Presence of Foreign Firms and the Firm Capital Structure: Evidence from China’s Manufacturing Sector

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Abstract

This paper argues that there is a link between foreign presence and the leverage of domestic firms. This link is empirically evaluated by using firm level panel data from China. The empirical estimation based on (i) the Tobit and (ii) the Instrumental Variable Tobit regression reveals that, in overall terms, the impact of foreign presence on the leverage of domestic firms in China’s manufacturing sector is negative. We find that the negative impact on the leverage of privately owned firms is relatively large. We expect the impact of foreign presence on the leverage of domestic firms to vary from industry to industry.

Keywords: Foreign direct investment; capital structure; panel data analysis; China

* This paper has greatly benefitted from helpful comments and suggestions from several colleagues. However, the authors are responsible for all remaining errors and imperfections.
1. Introduction

A number of empirical studies such as Görg and Greenaway (2004), Branstetter (2006), Buckley, Clegg and Wang (2007) have shown that foreign direct investment (FDI) in a country can affect the output of domestic firms. FDI affects the output of domestic firms directly as well as indirectly through FDI-linked spillover effects. The entry of foreign firms increases competition in the domestic market which can affect the profitability of domestic firms. Increased competition can also restrict the growth opportunities of the domestic firms. At the same time, Brander and Lewis (1986), among others, have argued that firm output and financial structure decisions are interconnected.

Given that (i) output and financial structure decisions of firms are interconnected and (ii) firm output is affected by FDI, it can be argued that presence of foreign firms in a country through the related spillovers can also affect firm capital structure. For example, due to entry of foreign firms, domestic firms may shift to debt financing because raising equity is too difficult. By making use of a simple theoretical model, this paper argues that firm capital structure also depends on the presence of foreign firms. Based on the theoretical model, an empirical model is specified. The empirical model is estimated by making use of firm level panel data from China.

China is one of the largest recipients of FDI and the Chinese economy is rapidly growing. Since the opening up of the Chinese economy in the late 1970s, the Chinese capital market has gone through significant changes. As noted by Chen (2004), as compared to most western firms, the Chinese firms make a greater use of retained earnings for business finance. Recent figures suggest a shift away from this and in favour of equity finance. In 2011, 282
new companies listed on the stock market raising US$45.3 billion in new equity funds (which represents a sharp decrease as compared to US$76.3 billion raised in 2010 but a big improvement over 2009 when only 99 companies were listed raising US$29.6 billion). The private equity is emerging as an important provider of funds for China’s small and medium-sized companies (Perkowski, 2012). China has recently allowed a selected number of institutions to invest in its capital markets. The new rules allow selected international fund managers to invest a combined total of US$80 billion in China.

Li, Yue and Zhao (2000), Chen and Strange (2005), Huang and Song (2006) and Qian, Tian and Wirjanto (2009), among others, have considered the determinants of capital structure in China. However, none of the available studies have considered the impact of the presence of foreign firms. The empirical analysis presented in this study is based on a comprehensive dataset that covers over 85 per cent of the total industrial output of China. Such an extensive dataset allows one to appropriately measure the presence of foreign firms. One of the reasons why the earlier studies have not empirically examined the impact of the presence of foreign firms on firm capital structure may be that the dataset available was not sufficiently large. Earlier studies on China have suggested financing decisions of private and state owned firms can be very different. Accordingly, we also separately examine the impact of foreign presence on the capital structure of privately owned and state & collectively owned firms. The empirical results are based on the Tobit and the Instrumental variable Tobit estimation.
The rest of the paper is organized as follows. A theoretical model that shows the link between the presence of foreign firms and firm capital structure is presented in section 2. Based on the theoretical model, an empirical model is specified in Section 3. This section also includes a discussion of the data. The empirical results are presented in Section 4 and Section 5 contains some concluding remarks.

