Todd. 2010. The impact of foreign bank entry in emerging markets: evidence from India. *Journal of Financial Intermediation* 19: 26–51.

Greenaway, David, Alessandra Guariglia and Richard Kneller. 2007. Financial factors and exporting decisions. *Journal of International Economics* 73: 377–395.

Hahn, Donghoon, and Keun Lee. 2006. Chinese business groups: Their origins and development. In S. J. Chang (Ed.), *Business Groups in East Asia: Financial Crisis, Restructuring, and New Growth*: 207-231. Oxford: Oxford University Press.

Helpman, Elhnan, Marc J. Melitz and Stephe. R. Yeaple, 2004. Export versus FDI with heterogeneous firms. *The American Economic Review* 94: 300-16.

Hennart, Jean-Francois. 1991. The transaction cost theory of multinational enterprise, in C. N. Pitleis and R. Sugden (eds) *The Nature of the Transnational Firm*. London: Rutledge, pp., 81-116.

Hirsch, Barry. 1991. Union Coverage and profitability among US firms. *The Review of Economics and Statistics* 69-77.

Huang, Hui, Xiaojun Shi. and Shunming Zhang. 2011. Counter-cyclical substitution between trade credit and bank credit. *Journal of Banking and Finance* 35: 1859-1878.

Hymer, Stephen. 1976. *The international operations of national firms: A study of foreign direct investment.* Cambridge, MA: MIT Press.

Kayhan, Ayla. 2003. Managerial entrenchment and the debt-equity choices. *Working paper, University of Texas at Austin.*

Keister, Lisa. 1998. Engineering growth: Business group structure and firm performance in China's transition economy. *American Journal of Sociology* 104: 404-440.

Keister, Lisa. 2000. *The Structure and Impact of Interfirm Relations during Economic Development*. Oxford University Press.

Khanna, Tarun, and Krishna Palepu. 2000. The future of business groups in emerging markets: Long-run evidence from Chile. *Academy of Management Journal 43*(3): 268-285.

Khanna, Tarun, and Jane W. Rivkin. 2001. Estimating the performance effects of business groups in emerging markets. *Strategic Management Journal* 22: 45-74.

Kindleberger, Charles P. 1969. *American Business Abroad: Six Lectures on Direct Investment*. New Haven, CT: Yale University Press.

Garry, King, and Langche Zeng, 2001a. Logistic regression in Rare Events Data. *Political Analysis*, 9: 137-163.

Garry, King, and Langche Zeng, 2001b. *International Organization*. 55(3): 693-715.

Klein, Michael, Joe Peek and Eric Rosengren. 2002. Troubled Banks, Impaired Foreign Direct Investment: The Role of Relative Access to Credit. *American Economic Review* 92, 664-682.

Krautheim, Sebastian. 2013. Export-supporting FDI. *Canadian Journal of Economics* 14: 1571-1605.

Kuzmina, Olga. 2013. Operating Flexibility and capital structure: Evidence from a Natural Experiment. Accessed online: http://pages.nes.ru/okuzmina/CS.pdf

Lee, Hongshik. 2010. Decisions to Invest Abroad: The case of South Korean Multinationals. *Pacific Economic Review* 15(2): 281-302.

Leff, Le. 1978. Industrial organization and entrepreneurship in the developing countries: The economic groups. *Economic Development & Cultural Change* 26: 661-675.

Levinsohn, James, Amil Petrin and Brian Poi. P. 2003. Production Function Estimation in Stata using Inputs to Control for Unobservables. *Stata Journal* 4(2): 113-123.

Lewellen, Wilbur G., 1971. A Pure Financial Rationale for the Conglomerate Merger, *Journal of Finance* 26: 521–537.

Lieberman, Marvin, and Jina Kang. 2008. How to measure company productivity using value-added: A focus on Pohang Steel (POSCO). *Asia Pacific Journal of Management* 25:209-224.

Lin, Huidan. 2011. Foreign bank entry and firms' access to bank credit: Evidence from China. *Journal of Banking and Finance* 35:1000–1010

Love, Inessa. 2003. Financial Development and Financing Constraints: International Evidence from the Structural Investment Model. *Review of Financial Studies* 16(3): 765-791.

Luo, Xiaowei, and Chi-Nien Chung. 2005. Keeping it all in the family: The role of particularistic relationships in business group performance during institutional transition. *Administrative Science Quarterly* 50: 404–439.

Luo, Yadong, Qiuzhi Xue and Benjie Han. 2010. How emerging market governments promote outward FDI: Experience from China. *Journal of World Business* 45, 68-79.

