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Can the presence of foreign investment affect the capital structure of domestic firms?

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Abstract

Using a simple theoretical model, this paper argues that an increase in foreign presence, which refers to the level of foreign investment in a given domestic firm, can affect the leverage of domestic firms. We apply the model to explore the link between foreign presence and leverage with firm-level panel data from China. The empirical estimation, using 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 large relative to state-owned firms. Furthermore, we find that the impact of foreign presence on leverage varies from industry to industry, which is consistent with the presence of heterogeneity in the productivity spillover effect.

Keywords: Foreign investment; Capital structure; Leverage; Productivity spillovers, Panel data analysis; China

JEL Classification: G31; F21; F23

1. Introduction

International business researchers, such as Dunning (1988), argue that foreign firms possess significant advantages over domestic firms and hence 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 domestic firms.¹ Profitability and growth opportunities are important determinants of firm capital structure (Céspedes, González and Molina, 2010; Margaritis and Psillaki, 2010 and Kayo and Kimura, 2011).² Brander and Lewis (1986) made an important contribution to the related literature by demonstrating that the output and financial structure decisions of firms are interconnected. Recent studies, such as Campello (2006), have empirically evaluated the link between firm product market performance and financing decisions. Campello argues that debt financing does not always hurt a firm's product market performance; moderate debt can contribute to an increase in market share.

Given that (i) the output and financial structure decisions of firms are interconnected and (ii) firm output is affected by FDI, it can be argued that foreign presence in a country, through the related spillovers, can also affect firm capital structure. For example, due to an increase in foreign presence (arising from an increase in FDI), domestic firms may shift to debt financing because raising equity is too difficult. In other words, based on the finance and international business/economics literature, there seems to be a clear link between foreign presence and the capital structure of domestic firms. However, none of the existing studies has formally explored this link.

¹ A large number of studies including Görg and Greenaway (2004), Branstetter (2006), Buckley, Clegg and Wang (2007), Haskel, Pereira and Slaughter (2007), Liu (2008) and Meyer and Sinani (2009) support this view.

² Chung, Na and Smith, R. (2013) argue that attractive growth opportunities can contribute to an increase in leverage.

This paper makes two distinct contributions to the existing literature. First, using a simple theoretical model, where foreign presence gives rise to productivity spillovers to domestic firms, we show that an increase in foreign presence increases both the optimal debt and investment of domestic firms. We argue that foreign presence can decrease the leverage of domestic firms if its impact on optimal debt is smaller than its impact on investment (which equals debt plus equity). Second, using firm level panel data from China's manufacturing sector over the period 2000-2007, the relationship between foreign presence and leverage of domestic firms is empirically evaluated. As noted by Chen (2004), compared to most western firms, Chinese firms make greater use of retained earnings for business finance. However, recent figures suggest a shift away from this in favor of equity finance.³

Chen (2004), Chen and Strange (2005), Huang and Song (2006), Qian, Tian and Wirjanto (2009), Li, Yue and Zhao (2000), among others, have considered the determinants of capital structure in China.⁴ However, none of these studies has considered the impact of foreign presence on the capital structure of domestic 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 foreign presence. One of the reasons why the earlier studies have not empirically examined the impact of foreign presence on firm capital structure may be that the dataset available was not sufficiently large. Earlier studies on China have suggested that the 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 (a) privately owned and (b) state and collectively owned firms. As financing decisions may vary across Chinese industry sectors,

³ Keister (2004) suggests that economic transition in China forced a large number of Chinese firms to reduce their reliance on loans from state-owned banks. An (2012) argues that taxation can also affect firm capital structure. Private equity is emerging as an important source of funds for China's small and medium-sized companies (Perkowski, 2012). China's economic landscape is rapidly changing.

⁴ Li, Yue and Zhao (2009) show that state ownership has a positive effect on leverage and firm access to long-term debt, whereas the impact of foreign ownership on leverage is negative.

this paper also separately considers the case of the (i) textile industry, (ii) transportation equipment manufacturing industry, (iii) electrical machinery and equipment manufacturing industry and (iv) communication equipment, computer and other electronic equipment manufacturing industry. The choice of these industries is mainly dictated by data availability. The empirical results are based on Tobit and Instrumental Variable Tobit estimations. Our empirical analysis suggests that foreign presence decreases the leverage of domestic firms in China's manufacturing sector. We find that the negative impact on the leverage of privately owned firms is relatively large. Furthermore, the impact of foreign presence on the leverage of domestic firms varies from industry to industry.

The rest of the paper is organized as follows. A theoretical model that shows the link between foreign presence and capital structure of domestic firms 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

By making use of a simple theoretical model that combines elements of finance theory and international business, the aim of this section is to establish a link between foreign presence and firm capital structure.

Consider an industry where γ 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 and the magnitude of investment depends on the size of debt, debt indirectly enters as an input into the production process. $f(I) = Ae^{\gamma}I$ is the firm production function, where e^{γ} captures the impact of foreign

presence on domestic firms. Foreign presence is a source of positive externality in this model. $\gamma = 0$ means that there are no foreign firms in the industry and hence there is no productivity spillover effect, whereas $\gamma = 1$ implies that all firms are foreign. As this paper focuses on the impact of foreign investment on the leverage of domestic firms and the dataset used in our empirical analysis contains a large number of foreign firms, we assume that $0 < \gamma < 1$.

Within the context of this paper, an increase in foreign presence represents an increase in FDI. As the proportion of foreign firms increases, the domestic firms experience a higher level of positive externality.⁵ The positive externality arises from spillovers that result from, among other things, the introduction of new technology and superior management skills. The parameter A 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 is incurred. The firm's problem is to choose the level of debt (D) and investment (I) to maximize its value, as follows:

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

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

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

⁵ FDI-related spillovers can also potentially be negative as shown by various studies, but in the case of Chinese manufacturing sector, the spillovers are positive (for example see Liu, 2008). The theoretical results presented in this paper are not affected by including the possibility of negative spillovers. Using the framework of Acemoglu, Aghion and Zilibotti (2006) and Aghion et al. (2009), among others, we have also worked out the more general model, which is available to interested readers upon request.