2. Firm Leverage and Foreign Presence: A Theoretical Model

Consider an industry where \( \gamma \) is the proportion of foreign firms. A representative domestic firm with wealth \( W \) raises debt \( (D) \) to finance an investment \( I \) at time 0, which is used in production at time 1. As everything is measured in real values, debt can be viewed as an input into the production process. \( f(I) = Ae^{\gamma I} \) is the firm production function, where \( e^{\gamma} \) captures the impact of foreign presence. The presence of foreign firms is a source of positive externality in this model. As the proportion of foreign firms increases, the domestic firms experience a higher level of positive externality.\(^1\) The externality arises from spillovers that result from, among other things, the introduction of new technology and superior management skills. “\( A \)” (which is greater than 2 due to technical reasons) captures the impact of other factors that enter into (and affect) the production process, such as the level of domestic technology, etc. At time 2, a random cash flow \( x \) is realized and the debt \( (D) \) is payable. The randomness of cash flow \( x \) is due to market uncertainty and \( x \) is uniformly distributed over the support \((0, a)\). If the firm defaults, a deadweight cost of \( C \)

\(^{1}\gamma = 0 \) mean that there are no foreign firms in the industry, whereas \( \gamma = 1 \) implies that all firms are foreign. As this paper focuses on the impact of foreign presence on leverage of domestic firms, we assume that \( \gamma < 1 \).
where \( C < \frac{a}{2} \) is incurred. The firm’s problem is to choose the level of debt \((D)\) and investment \((I)\) to maximize its value, as follows:

Maximise \( Ae^\gamma I + \int_0^\infty \left( \frac{x-D}{a} \right) dx \) with respect to \( I & D \)

Subject to \( I - W = \int_0^D \left( \frac{x-C}{a} \right) dx + \int_0^a \left( \frac{D}{a} \right) dx \)

By solving the above optimization problem, the optimal level of debt can be derived as follows:

\[
D = \frac{Ae^\gamma (a-C) - a}{Ae^\gamma - 1}
\]

The optimal value of debt can be used to derive the optimal level of leverage as follows:

\[
leverage = \frac{D}{I} = \frac{\left( Ae^\gamma - 1 \right) \left( Ae^\gamma (a-C) - a \right)}{- \frac{1}{2} \left( Ae^\gamma (a-C) - a \right)^2 + (a - C) \left( Ae^\gamma - 1 \right) \left( Ae^\gamma (a-C) - a \right) + W \left( Ae^\gamma - 1 \right)^2}
\]  

Equation (1) shows that the firm’s optimal leverage depends on four factors: the level of foreign presence \((\gamma)\), its production \((A)\), the default cost \((C)\) and the equity level \((W)\).

Equation (1) suggests that there is a link between foreign presence (as measured by \(\gamma\)) and optimal leverage of the firm. However, as foreign presence affects both the denominator and the numerator of equation (1), it is not obvious whether this relationship is positive or negative. In other words, depending on the relative size of the impact on optimal debt and the level of investment, foreign presence can have a positive or a negative impact on a firm’s capital structure. Owing to FDI-linked spillover effects, entry of foreign firms increases the
productivity of domestic firms, which increases their profitability. An increase in profitability encourages other domestic firms to enter the industry, which increases the level of competition for debt and hence the impact on leverage can be negative. However, entry of foreign firms also increases competition in domestic market, which reduces firm profitability. A decrease in firm profitability can force some domestic firms to exit the industry, which reduces demand for debt and hence the overall impact on firm leverage can also be positive. In summary, a change in the level of foreign presence can affect the capital structure of domestic firms.