Ma, Xufei, and Jane Lu. 2005. The critical role of business groups in China. *Ivey Business Journal* 69(5): 1-12.

MacKay, Peter. 2003. Real Flexibility and Financial Structure: An Empirical Analyse. *Review of Financial Studies* 16(4): 1131-1165.

Manova, Kalina, Shang-Jin Wei and Zhiwei Zhang. 2011. Firm exports and Multinational Activity under credit constraints. *NBER Working Papers 16905*. National Bureau of Economic Research, Inc.

Manova, Kalina. 2013. Credit Constraints, Heterogeneous Firms and International Trade. *Review of Economic Studies*. 80,711-744.

Markusen, James R. 1984. Multinationals, multi-plant economies, and the gains from trade. Journal of International Economics 16: 205–226.

Markusen, James R. 1995. The Boundaries of Multinational Enterprises and the Theory of International Trade. *Journal of Economic Perspectives* 9(2):169-189.

Markusen, James R. 2002. Multinational Firms and the Theory of International Trade. *MPRA Paper 8380,* University Library of Munich, Germany

Markusen, James, R. and Anthony J. Venables. 1998. Multinational firms and the new trade theory. *Journal of International Economics* 46: 186-203.

Melitz, Marc. 2003. The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica* 71: 1695-1725.

Minetti, Raoul. and Sushan C. Zhu. 2011. Credit constraints and firm export: Microeconomic evidence from Italy. *Journal of International Economics* 83: 109-125.

Muûls, Mirabelle. 2008. Exporters and credit constraints. A firm-level approach. *Working Paper Research 139, National Bank of Belgium.*

Nee, Victor. 1992. Organizational dynamics of market transition: hybrid forms, property rights, and mixed economy in China. *Administrative Science Quarterly* 37(1): 1-27

Norton, Edward, Hya, Wang and Cunrong Ai. 2004. Computing interaction effects and standard errors in logit and probit models. *The Stata Journal* 4(2): 154-167.

Oi, Walter. 1962. Labor as a Quasi-Fixed Factor. *Journal of Political Economy* 70(6):538-555.

Olley, Steven, and Ariel Pakes. 1996. The Dynamics of Productivity in the Telecommunications Industry. *Econometrica* 64(6): 1263-1298.

Ottaviano, Gianmarco., and Mayer, Thierry., 2007. Happy few: the internationalization of European firms, new facts based on firm-level evidence. Open Access publications from Sciences Po info:hdl:2441/10147, Sciences Po.

Petrin, Amil, Brian P. Poi. and James Levinsohn. 2004. Production Function Estimation in Stata Using Inputs to Control for Unobservable. *Stata Journal* 4(20): 113-123.

Rajan, Raghuram, and Luigi Zingales. 1998. Financial Dependence and Growth. *American Economic Review* 88: 559-586.

Rugman, Alan. 1981. *Inside the Multinationals. The Economics of Internal Markets*. London, Croom Helm, and New York: Columbia University Press.

Schiantarelli, Fabio. 1995. Financial Constraints and Investment: A Critical Review of Methodological Issues and International Evidence. In: J. Peek and E. Rosengren (eds.), *Is Bank Lending Important for the Transmission of Monetary Policy*? Boston, MA: Federal Reserve Bank of Boston.

Stark, David. 1996. Recombinant Property in East European Capitalism. *American Journal of Sociology* 101: 993-1011.

Stein, Jeremy. 1997. Internal capital markets and the competition for corporate resources. *Journal of Finance* 52(1): 111-133.

Stein, Jeremy. 2003. Agency, Information and Corporate Investment. In *Handbook of the Economics of Finance*, edited by George Constantinides, Milton Harris and Ren´e Stulz, Elsevier, 111-165.

Tobin, James. 1969. A general equilibrium approach to monetary theory. *Journal of Money, Credit and Banking* 1(1): 15-29.

Todo, Yasuyuki. 2011. Quantitative evaluation of determinants of export and FDI: firm-level evidence from Japan. *World Economy* 34 (3): 355- 381.

Tomz, Michael. Garry King, and Langche Zeng. 1999. RELOGIT: *Rare Events Logistic Regression*, Version 1.1 Cambridge, MA: Harvard University, October 1, http://gking.harvard.edu/

Vernon, Raymond. 1966, International investment and international trade in the product cycle. *Quarterly Journal of Economics* 80 (May):190-207.

White, Robert. Robert E. Hoskisson. Daphne Yiu, and Garry D. Bruton. 2008. Employment and market innovation in Chinese business group-affiliated firms: The role of group control systems. *Management and Organization Review* 4: 225-256

Xiao, Li, and David North. 2012. Institutional transition and the financing of high-tech SMEs in China: A longitudinal perspective. *Venture Capital* 14(4): 269-287.