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

Eq. (1) shows that there is a one-to-one and positive relationship between debt and the uncertain cash flow. In other words, as the maximum possible cash flow (i.e., a) increases, domestic firms are more likely to opt for a higher level of debt. Investment decisions are based on potential cash flows. As the maximum possible cash flow increases, investors would be more willing to take on extra debt. Eq. (1) also shows that an increase in the debt default cost (i.e., C) discourages debt only if $A > 1$. Accordingly, in the rest of this paper, we assume that $A > 1$. If the debt default cost is zero then the optimal debt equals the maximum possible cash flow (i.e., as $C \rightarrow 0$, $D \rightarrow a$). Because $A > 1$, $\frac{Ae^\gamma}{Ae^\gamma - 1}$ is always greater than one and hence the optimal debt is positive only if $a > C$.⁶ In other words, the debt default cost cannot be greater than (or equal to) the maximum possible cash flow.

Eq. (1) can be used to establish a relationship between foreign presence and the optimal debt of a domestic firm as follows:

$$\frac{\partial D}{\partial \gamma} = \frac{\beta Ae^\gamma C}{(Ae^\gamma - 1)^2} \quad (2)$$

Eq. (2) shows that there is a positive relationship between foreign presence and optimal debt. Eq. (2) also suggests that the debt default cost plays a crucial role. If the debt default cost was lower, foreign presence would lead to a smaller increase in optimal debt. An increase in foreign presence (i.e., entry of new foreign firms or expansion of the existing foreign firms) leads to an increase in the productivity of the domestic firms, which improves firm profitability. A large number of existing studies, such as Meyer and Sinani (2009), have

⁶ In other words, in the presence of a positive spillover effect, $A > 1$ and $a > C$ are necessary conditions for the optimal debt to be positive.

confirmed the presence of such a positive productivity spillover effect. An increase in profitability also increases the firm's capacity to take on extra debt.

We now turn our attention to the impact of foreign presence on investment of domestic firms. Using the constraint $\left(\text{i.e., } I - W = \int_0^D \left(\frac{x-C}{a} \right) dx + \int_D^a \left(\frac{D}{a} \right) dx \right)$, the relationship between debt and investment can be written as follows:

$$I = W + \left[\frac{1}{a} \right] \left[(a-C)D - \frac{D^2}{2} \right] \quad (3)$$

By differentiating Eq. (3) with respect to γ , the relationship between foreign presence and optimal investment can be derived as follows:

$$\frac{\partial I}{\partial \gamma} = \left[\frac{(a-C)-D}{a} \right] \left[\frac{\partial D}{\partial \gamma} \right] = \left[\frac{C}{a(Ae^\gamma - 1)} \right] \left[\frac{\partial D}{\partial \gamma} \right] = \left[\frac{Ae^\gamma}{a(Ae^\gamma - 1)^3} \right] C^2 \quad (4)$$

Given that $A > 1$, Eq. (4) suggests that an increase in foreign presence increases firm investment.

Because foreign presence increases both debt and investment, the impact on firm leverage $\left(\text{i.e., } \frac{D}{I} \right)$ cannot be unambiguously determined. However, it is clear that an increase in foreign presence increases the leverage of domestic firms if its impact on debt is greater than the impact on investment. On the other hand, an increase in foreign presence decreases the leverage of domestic firms if its impact on debt is less than the impact on investment. Finally, if an increase in foreign presence leads to an equal increase in debt and investment, then there is no change in firm leverage.

In order to explore further the link between foreign presence and leverage of domestic firms, we turn our attention to empirical analysis using data from China's manufacturing

sector. The empirical analysis can produce a conclusive result. For example, if empirical analysis reveals that there is a negative and statistically significant relationship between foreign presence and leverage then it can be argued that an increase in foreign presence leads to a relatively small increase in the firm debt.

Using Eqs. (1) and (3), the optimal value of firm leverage can be written as follows:

$$\frac{D}{I} = \frac{(Ae^\gamma - 1)[Ae^\gamma(a - C) - a]}{-\left(\frac{1}{2a}\right)[Ae^\gamma(a - C) - a]^2 + \left(\frac{a - C}{a}\right)(Ae^\gamma - 1)[Ae^\gamma(a - C) - a] + W(Ae^\gamma - 1)^2} \quad (5)$$

Eq. (5) suggests that the relationship between foreign presence and firm leverage is sensitive to fluctuations in factors that include the maximum cash flow and debt default cost. As all of these factors and the parameters of the production function cannot be observed in real life, empirical evaluation of the relationship between foreign presence and leverage by means of an appropriate empirical model is desirable. Furthermore, the level of foreign presence and profitability, among other factors, can vary from industry to industry and hence the empirical analysis presented in this paper also considers the link between foreign presence and firm capital structure in different industries.

In order to empirically evaluate the impact of foreign presence on the leverage of domestic firms, using Taylor's expansion, we linearize Eq. (5) at $(A_0, C_0, W_0, \gamma_0)$ which yields Eq. (6) as follows:

$$leverage = \alpha_0 + \alpha_1 A + \alpha_2 C + \alpha_3 W + \alpha_4 \gamma \quad (6)$$

where $\alpha_0 = y(A_0, C_0, W_0, \gamma_0) - A_0\alpha_1 - C_0\alpha_2 - W_0\alpha_3 - \gamma_0\alpha_4$, $\alpha_1 = \frac{\partial y}{\partial A} \Big|_{A_0, C_0, W_0, \gamma_0}$,

$\alpha_2 = \frac{\partial y}{\partial C} \Big|_{A_0, C_0, W_0, \gamma_0}$, $\alpha_3 = \frac{\partial y}{\partial W} \Big|_{A_0, C_0, W_0, \gamma_0}$, $\alpha_4 = \frac{\partial y}{\partial \gamma} \Big|_{A_0, C_0, W_0, \gamma_0}$, and y denotes the functional form of

Eq. (5).

Based on Eq. (6), the following empirical model can be specified, where fp_{it} is foreign presence in industry i at time t .

$$leverage_{it} = \lambda_0 + \lambda_1 X_{it} + \lambda_2 fp_{it} + \lambda_3 dindustry_i + \lambda_4 dyear_t + \varepsilon_{it} \quad (7)$$

Eq. (7), which is based on Eq. (5), suggests 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 ($dindustry$) and year dummies ($dyear$) have been included in Eq. (7). Finally, we also add an error term (ε_{it}) to capture the impact of all omitted variables. The error term is assumed to be *i.i.d.* normal. Eq. (7), which is our empirical model, 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. Eq. (7) 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; $dindustry$ is a set of two-digit industry dummies that control for industry fixed effects; $dyear$ is a set of year dummies that captures the time variant effects. fp , which is the main variable of interest, captures foreign presence. The degree of foreign presence fp is the share of the assets of foreign firms within the four-digit industry classification as follows:⁷

⁷ A firm is designated as a foreign firm if it has foreign capital. Such firms are also characterized as foreign-invested firms (see Meyers and Sinani, 2009 and references therein). In our sample, the share of foreign capital in more than 85% of the designated foreign firms is greater than 30 per cent. Furthermore, the proportion of foreign capital in over 75 per cent of the designated foreign firms is greater than 50 per cent.