In order to empirically evaluate the impact of foreign presence on leverage of domestic firms, we linearize equation (1) at \((A_0, C_0, W_0, \gamma_0)\) which yields equation (2) as follows:

\[
\begin{align*}
\text{leverage} &= \alpha_0 + \alpha_1 A + \alpha_2 C + \alpha_3 W + \alpha_4 \gamma \\
&= \lambda_0 + \lambda_1 X + \lambda_2 fp + \lambda_3 d\text{industry} + \lambda_4 d\text{year} + \varepsilon
\end{align*}
\]  

(2)

where \(\alpha_0 = y(A_0, C_0, W_0 - \gamma_0) - A_0\alpha_1 - C_0\alpha_2 - W_0\alpha_3 - \gamma_0\alpha_4\), \(\alpha_1 = \frac{\partial y}{\partial A}\bigg|_{A_0, C_0, W_0, \gamma_0}\), \(\alpha_2 = \frac{\partial y}{\partial C}\bigg|_{A_0, C_0, W_0, \gamma_0}\), \(\alpha_3 = \frac{\partial y}{\partial W}\bigg|_{A_0, C_0, W_0, \gamma_0}\), and \(\alpha_4 = \frac{\partial y}{\partial \gamma}\bigg|_{A_0, C_0, W_0, \gamma_0}\).

The second line of equation (2) is obtained by assuming that \(A\), \(C\), and \(W\) depend on a set of firm characteristics (\(X\)). As we plan to estimate the model by using firm level panel data, industry dummies (\(d\text{industry}\)) and year dummies (\(d\text{year}\)) have been included in equation (2). Finally, we also add an error term (\(\varepsilon\)) to capture the impact of all omitted variables. The
error term is assumed to be \textit{i.i.d.} normal. Equation (2) is our empirical model, which is further discussed in the following section.

3. Empirical Model and Data

The theoretical model presented in Section 2 shows that firm capital structure depends on a number of factors including foreign presence. Equation (2) includes $X$ which is a vector of control variables. These control variables consist of other determinants of firm capital structure that have been identified in previous studies. These variables include firm size, firm age, collateral value of assets, growth opportunities, non-debt tax shields, profitability, business risk and ownership structure; $d_{industry}$ is a set of two-digit industry dummies that control for industry fixed effects; $d_{year}$ is a set of year dummies that captures the time variant effects. $fp$, which is the main variable of interest, captures the presence of foreign firms. The degree of foreign presence $fp$ is the share of the assets of foreign firms within the four-digit industry classification as follows:

$$fp = \frac{\sum_{i \in F} y_i}{\sum_{j \in J} y_j}$$

where $y$ is the firm’s total assets, $F$ is the set of foreign firms in the industry whereas $J$ is the set of all firms in the industry; $F$ is a subset of $J$ (i.e., $F \subseteq J$).

In order to address the issue of omitted variable bias, eight variables are included in the vector of control variables. The first control variable is firm size, which is measured by the natural logarithm of number of employees. Firm size can also be measured by the natural logarithm of firm assets. Compared with smaller firms, large firms tend to diversify their
business and therefore have a lower risk of default (Ferri and Jones, 1979, Rajan and Zingales, 1995), which suggests a positive relationship between firm size and leverage. A number of theoretical studies (for example Harris and Raviv, 1990 and Stulz, 1990) have suggested that the firm leverage increases with the firm size.

Firm age can also affect leverage. It has been suggested that older firms may have lower debt-related agency costs (Frank and Goyal, 2009), which leads to a higher leverage ratio. However, Akhtar and Oliver (2009) find a positive relationship between firm age and leverage. The collateral value of assets (the tangibility of assets) exerts two contrasting effects on firm leverage. Tangible assets can serve as collateral against external loans (Scott, 1977). An increase in tangible assets can reduce the scope of asset substitution (Titman and Wessels, 1988, Harris and Raviv, 1991) and have a higher liquidation value than intangible assets in case of bankruptcy (Huang and Song, 2006, Fattouh et al., 2008). Firms with higher tangible assets tend to have lower default costs and fewer debt-related agency problems (Akhtar and Oliver, 2009), which in turn suggests a positive relationship between tangible assets and leverage. However, in the case of Chinese firms, Li, Yue and Zhao found this relationship to be negative.

Growth opportunities represent the non-collateralisable assets and therefore it may be more difficult for a firm faced with high growth opportunities to access credit due to the asset substitution effect (Bradley et al., 1984, Titman and Wessels, 1988). Growth opportunities also affect firm leverage through changing the agency costs. A number of existing empirical studies have found a negative relationship between leverage and growth opportunities; for
example see Kayo and Kimura (2011). On the other hand, other studies such as Wu and Yue (2009) and Céspedes, González and Molina (2010) found a positive relationship between growth opportunities and leverage.