Yiu, Daphne, and Chungming Lau and Garry D. Bruton. 2007. International venturing by emerging economy firms: the effects of firm capabilities, home country networks, and corporate entrepreneurship. *Journal of International Business Studies* 38: 519-540.

Table 1: Measurement of key variables and descriptive statistics

Variable	Measurement	Mean	Std. Dev	Min	Max
FDI decision	=1 if the firm has FDI; 0=otherwise	0.006	0.047	0.000	1.000
Access to finance	Long term bank credit/total assets	0.102	0.765	0.000	43.245
Fixed assets	Fixed assets/total assets	0.235	0.167	0.000	0.875
Firm size	Natural log of employees	4.232	1.021	0.654	9.022
Age	Number of years in operation	9.054	7.543	0.000	106.000
R&D	=1 if the firm has R&D expenditure; 0=otherwise	0.082	0.275	0.000	1.000
Total factor productivity (TFP)	It is measured using Levinsohn-Petrin method based on value added. Number of employee is used as freely variable input, material costs are the proxy. Capital is specified by the log value of total assets	2.451	0.703	-4.562	5.884
Export	=1 if the firm has export; 0=otherwise	0.113	0.194	0.000	1.000
State equity	=1 if the firm has state equity; 0=otherwise	0.132	0.185	0.000	1.000
Foreign equity	=1 if the firm has foreign equity; 0=otherwise	0.219	0.255	0.000	1.000
Entry (industry)	Number of new entries by two-digit industry classification	33.709	43.743	0.000	149.000
Volatility (industry)	Annual total sales fluctuations by two-digit industry classification	15.574	1.177	6.537	17.217
External finance dependency (industry)	=1 if (current assets-current liability)/total assets>sample mean; 0=otherwise	0.637	0.196	0.000	1.000
Technology intensity (industry)	=1 if R&D expense/total operation costs>sample mean; 0=otherwise	0.027	0.026	0.000	0.090
Inventory ratio (industry)	=1 if value of inventory/total sales>sample mean; 0=otherwise	0.167	0.027	0.070	0.230
Asset tangibility (industry)	=1 if fixed assets/employee number<sample mean; 0=otherwise	0.307	0.111	0.120	0.620
Group association	=1 if the firm is associated with a group network; 0=otherwise	0.118	0.264	0.000	1.000
Group association core	=1 if the firm is the core firm of a group network; 0=otherwise	0.048	0.064	0.000	1.000
Welfare provision	The natural log of the sum of medical insurance, unemployment insurance and housing benefit per person	7.616	0.783	0.151	12.275

Table 2: Correlation matrix of key variables

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*	*(15)*	*(16)*	*(17)*	*(18)*
(1) FDI																		
(2) Access to finance	0.0871*																	
(3) Fixed assets	0.0091	0.0489*																
(4) Firm size	0.0591*	0.2802*	0.1606*															
(5) Age	-0.0029	0.0937*	-0.0738*	0.2114*														
(6) R&D	0.0193*	0.0719*	-0.0202*	0.1279*	0.0963*													
(7) Export	0.1432*	0.4231*	0.2353	0.3212	0.0453	0.0367												
(8) State equity	-0.1221	0.4831*	0.3210*	0.3335*	0.1546	0.1003	0.1092											
(9) Foreign equity	-0.0313	0.3421*	0.2775*	0.3156*	-0.1264	0.3287*	0.3421	-0.016										
(10) TFP	0.0204*	0.1325*	-0.0643*	0.1631*	-0.0110	0.0410*	0.2175	-0.2186*	0.3224*									
(11) Entry	-0.0166*	-0.0145	-0.0081	-0.0142	-0.0228*	-0.0373*	-0.0486*	-0.0677*	-0.0346	-0.1451								
(12) Volatility	-0.0222*	0.0332*	-0.0915*	-0.0093	-0.0591*	0.0114	0.0861*	0.4195*	0.0324	-0.0475	-0.0653							
(13) External finance	-0.0344	0.0315	0.0376	0.0231	0.0435	-0.0865	0.0364	-0.0453	0.2543	-0.0463	-0.0874	0.0112						
(14) Technology intensity	0.0016	0.3203	0.0432	0.1632	-0.1654	0.3423*	0.3886*	-0.1943	0.2113	0.3122*	-0.0734	-0.0544	0.4076*					
(15) Inventory ratio	-0.1342	0.0054	0.0775	0.0653	-0.0754	-0.1449	-0.0761	-0.0754	-0.0475	-0.1721	-0.0766	-0.1002	0.1864*	-0.0432				
(16) Asset tangibility	-0.0246	0.2764	-0.3532	0.0683	0.1175*	-0.0045	0.2841	-0.0340	-0.0543	0.0064	0.0487	0.0754	-0.2873*	-0.1154	0.0485			
(17) Group association core	0.1671	0.1754*	0.2651*	0.2364*	0.2945	-0.0654	0.2147	-0.0328	-0.2172	0.0784	0.0629	0.1787	-0.0654	0.0054	0.0509	0.1082		
(18) Group association	0.1034	0.0784*	0.0072	0.0765	0.1143	-0.0376	0.0877	-0.0320	-0.2101	0.0879	0.1143	0.0864	-0.0878	0.0042	0.1002	0.0832	0.0453	
(19) Welfare provision	-0.0043	-0.1309	-0.0368	0.0674	0.0065*	0.1420	0.1453	-0.0322	0.2276*	0.0874*	-0.0765	-0.0115	0.1184	0.1768	-0.0765	-0.0878	0.0867*	0.0564
Notes: * Correlation is significant at the 0.05 level (two-tailored).																		