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

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., $F \subseteq J$).⁸

In order to address the issue of omitted variable bias, eight variables are included in the vector of control variables. These variables are selected in an attempt to take into account the agency and other costs arising from asymmetric information faced by stakeholders (i.e., the debt holders, equity holders and firm managers).

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.⁹ 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 (Harris and Raviv, 1990; Narayanan, 1988; Noe, 1988; Poitevin, 1989; Stulz, 1990) have suggested that firm leverage increases with firm size. Empirical studies also tend to support this positive relationship, for example de Jong, Kabir and Nguyen (2008), Wu and Yue (2009) and Kayo and Kimura (2011).

The existing literature suggests that firm age affects leverage through debt-related agency cost and information asymmetry (Frank and Goyal, 2009). Older firms are likely to have lower debt-related agency cost and hence the relationship between firm age and leverage is positive. However, a higher level of information asymmetry can result in a negative relationship between firm age and leverage. Akhtar and Oliver (2009) report a

⁸ Foreign presence can also be measured in other ways. In section 4.1, we discuss alternative methods.

⁹ Céspedes, González and Molina (2010) used logarithm of sales as a measure of firm size.

positive relationship between firm age and leverage, indicating that the debt-related agency cost effect outweighs the information asymmetry effect in their sample.

Just like firm age, 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 (Bradley et al., 1984; Harris and Raviv, 1991; Titman and Wessels, 1988) and have a higher liquidation value than intangible assets in case of bankruptcy (Fattouh et al., 2008; Huang and Song, 2006). Accordingly, 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. Huang and Song (2006), Fattouh, Harris, and Scaramozzino (2008) and Akhtar and Oliver (2009) found a positive relationship between tangible assets and leverage. However, in the case of Chinese firms, Li, Yue and Zhao (2009) reported a negative relationship between the two variables.

Growth opportunities represent non-collateralisable assets. Owing to the asset substitution effect, a firm faced with high growth opportunities may find it hard to access credit (Bradley et al., 1984; Titman and Wessels, 1988). Growth opportunities also affect firm leverage through changing the agency costs. This effect arises from the conflict of interest between debt and equity holders. Myers (1977) has suggested that firms with high growth opportunities also experience high agency cost. A high growth firm may not issue debt and thus have a low leverage ratio. In other words, the relationship between leverage and growth opportunities can be negative (see Berens and Cuny, 1995). A number of existing empirical studies have found a negative relationship between leverage and growth opportunities (for example see de Jong, Kabir and Nguyen, 2008, Akhtar and Oliver, 2009 and Kayo and Kimura, 2001). However, Wu and Yue (2009) and Céspedes, González and Molina (2010) found a positive relationship between growth opportunities and leverage.

Taxation is another factor that affects a firm's choice of capital structure. 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 Wald (1999) and 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; the relationship between the average tax rate and leverage is positive in the case of some countries and negative in the case of others.

Firm profitability is expected to affect leverage, but existing theories provide contradictory predictions concerning the direction of the relationship (see Céspedes et al., 2010).¹⁰ 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 (DeAngelo and Masulis, 1980; Leland, 1994; Ross, 1977) suggest that highly profitable firms can borrow more to shield income from corporate taxes, which predicts a positive relation between profitability and leverage. Based on 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 these contradictory theoretical predictions, empirical studies appear to have found a consensus. Studies such as Fattouh, Harris, and

¹⁰ An excellent review of theories of capital structure can be found in Brounen, de Jong and Koedijk (2006).

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 (Booth et al., 2001; Burgman, 1996; Chen et al., 1997; Demsetz and Lehn, 1985; Titman and Wessels, 1988).

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.¹¹

3.1 The data

We utilize a comprehensive dataset 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. We first clean the dataset by excluding firms that (1) employ fewer than eight workers as they may not have

¹¹ Margaritis and Psillaki (2010) have highlighted the importance of the links among capital structure, ownership structure and firm performance. Céspedes, González and Molina (2010) focused on the link between ownership structure and firm capital structure in Latin America. Furthermore, the recent work of Paligorova and Xu (2012) on determinants of leverage also highlights the importance of firm ownership structure.

reliable accounting systems (Jefferson et al., 2008); (2) report negative net values of fixed assets, negative employee wages, negative long term debt, negative total equity, negative total assets, and negative annual depreciation; (3) report a long term debt to total assets ratio higher than 1.¹² Our aim is to avoid extreme outliers. In 2002-03, the Chinese Government revised its industrial classification method. In order to remove this inconsistency from the original dataset, we applied the 2002-03 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 et al., 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, foreign presence is measured by the share of the assets of foreign firms in the four digit industry.¹³

<insert Table 1 & 2 about here>

¹² Debt to total assets can be greater than 1 if the book value of equity is negative. This occurs if the firm has had negative profits for a while.

¹³ As indicated earlier, within the context of this paper, a firm is designated as foreign, if foreign capital is invested in it. Based on this definition, 18.36 per cent of the firms in our sample (averaged over four digit industry classification) are foreign.

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 Eq. (7). 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, foreign presence in Eq. (7) 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 foreign presence and the number of firms in the four digit industries as the instruments.¹⁴

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

¹⁴ As indicated by, among others, Nowak-Lehmann, et al. (2012), in the presence of persistent autocorrelation, lagged variables do not always serve as good instruments. Given that this paper utilizes panel data from 2000 to 2007, autocorrelation is not a serious concern. The statistical analysis found the instruments used in this paper to be valid. In addition, a number of sensitivity tests were conducted (see section 4.1 for further details). These tests suggest that the main empirical results presented in this paper are robust.

of exogeneity with a very high degree of confidence. Accordingly, it can be argued that IV-Tobit estimation is more appropriate and 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 an 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. By making use of the theoretical model, the negative and statistically significant relationship between foreign presence and leverage of domestic firms can also be used to argue that foreign presence in China's manufacturing sector leads to a relatively small increase in debt.

<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).¹⁵ Older firms are found to have higher leverage, 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 bank loans from the

¹⁵ Chen (2004) argues that, in the case of China, the long run relationship can also be negative.

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 and the agency theories that treat debt as a disciplining device. This result is also consistent with Li, Yue and Zhao (2009)'s work on China. 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.