DeAngelo and Masulis (1980) show that non-debt tax shields substitute for the tax benefits of holding higher debts and therefore a firm with higher non-debt tax shields tends to have lower leverage. This negative relationship is confirmed by a majority of empirical studies; for example, see Huang and Song (2006). Bradley, Jarrell and Kim (1984) found the relationship between non-debt tax shields and leverage to be positive. The empirical evidence provided by de Jong, Kabir and Nguyen (2008) is mixed.

Firm profitability is expected to affect the leverage, but the existing theories provide contracting predictions concerning the direction of the relationship (see Céspedes, González and Molina, 2010). The pecking order theory (Myers, 1984) suggests that firms will first resort to internally generated funds for financing investment and hence more profitable firms tend to have a lower level of leverage. The tax-based models (such as DeAngelo and Masulis, 1980 and Leland, 1994) suggest that highly profitable firms can borrow more to shield income from corporate taxes, which predicts a positive relation between the profitability and leverage. Based on the agency theories, it can be argued that debt can act as a disciplining device that restrains the manager’s behavior (Jensen, 1986, Williamson, 1988) and hence highly profitable firms should have more debt. On the other hand, treating the corporate capital structure as a mechanism to alleviate the problem associated with the separation of ownership from control, Chang (1999) shows that the optimal contract between the corporate
insider and outside investors can be interpreted as a combination of debt and equity and highly profitable firms tend to have less debt. In contrast to contradictory theoretical predictions, the empirical studies appear to have found a consensus. Studies such as Fattouh, Harris, and Scaramozzino (2008), de Jong, Kabir and Nguyen (2008), Li, Yue and Zhao (2009) and Kayo and Kimura (2011) found a significant negative relationship between profitability and leverage.

The existing literature has also suggested that business risk (or the volatility of earnings) can also affect capital structure. Generally speaking, it is expected that business risk negatively affects the level of leverage (Chen et al., 1997, Booth et al., 2001 and de Jong, Kabir and Nguyen, 2008).

The last variable included in the vector of control variables $X$ is ownership; whether a firm is privately owned or state and collectively owned. Jensen and Meckling (1976) identify two types of conflicts of interest, namely the conflicts between shareholders and managers and those between shareholders and debtholders, and therefore the ownership structure is expected to affect the level of leverage. Zeckhauser and Pound (1990), Chen and Strange (2005) and Huang and Song (2006), among others, found the relationship between ownership and leverage to be statistically significant.

3.1 The Data

We utilize a comprehensive data set that is available from China’s National Bureau of Statistics. This dataset accounts for over 85 per cent of China’s total industrial output from 2000 to 2007. Similar datasets from the same source have been used by a number of existing
studies. For example Hu, Jefferson, and Qian (2005) have considered the issue of R&D and technology transfer; Jefferson, Thomas, and Zhang (2008) have considered productivity growth and Sun (2009) has considered the issue of export spillovers arising from FDI. Data set is cleaned, to among other things, avoid extreme outliers. In 2002-03, the Chinese Government revised its industrial classification method. We also accounted for inconsistency arising from change in industrial classification to the data prior to 2003.

Based on the cleaned dataset, we construct the dependent and explanatory variables. Following Doukas and Pantzalis (2003) and Mitto and Zhang (2008), the dependent variable, i.e., leverage, is computed as the ratio of long term debt to total debt and equity. Firm size is measured by the natural logarithm of the number of employees. Firm age is the number of years the firm has been operational. Following Friend and Lang (1988), the collateral value of assets is calculated as the ratio of tangible assets to total assets. Following, Fattouh et al. (2008), growth opportunities are measured by the annual percentage change in total assets. Non-debt tax shields are defined as the total annual depreciation scaled down by total assets (Bradley, Jarrell and Kim, 1984, Titman and Wessels, 1988). We measure profitability by the ratio of a firm’s total profits to its total assets, and its standard deviation in the four digit industries is used to proxy for business risk. Ownership is a dummy variable that takes a value of 1 if a firm is privately owned. As indicated earlier, the presence of foreign firms is measured by the share of the assets of foreign firms in the four digit industry.