Table 3: Logistic regressions on access to finance and the decision of FDI

	(1)	(2) High external finance dependence	(3) High technology intensity	(4) Low asset tangibility	(5) High inventory ratio	(6) High external finance dependence	(7) High external finance dependence
Access to finance$_{t-1}$	0.151**	0.303**	0.243**	0.184**	0.218**	0.327***	0.335***
	(0.058)	(0.127)	(0.095)	(0.076)	(0.081)	(0.074)	(0.079)
Access to finance$_{t-1}$* Industry finance dependence		0.043**	0.349***	0.396**	0.085***	0.056**	0.051**
		(0.017)	(0.102)	(0.145)	(0.023)	(0.021)	(0.022)
Industry finance dependence		-0.127	0.103	-0.003	-0.036	-0.132	-0.128
		(0.110)	(0.118)	(0.039)	(0.037)	(0.115)	(0.116)
Access to finance$_{t-1}$* Group Association						-0.079**	-0.077**
						(0.039)	(0.037)
Group association						-0.213	-0.235
						(0.181)	(0.192)
Access to finance$_{t-1}$* Group Association core						-0.125***	-0.129***
						(0.031)	(0.030)
Group association core						-0.067	-0.066
						(0.101)	(0.101)
Access to finance$_{t-1}$* Welfare provision							0.105**
							(0.045)
Welfare							-0.445
							(0.277)
Export$_{t-1}$	0.054*	0.060*	0.061*	0.062**	0.059**	0.063**	0.066**
	(0.028)	(0.031)	(0.031)	(0.027)	(0.29)	(0.026)	(0.028)
State equity$_{t-1}$	-0.123	-0.117	-0.115	-0.113	-0.115	-0.117	-0.117
	(0.887)	(0.854)	(0.876)	(0.877)	(0.890)	(0.843)	(0.811)
Foreign equity$_{t-1}$	-0.046	-0.051	-0.052	-0.056	-0.055	-0.055	-0.056
	(0.077)	(0.077)	(0.074)	(0.074)	(0.073)	(0.073)	(0.077)
TFP$_{t-1}$	0.807**	0.891**	0.892**	0.867**	0.811***	0.893***	0.878***
	(0.296)	(0.343)	(0.399)	(0.381)	(0.258)	(0.301)	(0.289)
Fixed Assets$_{t-1}$	-0.104	1.356	2.944	1.234	1.448	2.345*	1.345
	(1.174)	(2.132)	(2.466)	(1.248)	(1.238)	(1.012)	(3.205)
Firm size$_{t-1}$	0.693***	0.120*	0.588	0.667**	0.559*	0.432	0.725*
	(0.197)	(0.497)	(0.349)	(0.232)	(0.235)	(0.538)	(0.312)
Age$_{t-1}$	0.078*	0.061	0.123	0.110*	0.061	0.074	0.133
	(0.033)	(0.051)	(0.111)	(0.043)	(0.036)	(0.048)	(0.076)
Age$_{t-1}$ squared	-0.115	-0.113	-0.116	-0.117	-0.117	-0.113	-0.115
	(0.0880	(0.082)	(0.082)	(0.082)	(0.081)	(0.084)	(0.089)
R&D$_{t-1}$	1.342**	1.448*	1.288*	0.913	1.145*	1.121*	1.245**
	(0.464)	(0.622)	(0.642)	(0.644)	(0.522)	(0.523)	(0.456)
Entry$_{tj}$	0.002	-0.05	0.029*	0.009	-0.001	-0.031	-0.002
	(0.008)	(0.038)	(0.013)	(0.011)	(0.009)	(0.232)	(0.015)
Volatility$_{tj}$	0.503	7.223	-0.881	-0.168	1.282	-3.323	0.785
	(0.730)	(6.421)	(0.676)	(1.112)	(1.274)	(3.238)	(1.134)
Constant	-10.617	-78.233	-4.562	-6.102	-4.430	-6.231	-7.786
	(8.813)	(62.320)	(9.453)	(17.698)	(12.276)	(46.234)	(13.100)
Pseudo R2	31%	41%	44%	43%	41%	51%	56%
N	27162	27043	27040	27016	27040	27040	27008