<insert Table 4 about here>

The estimated results presented in Table 4 suggest that, in overall terms, foreign presence 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.

While in overall terms, 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 the rest of this paper, we consider the case of China's (i) textile industry, (ii) transportation equipment industry, (iii) electrical machinery and equipment industry and (iv) communication equipment, computer and other electronic equipment industry. In relative terms, the textile industry does not rely on advanced technology and, like the transportation equipment industry, the textile industry also caters for a high level of domestic demand. The last two industries are relatively more export oriented and these industries also have a higher level of foreign presence. The estimated results for each of the four industries are reported in Tables 5 to 8.

<insert Tables 5 to 6 about here>

Table 5 shows that foreign presence has a negative impact on the leverage of textile firms. It is interesting to note that the estimated coefficient is smaller than the one reported in Table 3. This suggests that, as compared to the overall impact on the manufacturing sector, foreign presence has a stronger effect on leverage of domestic firms in China's textile industry. Table 6 shows that, in the case of China's transportation equipment industry, the impact of foreign presence on leverage is positive which appears to suggest that foreign presence in this industry creates stronger competition in the domestic market. The empirical results presented in this paper are based on data collected from 2000 to 2007. In recent years there have been some changes in government policies concerning foreign investment in China's transportation sector. The new policies are designed to substantially reduce foreign presence in the domestic car industry.

Table 7 shows that foreign presence has a negative effect on firm leverage in China's electrical machinery and equipment manufacturing industry. In addition, as compared to its overall effect on the manufacturing sector, the impact on firm leverage in this industry is smaller. However, Table 8 shows that the impact of foreign presence on firm leverage in China's communication equipment, computer and other electronic equipment industry is statistically insignificant. The absence of a statistically significant relationship in this industry implies that the effect of foreign presence on debt and investment of domestic firms is almost identical. It is interesting to note that the negative impact of profitability on leverage in this industry is the strongest.

<insert Tables 7 to 8 about here>

In summary, the empirical results presented in this paper suggest that (i) in overall terms, foreign presence is an important determinant of firm leverage in China's manufacturing sector and (ii) the impact of foreign presence on firm leverage varies from industry to industry.

4.1 Sensitivity analysis

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 other robustness checks.

First, we dropped the industry dummies (as they may be collinear with the foreign presence variable) and re-estimated the model. Second, in our theoretical model foreign presence 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. In order to examine whether this affects our empirical results, we re-estimated Eq. (7), using the proportion of the number of foreign firms in the four digit industry as a measure of foreign presence. Third, 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 using this variable. Fourth, in the empirical estimation, the foreign presence variable does not consist of firms that are 100% foreign-owned firms. A domestic firm is categorized as foreign if any non-zero amount of foreign capital is invested in it. In order to test for robustness, Eq. (7) was re-estimated after measuring foreign presence variable by the proportion of the assets of 100% foreign-owned firms.¹⁶

In each of the four cases, our main empirical findings were unaffected. In order to save space, the results of the first three cases are not presented in this paper.¹⁷ The estimated results where foreign presence consists of 100% foreign-owned firms are reported in Table 9.

<insert Table 9 about here>

Table 9 shows that an increase in foreign presence, when foreign presence is measured by the assets of 100% foreign-owned firms as a proportion of the total, continues to have a negative impact on leverage of domestic firms in China's manufacturing sector. However, the absolute value of the estimated coefficient is slightly higher than that reported in Table 3. In other words, our main empirical conclusion that foreign presence is negatively related to leverage is robust with respect to the definition of foreign presence. Based on the theoretical results presented in section 2, the estimated negative relationship implies that, as

¹⁶ The average foreign presence in a four digit industry with this definition is 14.25 per cent. As indicated in Table 3, the same average when all firms with non-zero foreign capital are considered is 33.33 per cent.

¹⁷ We would be happy to provide these results to interested readers upon request.

compared to its impact on investment, foreign presence leads to a relatively small increase in the debt of domestic firms in China's manufacturing sector.

5. Concluding remarks

The existing literature on foreign direct investment, such as the work of Meyer and Sinani (2009), suggests that domestic firms in host countries experience positive spillovers from foreign presence. Acemoglu, Aghion and Zilibotti (2006) and Aghion et al. (2009), among others, suggest that, depending on the distance from the world technology frontier, entry of foreign firms can reduce the output of domestic firms. In other words, the foreign investment related productivity spillover effect can also be negative. A strand of the existing literature on capital structure, such as the seminal work of Brander and Lewis (1986), suggests that the output and capital structure decisions of firms are interdependent. It can therefore be argued that foreign presence can also affect the firm capital structure. However, none of the available studies has explicitly examined the link between foreign presence and firm capital structure.

By making use of a simple theoretical model, where foreign investment leads to positive productivity spillovers to domestic firms, this paper shows that there is a link between foreign presence and capital structure of domestic firms. Specifically, foreign presence increases both debt and investment of domestic firms, where investment equals debt plus equity. If the increase in debt is larger than the increase in investment then there is a positive relationship between foreign presence and leverage. On the other hand, if increase in debt is smaller than the increase in investment then there is a negative relationship between foreign presence and leverage. If both debt and investment increase by the same amount then there is no relationship between foreign presence and leverage.

We explore the link between foreign presence and firm leverage by making use of firm level panel data from China. 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, Tobit and Instrumental Variable Tobit regressions. The empirical model is also estimated after disaggregating firms into (i) state and collectively owned and (ii) privately owned domestic firms. As the link between the firm leverage and foreign presence can vary across industries within the manufacturing sector, the model is also estimated for 4 separate manufacturing industries. The empirical results reported in this paper are found to be fairly robust.

The empirical results presented in this paper suggest that foreign presence has a negative and statistically significant effect on the leverage of domestic firms in China's manufacturing sector.¹⁸ This implies that foreign presence in China's manufacturing sector leads to a relatively small increase in the debt of domestic firms. Not surprisingly, 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 favor state and collectively owned firms.