<insert Table 1 & 2 about here>
Table 1 presents the descriptive statistics for the entire sample. The correlation matrix for the entire sample is presented in Table 2. The estimated correlation coefficients among explanatory variables appear to be reasonably low.

4. Empirical Results and Discussion

In this section we present the estimation results. Since the dependent variable (i.e., leverage), is censored between 0 and 1, the Tobit regression method was used to estimate equation (1). The model was estimated by making use of pooled data over a period of eight years, clustered by firm to accommodate the problem of potential heteroskedasticity and unspecified serial correlation within firms. However, it is possible that foreign firms tend to enter an industry where firms have low leverage, or firms with low leverage are more likely to be acquired by the foreign firms. In both cases, the presence of foreign firms in equation (2) may be endogenous. To address the possible endogeneity issue, we employ the Tobit model with instrumental variables, using Newey's minimum chi-squared estimator with the one-year lagged presence of foreign firms and the number of firms in the four digit industries as the instruments.

The estimated results are reported in Table 3. In order to facilitate a comparison, estimated results from three estimation techniques are reported: (i) ordinary least square (OLS), (ii) Tobit and (iii) instrumental variables Tobit (IV-Tobit). Except for the estimated coefficient of foreign presence, the Tobit and the IV-Tobit estimation results are quite similar. However, as far as magnitude of the estimated coefficients is concerned, the OLS results are
very different from the Tobit and IV-Tobit estimation. We tested the foreign presence variable for exogeneity. The estimated value of the Wald statistic for exogeneity is 69.13 (with a $p$-value of 0.000). Based on the estimated $p$-value, it is possible to reject the null hypothesis of exogeneity with a very high degree of confidence. As IV-Tobit estimation result are relatively more reliable, the discussion presented below is based on the third estimation technique.

The estimated coefficient of foreign presence reported in Table 3 is negative and highly significant suggesting that increase in foreign presence reduces the leverage of domestic firms in China’s manufacturing sector, which could be attributed to increased competition for funds in the domestic market. Massive foreign investment in China has resulted in expansion of the private sector which has in overall terms increased the level of competition for loanable funds and hence there is a negative relationship between foreign presence and firm leverage.

<insert Table 3 about here>

The signs and magnitudes of the coefficients of the rest of the determinants of capital structure are largely consistent with other studies. Firm size significantly and positively affects leverage, confirming that bigger firms tend to diversify their business which reduces the default risks and hence increases their leverage level (Ferri and Jones, 1979, Rajan and Zingales, 1995 and Kayo and Kimura, 2011). Older firms are found to have higher leverage,

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2 Chen (2004) argues that in the case of China, the longrun relationship can also be negative.
indicating that the positive effect of lower debt-related agency costs (Frank and Goyal, 2009) outweighs the negative effect of a lower information asymmetry on the leverage level (Akhtar and Oliver, 2009). Ownership plays a significant role and privately owned firms have a lower leverage level than their state and collectively owned counterparts, which occurs due to the fact that the state and collectively owned firms have better access to credit (especially the bank loans from the state owned banks). The coefficient of the collateral value of assets is significantly negative, which implies that tangible assets act as credible collateral to reduce information asymmetries and therefore lower the leverage level; this follows from the fact that reduction in information asymmetries makes equity less costly (Akhtar and Oliver, 2009). Li, Yue and Zhao (2009) found the impact of ownership structure on leverage in China to be negative. Business risk appears not to significantly affect the leverage level, which is consistent with the work of de Jong, Kabir and Nguyen (2008) on China. The impact of profitability on leverage is negative, which supports the predictions of the pecking order theory. The estimated results concerning the impact of growth opportunities and profitability are also consistent with de Jong, Kabir and Nguyen (2008) and Kayo and Kimura (2011). The impact of non-debt tax shields and growth opportunities on the leverage level is statistically insignificant.