Notes: the dependent variable FDI is a dummy variable which is coded as "1" if the firm has an FDI and "0" otherwise. The coefficients are based on log odds. All estimates include year and industry fixed effects. The year dates from 1999 to 2007. Industry classification follows two digit industry codes. There are 34 industries included. VIF values are below 5.31 in all estimates. All independent variables are one year lagged. Standard errors are clustered on firm.
* p<0.05, ** p<0.01, *** p<0.001

Table 4: z-statistic of Interaction Effects after Logit

Interaction term	variables	Mean	Std Dev.	Min	Max
Access to finance * Industry finance dependence	_logit_ie	0.11794	0.00213	0.00031	0.22285
	_logit_se	0.01619	0.00067	0.00024	0.02731
	_log_z	**7.28251**	1.05354	0.55432	13.23423
Access to finance * Group association	_logit_ie	-0.08843	0.00543	-0.17105	-0.00057
	_logit_se	0.00933	0.00059	0.00065	0.02191
	_log_z	**-9.47164**	1.43213	-27.09988	-3.76578
Access to finance * Group association core	_logit_ie	-0.08942	0.00569	-0.19551	-0.00055
	_logit_se	0.00667	0.00055	0.00058	0.01665
	_log_z	**-14.05978**	1.33441	-29.00932	-3.43445
Access to finance * Welfare provision	_logit_ie	0.14112	0.00235	0.00084	0.23477
	_logit_se	0.01225	0.00041	0.00076	0.02671
	_log_z	**11.58316**	2.34227	4.55644	27.23112

Notes: the calculation is based on Model 7 in Table 3. Observations are 27008.

Appendix 1: Industry distribution of POEs in Wuxi 1999-2007

Two-digit industry name	Percent (%)	Cumulative Percent (%)	Number	Cumulative number
Agricultural and side-line foods processing	1.91	1.91	519	519
Beverage production	1.09	3.01	296	818
Chemical fibres	1.64	4.64	445	1260
Clothes, shoes and hat manufacture	0.82	5.46	223	1483
Common equipment	8.47	13.93	2301	3784
Communications equipment, computer and other electronic equipment	4.65	14.75	1263	4006
Craftwork and other manufactures	2.46	21.04	668	5715
Cultural education and sports articles	2.46	23.5	668	6383
Electric machines and apparatuses manufacturing	7.1	30.6	1929	8312
Electricity and heating production and supply	1.09	31.69	296	8608
Food production	3.83	35.52	1040	9648
Fuel gas production and supply	0.27	35.79	73	9721
Furniture manufacturing	0.55	36.34	149	9871
Instruments, meters, cultural and office machinery manufacture	4.37	40.71	1187	11058
Leather fur feather and other products	1.37	42.08	372	11430
Metal products	5.25	47.33	1426	12856
Mining: other mining industries	0.21	47.75	57	12913
Nonferrous metals mining and dressing	0.27	47.81	73	12986
Non-metal mineral products	7.38	55.19	2005	14991
Papermaking and paper products	1.09	56.28	296	15287
Petroleum processing, coking and nuclear fuel processing	0.55	56.83	149	15436
Plastic products	2.46	59.29	668	16104
Printing and record medium reproduction	1.37	60.66	372	16476
Raw chemical material and chemical products	9.56	70.22	2597	19073
Rubber products	2.19	72.4	595	19665
Smelting and pressing of ferrous metals	0.82	73.22	223	19888
Smelting and pressing of non-ferrous metals	3.28	76.5	891	20779
Special equipment	9.84	86.34	2673	23452
Spinning industry	5.46	91.8	1483	24935
Timber processing, bamboo, cane, palm fibre and straw products	1.8	93.6	489	25424
Tobacco products processing	0.11	93.76	30	25454
Traffic equipment	5.74	99.45	1559	27013
Waste resources and old material recycling and processing	0.27	99.73	73	27089
Water production and supply	0.27	100	73	27162