Our empirical results suggest that the impact of foreign presence on the leverage of domestic firms in China's textile industry is negative and significant. We also found that the impact on the leverage of domestic firms in the textile industry is much stronger compared to its overall impact on the manufacturing sector which suggests that, in relative terms, Chinese banks are not keen to support the local domestic textile industry. The impact of foreign presence on the leverage of domestic firms in the electrical machinery and equipment manufacturing industry is negative but smaller than the overall impact on the manufacturing industry. On the other hand, the impact of foreign presence on the leverage of domestic firms

¹⁸ While this paper focuses on the impact of a change in foreign presence on capital structure of domestic firms, the entry of domestic firms with foreign firms' like characteristics can also result in productivity spillovers to the rest of the domestic firms. We are grateful to an anonymous reviewer for bringing this point to our attention.

in China's transportation equipment manufacturing industry is positive. This suggests foreign presence leads to a relatively large increase in debt. The Chinese government is keen to protect its domestic automobile industry from foreign competition and, by increasing the availability of credit to domestic firms in the transportation industry, the Chinese banks appear to be simply following government directions. Finally, we found that the impact of foreign presence on the leverage of domestic firms in China's communication equipment, computer and other electronic equipment manufacturing industry is statistically insignificant. This suggests that foreign presence increases both debt and investment by almost the same amount.

While this paper deals with the impact of foreign investment on domestic firms in China's manufacturing sector, recent studies, such as Doytch and Uctum (2011), highlight the implications of the shift of foreign investment from the manufacturing to the services sector. It would be interesting to examine the impact of fluctuations in foreign presence on leverage of services sector firms. Due to unavailability of data, we were unable to examine this link in China's services sector. In addition, it will be interesting to investigate the impact of the entry of domestic firms on the leverage of domestic firms.

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References

- Acemoglu, D., Aghion, P. and Zilibotti, F., 2006. Distance to frontier, selection, and economic growth. *Journal of the European Economic Association*, 4(1), 37-74.
- Aghion, P., Blundell, R., Griffith, R., Howitt, P and Prantl, S., 2009. The effects of entry on incumbent innovation and productivity. *The Review of Economics and Statistics*, 91(1), 20-32.
- Akhtar, S. and Oliver, B., 2009. Determinants of capital structure for Japanese multinational and domestic corporations. *International Review of Finance*, 9, 1-26.
- An, Z. (2012), Taxation and capital structure: Empirical evidence from a quasi-experiment in China. *Journal of Corporate Finance*, 18, 683-689.
- Berens, J.L. and Cuny, C.L., 1995. The capital structure puzzle revisited., *Review of Financial Studies*, 8, 1185-208.
- Booth, L., V. Aivazian, V. Demirguc-Kunt and Maksimovic, V., 2001. Capital structures in developing countries. *Journal of Finance*, 56, 87-130.
- Brounen, D., de Jong, A. and Koedijk, K., 2006. Capital structure policies in Europe: Survey evidence. *Journal of Banking & Finance*, 30, 1409-1442.
- Bradley, M., G. Jarrell and Kim, E., 1984. On the existence of an optimal capital structure: Theory and evidence. *Journal of Finance*, 39, 857-78.
- Brander, J.A. and Lewis, T.R., 1986. Oligopoly and financial structure: The limited liability effect. *American Economic Review*, 76, 956-70.
- Branstetter, L., 2006. Is foreign direct investment a channel of knowledge spillovers? Evidence from Japan's FDI in the United States. *Journal of International Economics*, 68, 325-44.
- Buckley, P.J., J. Clegg and Wang, C., 2007. Is the relationship between inward FDI and spillover effects linear? An empirical examination of the case of China. *Journal of International Business Studies*, 38, 447-59.
- Campello, M., 2006. Debt financing: Does it boost or hurt firm performance in product market? *Journal of Financial Economics*, 82, 135-172.
- Céspedes, J., González, M. and Molina, C.A., 2010. Ownership and capital structure in Latin America. *Journal of Business Research*, 63, 248-254.
- Chang, C., 1999. Capital structure as optimal contracts. *North American Journal of Economics and Finance*, 10, 363-85.
- Chen, C., A. Cheng, N. He and Kim, J., 1997. An investigation of the relationship between international activities and capital structure. *Journal of International Business Studies*, 23, 563-640.
- Chen, J.J., 2004. Determinants of capital structure of Chinese-listed companies. *Journal of Business Research*, 57, 1341-1351
- Chen, J. and Strange, R., 2005. The determinants of capital structure: Evidence from Chinese listed companies. *Economic Change and Restructuring*, 38, 11-35.
- Chung, Y.P., Na, H.S. and Smith, R. (2013), How Important is Capital Structure to Firm Survival? *Journal of Corporate Finance*, 22, 88-103.
- DeAngelo, H. and Masulis, R., 1980. Optimal capital structure under corporate and personal taxation. *Journal of Financial Economics*, 8, 3-29.
- de Jong, A., Kabir, R., and Nguyen, T., 2008. Capital structure around the world: The roles of firm and country-specific determinants. *Journal of Banking & Finance*, 32, 1954-1969.
- Doukas, J. A. and Pantzalis, C., 2003. Geographic diversification and agency costs of debt of multinational firms. *Journal of Corporate Finance*, 9, 59-92.
- Doytch, N. and Uctum, M., 2011. Does the worldwide Shift of FDI from manufacturing to services accelerate economic growth? A GMM study. *Journal of International Money*