The existing literature, such as the work of Chen (2004), suggests that debt is not freely available to all firms in China. Li, Yue and Zhao (2009) found that non-state owned firms tend to have lower debt as compared to state owned firms. The empirical results presented in Table 3 also suggest that ownership structure has a significant impact on
leverage. In order to further explore this issue, the sample was split into (i) state and collectively owned and (ii) privately owned domestic firms. The results of IV-Tobit estimation for each of these two groups are reported in Table 4.

The estimated results presented in Table 4 suggest that, in overall terms, presence of foreign firms negatively affects the leverage of both state and collectively owned and privately owned domestic firms. As compared to state and collectively owned firms, the negative impact on the leverage of privately owned domestic firms is stronger. This result is not surprising as most banks in China are state owned.

The empirical model has been estimated by using three different estimation techniques; OLS, Tobit and IV-Tobit and the main conclusions concerning the link between foreign presence and firm capital structure highlighted in this paper remain robust to the choice of estimation procedure. In addition, we conducted a number of robustness checks. Among other thing, we dropped the industry dummies (as they may be collinear with the foreign presence variable) and re-estimated the model. Second, the presence of foreign firms is measured by the number of foreign firms as a proportion of the total (i.e., number of foreign plus domestic firms). But in our empirical exercise, we measure foreign presence as the proportion of foreign firm assets to the total in the four digit industry classification. One could argue that firm size can be better measured by the logarithm of firm assets instead of the number of employees and hence we re-estimated the model. In each of the three cases,
our main empirical findings were unaffected. In order to save space, these results are not presented in this paper; however we would be happy to provide these results to interested readers upon request.

5. Concluding Remarks

Based on international business and business finance literature, we argue that foreign direct investment can also affect firm leverage. Specifically, we argue argued that the presence of foreign firms can also affect the firm capital structure. None of the existing studies have examined this link.

We use a theoretical model to argue that there is a link between the firm capital structure and foreign presence. Based on the theoretical model, an empirical model is specified, which includes foreign presence and a number of control variables as determinants of the firm leverage. The empirical model is estimated by using firm level panel data from China’s manufacturing sector over the period 2000-2007. The model is estimated for domestic firms by means of OLS, the Tobit and the Instrumental Variable Tobit regression. The empirical model is also estimated after disaggregating firms into state and collectively owned and privately owned domestic firms.

The empirical results presented in this paper suggest that presence of foreign firms has a negative and significant effect on the leverage of domestic firms in China’s manufacturing sector. We find that the negative impact of foreign presence on the leverage of privately owned domestic firms is relatively strong. This could be attributed to the fact that
domestic banks in China are state owned and hence they tend to favour state and collectively owned firms. While in overall terms, our empirical analysis shows that the impact of leverage on firm capital structure in China’s manufacturing sector is negative, this result may not hold across all industries within the manufacturing sector. In our future research we plan to conduct a more disaggregated analysis.
References


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Note: NDTS is the non-debt tax shield. Collateral is the collateral value of assets. ***, **, * denote significance at the 1%, 5% and 10% level respectively; (w) is the Wald chi2 statistic; The estimated value of the Wald statistic for exogeneity of foreign presence is 69.13 with a p-value of 0.000, which rejects the null hypothesis of exogeneity of foreign presence.
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Note: NDTs is the non-debt tax shield. Collateral is the collateral value of assets. ***, **, * denote significance at the 1%, 5% and 10% level respectively; Both regressions are IV Tobit; The estimated value of the Wald statistics for exogeneity of foreign presence is the case of privately owned firms is 22.83. The corresponding value in the case of state and collectively owned firms is 43.23. In both cases, the estimated p-values are 0.000 and hence we can reject the null hypothesis of exogeneity of foreign presence.