- and Finance, 30(3), 410-427.
- Dunning, J.H., 1988. Explaining International Production, Unwin Hyman: London.
- Fattouh, B., L. Harris and Scaramozzino, P., 2008. Non-linearity in the determinants of capital structure: evidence from UK firms. *Empirical Economics*, 34, 417-38.
- Ferri, M. G. and Jones, W.H., 1979. Determinants of financial structure: A new methodological approach. *Journal of Finance*, 34, 631-44.
- Frank, M. and Goyal, V., 2009. Capital structure decisions: Which factors are reliably important. *Financial Management*, 38, 1-37.
- Friend, I. and Lang, L.P.H., 1988. An empirical test of the impact of managerial self-interest on corporate capital structure. *Journal of Finance*, 43, 271-81.
- Gleason, K.C., Mathur, L.K. and Mathur, I., 2000. The interrelationship between culture, capital structure, and performance: Evidence from European retailer, *Journal of Business Research*, 50, 185-191.
- Görg, H. and Greenaway, D., 2004. Much ado about nothing? Do domestic firms really benefit from foreign direct investment? *The World Bank Research Observer*, 19, 171-197.
- Harris, M. and Raviv, A., 1990. Capital structure and the information role of debt. *Journal of Finance*, 45, 321-49.
- Harris, M. and Raviv, A., 1991. The theory of capital structure. *Journal of Finance*, 46, 297-355.
- Haskel, J.E., S.C. Pereira and Slaughter, M.J., 2007. Does inward foreign investment boost the productivity of domestic firms? *Review of Economics and Statistics*, 89, 482-496.
- Hu, A.G.Z., G.H. Jefferson and Qian, J., 2005. R&D and technology transfer: Firm-level evidence from Chinese industry. *Review of Economics and Statistics*, 87, 780-86.
- Huang, G. and Song, F.M., 2006. The determinants of capital structure: Evidence from China. *China Economic Review*, 17, 14-36.
- Jefferson, G.H., G.R. Thomas and Zhang, Y., 2008. Productivity growth and convergence across China's industrial economy. *Journal of Chinese Economic and Business Studies*, 6, 121-40.
- Jensen, M., 1986. Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review*, 76, 323-39.
- Jensen, M. and Meckling, W.H., 1976. Theory of the firms: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3, 305-60.
- Kayo, E.K. and Kimura, H., 2011. Hierarchical determinants of capital structure. *Journal of Banking and Finance*, 35, 358-371.
- Keister, L. (2004), Capital structure in transition: The transformation of financial strategies in China's emerging economy, *Organization Science*, 15(2), 145-158.
- Li, K., Yue, H. and Zhao, L. (2009), Ownership, institutions, and capital structure: Evidence from China, *Journal of Comparative Economics*, 37 (3), 471-490.
- Liu, Z., 2008. Foreign direct investment and technology spillovers: Theory and evidence. *Journal of Development Economics*, 85, 176-93.
- Margaritis, D. and Psillaki, M., 2010. Capital structure, equity ownership and firm performance. *Journal of Banking & Finance*, 34, 621-632.
- Mitto, U. and Zhang, Z., 2008. The capital structure of multinational corporations: Canadian vs US evidence. *Journal of Corporate Finance*, 14, 706-20.
- Meyer, K.E. and Sinani, E., 2009. When and where does foreign direct investment generate positive spillovers? *Journal of International Business Studies*, 40, 1075-1094.
- Myers, S.C., 1977. Determinants of corporate borrowing. *Journal of Financial Economics*, 5, 147-75.

- Myers, S.C., 1984. The capital structure puzzle. *Journal of Finance*, 39, 575-92.
- Nowak-Lehmann, F. Dreher, A. Herzer, D. Klasen, S. and Martinez-Zarzoso, I, 2012. Does foreign aid really raise per capita income? A time series perspective, *Canadian Journal of Economics*, 45, 288-313.
- Paligorova, T. and Xu, Z. (2012), Complex Ownership and Capital Structure. *Journal of Corporate Finance*, 18 (4), 701-716.
- Perkowski, J. (2012), China's Developing Capital Markets, <http://www.forbes.com/sites/jackperkowski/2012/02/10/chinas-developing-capital-markets/>
- Qian, Y, Tian, Y. and Wirjanto, T.S. (2009), Do Chinese publicly listed companies adjust their capital structure toward a target level? *China Economic Review*, 20(4), 662-676.
- Rajan, R. and Zingales, L., 1995. What do we know about capital structure? Some evidence from international data. *Journal of Finance*, 50, 1421-28.
- Scott, J., 1977. Bankruptcy, secured debt, and optimal capital structure. *Journal of Finance*, 32, 1-19.
- Smith, C. and Watts, R., 1992. The investment opportunity set and corporate financing, dividend and compensation policies. *Journal of Financial Economics*, 32, 263-92.
- Stulz, R., 1990. Managerial discretion and optimal financing policies. *Journal of Financial Economics*, 26, 3-27.
- Sun, S., 2009. How does FDI affect domestic firms' exports? Industrial evidence. *World Economy*, 32, 1203-22.
- Titman, S. and Wessels, R., 1988. The determinants of capital structure choice. *Journal of Finance*, 43, 1-19.
- Wald, J.K., 1999. How firm characteristics affect capital structure: An international comparison. *Journal of Financial Research*, 22, 161-87.
- Williamson, O., 1988. Corporate finance and corporate governance. *Journal of Finance*, 43, 567-91.
- Wu, L. and Yue, H., 2009. Corporate tax, capital structure, and the accessibility of bank loans: Evidence from China. *Journal of Banking & Finance*, 33, 30-38.
- Zeckhauser, R.J. and Pound, J., 1990. Are large shareholders effective monitors? An investigation of share ownership and corporate performance. in: Hubbard, R. G. (ed.) *Asymmetric Information, Corporate Finance and Investment*. Chicago: University of Chicago Press, 149-180.

Table 1
Manufacturing Sector Summary Statistics

| Variable | Observations | Mean | Standard. Deviation | Minimum | Maximum |
|----------------------|--------------|-------|------------------------|---------|---------|
| Leverage | 164118 | 0.12 | 0.21 | 0 | 1 |
| ln(firm size) | 164216 | -1.70 | 1.09 | -4.83 | 5.09 |
| Collateral | 164216 | 0.97 | 0.07 | 0.07 | 2 |
| business risks | 164215 | 1.03 | 31.04 | 0.0047 | 1158.72 |
| Profitability | 164216 | 0.08 | 0.21 | -1.99 | 17.38 |
| NDTS | 164216 | 0.03 | 0.04 | 0 | 1.77 |
| growth opportunities | 143689 | 0.21 | 4.75 | -1 | 1210.05 |
| foreign presence | 164216 | 0.33 | 0.17 | 0 | 1 |
| Ownership | 164216 | 0.34 | | | |

Source: NBS, Beijing, 2000-2007
 Notes: Firm size is measured as the natural log of number of employees in thousands.
 Accordingly, an average firm size of -1.7 implies 0.1826 thousand employees.
 Note: NDTS is the non-debt tax shield. Collateral is the collateral value of assets.

Table 2
Correlation Matrix of the Variables (the Manufacturing Sector)

| | ln(firm size) | age | ownership | collateral | business risks | profitability | NDTS | growth opportunities | foreign presence |
|----------------------|------------------|-------|-----------|------------|-------------------|---------------|-------|-------------------------|---------------------|
| ln(firm size) | 1 | | | | | | | | |
| age | 0.28 | 1 | | | | | | | |
| ownership | -0.16 | -0.25 | 1 | | | | | | |
| collateral | -0.07 | -0.04 | 0.01 | 1 | | | | | |
| business risks | -0.003 | -0.01 | -0.01 | 0.001 | 1 | | | | |
| profitability | -0.07 | -0.08 | 0.08 | 0.08 | -0.002 | 1 | | | |
| NDTS | 0.02 | -0.02 | 0.03 | 0.03 | -0.001 | 0.07 | 1 | | |
| growth opportunities | 0.0001 | -0.01 | 0.005 | -0.0004 | 0.0003 | 0.005 | -0.01 | 1 | |
| foreign presence | -0.06 | -0.13 | 0.10 | 0.02 | -0.004 | 0.01 | -0.02 | 0.005 | 1 |

Source: NBS, Beijing, 2000-2007
 Note: NDTS is the non-debt tax shield. Collateral is the collateral value of assets.

Table 3
Manufacturing Sector Estimation Results

| | IV Tobit | | Tobit | | OLS | |
|------------------------|-------------|----------------|-------------|----------------|-------------|----------------|
| | Coefficient | Standard Error | Coefficient | Standard Error | Coefficient | Standard Error |
| ln(firm size) | 0.07*** | 0.001 | 0.07*** | 0.002 | 0.02*** | 0.001 |
| Age | 0.003*** | 0.0001 | 0.003*** | 0.0002 | 0.001*** | 0.0001 |
| Ownership | -0.03*** | 0.002 | -0.03*** | 0.005 | -0.01*** | 0.002 |
| Collateral | -0.38*** | 0.02 | -0.38*** | 0.03 | -0.15*** | 0.02 |
| business risks | -0.00004 | 0.00004 | -0.00005 | 0.00003 | -0.00003** | 0.00001 |
| Profitability | -0.10*** | 0.01 | -0.10*** | 0.01 | -0.05*** | 0.005 |
| NDTS | -0.02 | 0.03 | -0.02 | 0.04 | 0.01 | 0.02 |
| growth opportunities | -0.0002 | 0.0002 | -0.0002 | 0.0003 | -0.0001 | 0.0001 |
| foreign presence | -0.18*** | 0.01 | -0.13*** | 0.02 | -0.05*** | 0.01 |
| industry dummies | yes | | yes | | yes | |
| year dummies | yes | | yes | | yes | |
| Constant | 0.44*** | 0.02 | 0.43*** | 0.03 | 0.34*** | 0.02 |
| Number of observations | 143500 | | 143500 | | 143500 | |
| F | 12864.61(w) | | 92.08 | | 58.72 | |
| R-squared | n.a. | | 0.09 | | 0.06 | |

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.

Table 4
IV Tobit Estimation Results by Ownership within the Manufacturing Sector

| | Privately Owned | | State and Collectively Owned | |
|------------------------|-----------------|----------------|------------------------------|----------------|
| | Coefficient | Standard Error | Coefficient | Standard Error |
| ln(firm size) | 0.06*** | 0.002 | 0.07*** | 0.001 |
| Age | 0.004*** | 0.0002 | 0.003*** | 0.0001 |
| Collateral | -0.48*** | 0.03 | -0.34*** | 0.02 |
| business risks | -0.00009 | 0.00011 | -0.00002 | 0.00004 |
| Profitability | -0.08*** | 0.01 | -0.11*** | 0.01 |
| NDTS | 0.03 | 0.05 | -0.04 | 0.03 |
| growth opportunities | -0.0045 | 0.0028 | -0.0002 | 0.0002 |
| foreign presence | -0.23*** | 0.02 | -0.15*** | 0.01 |
| industry dummies | yes | | yes | |
| year dummies | yes | | yes | |
| Constant | 0.49*** | 0.03 | 0.41*** | 0.02 |
| Number of observations | 51498 | | 92002 | |
| Wald | 2477.59 | | 9145.97 | |

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.

Table 5
Estimation Results for Textile Industry

| | IV Tobit | | Tobit | | OLS | |
|---|-------------|----------------|-------------|----------------|-------------|----------------|
| | Coefficient | Standard Error | Coefficient | Standard Error | Coefficient | Standard Error |
| ln(firm size) | 0.07*** | 0.004 | 0.08*** | 0.008 | 0.02*** | 0.004 |
| Age | 0.003*** | 0.0004 | 0.003*** | 0.0006 | 0.001*** | 0.0004 |
| Ownership | -0.08*** | 0.010 | -0.08*** | 0.018 | -0.03*** | 0.008 |
| Collateral | -0.45*** | 0.07 | -0.43*** | 0.13 | -0.19*** | 0.07 |
| business risks | 0.04 | 0.05 | 0.04 | 0.05 | 0.03 | 0.02 |
| Profitability | -0.16*** | 0.03 | -0.16** | 0.07 | -0.06*** | 0.014 |
| NDTS | 0.08 | 0.10 | 0.08 | 0.14 | 0.08 | 0.06 |
| growth opportunities | -0.0121 | 0.0081 | -0.0129 | 0.0085 | -0.009*** | 0.0031 |
| foreign presence | -0.35*** | 0.04 | -0.31*** | 0.06 | -0.12*** | 0.03 |
| year dummies | yes | | yes | | yes | |
| Constant | 0.53*** | 0.07 | 0.50*** | 0.13 | 0.36*** | 0.07 |
| | | | | | | |
| Number of observations | 10190 | | 10443 | | 10443 | |
| F | 1051.4(w) | | 24.3 | | 17.43 | |
| R-squared | n.a. | | 0.10 | | 0.07 | |
| 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 10.01 with a <i>p</i> -value of 0.002, which rejects the null hypothesis of exogeneity of foreign presence. | | | | | | |

Table 6
Estimation Results for Transportation Equipment Manufacturing Industry

| | IV Tobit | | Tobit | | OLS | |
|--|-------------|----------------|-------------|----------------|-------------|----------------|
| | Coefficient | Standard Error | Coefficient | Standard Error | Coefficient | Standard Error |
| ln(firm size) | 0.07*** | 0.004 | 0.07*** | 0.007 | 0.02*** | 0.004 |
| Age | 0.003*** | 0.0002 | 0.003*** | 0.0004 | 0.002*** | 0.0003 |
| Ownership | 0.01 | 0.010 | 0.02 | 0.018 | 0.01* | 0.008 |
| Collateral | -0.49*** | 0.07 | -0.50*** | 0.10 | -0.20*** | 0.06 |
| business risks | 0.03 | 0.03 | 0.04 | 0.03 | 0.03** | 0.02 |
| Profitability | -0.21*** | 0.04 | -0.19*** | 0.06 | -0.07*** | 0.021 |
| NDTS | -0.25* | 0.15 | -0.26 | 0.17 | -0.14** | 0.07 |
| growth opportunities | -0.0165** | 0.0078 | -0.02** | 0.0087 | -0.009*** | 0.0030 |
| foreign presence | 0.18*** | 0.03 | 0.16*** | 0.05 | 0.08*** | 0.02 |
| year dummies | yes | | yes | | yes | |
| Constant | 0.34*** | 0.07 | 0.36*** | 0.11 | 0.30*** | 0.06 |
| | | | | | | |
| Number of observations | 8523 | | 8973 | | 8973 | |
| F | 866.47(w) | | 19.78 | | 12 | |
| R-squared | n.a. | | 0.10 | | 0.06 | |
| 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 0.52 with a <i>p</i> -value of 0.47, which fails to reject the null hypothesis that foreign presence is exogenous. | | | | | | |

Table 7
Estimation Results for Electrical Machinery and Equipment Manufacturing Industry

| | IV Tobit | | Tobit | | OLS | |
|--|-------------|----------------|-------------|----------------|-------------|----------------|
| | Coefficient | Standard Error | Coefficient | Standard Error | Coefficient | Standard Error |
| ln(firm size) | 0.06*** | 0.004 | 0.06*** | 0.007 | 0.01*** | 0.003 |
| Age | 0.004*** | 0.0003 | 0.004*** | 0.0006 | 0.002*** | 0.0003 |
| Ownership | 0.003 | 0.009 | 0.004 | 0.016 | 0.001 | 0.006 |
| Collateral | -0.36*** | 0.07 | -0.36*** | 0.12 | -0.14** | 0.06 |
| business risks | -0.006 | 0.00678 | -0.007 | 0.00678 | -0.001 | 0.00221 |
| Profitability | -0.29*** | 0.04 | -0.26*** | 0.07 | -0.07*** | 0.020 |
| NDTS | -0.08 | 0.11 | -0.06 | 0.15 | -0.02 | 0.05 |
| growth opportunities | 0.0031 | 0.0065 | 0.0041 | 0.0063 | -0.0009 | 0.0027 |
| foreign presence | -0.11*** | 0.04 | -0.11* | 0.05 | -0.03 | 0.02 |
| year dummies | yes | | yes | | yes | |
| Constant | 0.27*** | 0.07 | 0.26*** | 0.12 | 0.26*** | 0.06 |
| | | | | | | |
| Number of observations | 9876 | | 10415 | | 10415 | |
| <i>F</i> | 661.97(w) | | 17.05 | | 10.19 | |
| R-squared | n.a. | | 0.07 | | 0.04 | |
| 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 0.03 with a <i>p</i> -value of 0.87, which fails to reject the null hypothesis that foreign presence is exogenous. | | | | | | |

Table 8
Estimation Results for Communications Equipment, Computers and Other Electronic Equipment
Manufacturing Industry

| | IV Tobit | | Tobit | | OLS | |
|------------------------|-------------|----------------|-------------|----------------|-------------|----------------|
| | Coefficient | Standard Error | Coefficient | Standard Error | Coefficient | Standard Error |
| ln(firm size) | 0.06*** | 0.006 | 0.06*** | 0.010 | 0.02*** | 0.005 |
| Age | 0.006*** | 0.0006 | 0.005*** | 0.0009 | 0.003*** | 0.0006 |
| Ownership | -0.05*** | 0.016 | -0.06** | 0.026 | -0.02 | 0.010 |
| Collateral | -0.77*** | 0.13 | -0.73*** | 0.25 | -0.38** | 0.17 |
| business risks | 0.006 | 0.04 | 0.006 | 0.04 | 0.01 | 0.02 |
| Profitability | -0.36*** | 0.07 | -0.35*** | 0.11 | -0.14*** | 0.034 |
| NDTS | -0.53** | 0.25 | -0.52* | 0.32 | -0.14 | 0.13 |
| growth opportunities | -0.005 | 0.0145 | -0.02 | 0.0105 | -0.0002*** | 0.0000 |
| foreign presence | 0.05 | 0.05 | -0.06 | 0.07 | 0.04 | 0.03 |
| year dummies | yes | | yes | | yes | |
| Constant | 0.68*** | 0.14 | 0.66** | 0.26 | 0.45*** | 0.17 |
| | | | | | | |
| Number of observations | 2794 | | 3058 | | 3058 | |
| <i>F</i> | 443.21(w) | | 10.53 | | 8.12 | |
| R-squared | n.a. | | 0.17 | | 0.12 | |

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 0.32 with a *p*-value of 0.57, which fails to reject the null hypothesis that foreign presence is exogenous.

Table 9**Manufacturing Sector Estimation Results (foreign presence consists of firms that are 100% foreign owned)**

| | IV Tobit | | Tobit | | OLS | |
|---|-------------|----------------|-------------|----------------|-------------|----------------|
| | Coefficient | Standard Error | Coefficient | Standard Error | Coefficient | Standard Error |
| ln(firm size) | 0.07*** | 0.001 | 0.07*** | 0.002 | 0.02*** | 0.001 |
| Age | 0.003*** | 0.0001 | 0.003*** | 0.0002 | 0.001*** | 0.0001 |
| Ownership | -0.03*** | 0.002 | -0.03*** | 0.005 | -0.01*** | 0.002 |
| Collateral | -0.38*** | 0.02 | -0.38*** | 0.03 | -0.15*** | 0.02 |
| business risks | -0.00006* | 0.00004 | -0.00006* | 0.00003 | - | 0.00001 |
| Profitability | -0.10*** | 0.01 | -0.10*** | 0.01 | -0.05*** | 0.005 |
| NDTS | -0.02 | 0.03 | -0.02 | 0.04 | 0.01 | 0.02 |
| growth opportunities | -0.0002 | 0.0002 | -0.0002 | 0.0003 | -0.0001 | 0.0001 |
| foreign presence | -0.22*** | 0.01 | -0.17*** | 0.02 | -0.07*** | 0.01 |
| Time dummies | yes | | yes | | yes | |
| Year dummies | yes | | yes | | yes | |
| Constant | 0.42*** | 0.02 | 0.41*** | 0.03 | 0.33*** | 0.02 |
| | | | | | | |
| Number of observations | 143500 | | 143500 | | 143500 | |
| F | 12810.49(w) | | 91.9 | | 58.79 | |
| R-squared | n.a. | | 0.1 | | 0.06 | |
| 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 10.01 with a <i>p</i> -value of 0.002, which rejects the null hypothesis of exogeneity of foreign presence. | | | | | | |

Highlights

- An increase in foreign presence increases the debt of value maximizing domestic firms.
- Foreign presence decreases the leverage of domestic firms in China's manufacturing sector.
- Foreign presence has a stronger negative impact on the leverage of privately owned domestic firms.
- The impact of foreign presence on the leverage of domestic firms in China varies across industries.