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Poncet, Sandra; Steingress, Walter; Vandenbussche, Hylke

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Financial constraints in China: firm-level evidence

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Sandra Poncet, Walter Steingress, Hylke Vandenbussche

Katholieke Universiteit Leuven

LICOS Centre for Institutions and Economic Performance
Huis De Dorlodot
Deberiotstraat 34 – mailbox 3511
B-3000 Leuven
BELGIUM

TEL:+32-(0)16 32 65 98
FAX:+32-(0)16 32 65 99
http://www.econ.kuleuven.be/licos

Financial constraints in China: firm-level evidence♠

Sandra Poncet[1], Walter Steingress[2] and Hylke Vandenbussche[3]

Abstract

This paper uses a unique micro-level data-set on Chinese firms to test for the existence of a "political-pecking order" in the allocation of credit. Our findings are threefold. Firstly, private Chinese firms are credit constrained while State-owned firms and foreign-owned firms in China are not; Secondly, the geographical and sectoral presence of foreign capital alleviates credit constraints faced by private Chinese firms. Thirdly, geographical and sectoral presence of state firms aggravates financial constraints for private Chinese firms ("crowding out"). Therefore it seems that ongoing restructuring of the state-owned sector and further liberalization of foreign capital inflows in China can help to circumvent financial constraints and can boost the investment of private firms.

JEL Codes: E22; G32
Keywords: Investment-cashflow sensitivity, China, firm level data, foreign direct investment

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[1]Centre d'Economie de la Sorbonne, Université Paris 11 and CEPII,
[2]Boston College, US,
[3]Corresponding author, Université catholique de Louvain, Department of Economics, Place Montesquieu 3, 1348 Louvain-la-neuve, Belgium ; T :+3210474137 ; F : +3210473945 ; hylke.vandenbussche@uclouvain.be

1. Introduction

There is considerable evidence that financial constraints are an impediment to investment and growth of firms (Stein, 2003; Hubbard, 1998). This is even more important in developing countries, where the access to financial markets is a crucial determinant for the growth and survival of firms. Financial constraints can arise from various kinds of sources. The literature identifies informational asymmetries and agency problems as the most important factors influencing the allocation process of financial resources to firms.[4]

Capital market imperfections are believed to be very present in China. By law, the largest Chinese banks, which were predominantly state banks, were until 1998 instructed not to lend to private firms. This was embedded in a deep political notion that private firms do not rank high in terms of political status. This "political pecking order" in the allocation of credit where private Chinese firms are discriminated against compared to state-owned firms should in principle have been alleviated since 1998. But casual evidence suggests that credit constraints for private firms still exist because they are rooted in deep social and political factors (Huang, 2003).

Several macro studies have emphasized the detrimental effect of local government interference in capital allocation in China[5], with only a few studies at the micro-level.[6] The macro-level studies analyze the links between finance and growth in China and characterize it as a counterexample to the positive relationship generally found between finance and growth in the literature. Indeed, in spite of a malfunctioning financial system, China has one of the fastest growing economies.

The analysis in this paper is a micro-level study that extends the literature in several dimensions. First, it offers an explanation for the conundrum of firm growth in China despite evidence of credit constraints. We look at the presence of foreign capital and how it can mitigate the financial discrimination experienced by Chinese private firms. Our evidence suggests that foreign firms in China do not face credit constraints indicating that they have superior legal status compared to private firms (Naughton, 2007). Alternatively they may be less dependent on the local financial system in China since they can rely on other sources to finance their growth. Either they can

[4] See Stein (2003) and Hubbard (1998) for a review.
[5] Allen (2005), Levin (2005), Guariglia and Poncet (2008).
[6] Héricourt and Poncet (2008), Guariglia, Liu and Song (2008).

continue to have access to capital markets abroad or rely on intra-firm financial transfers. Our results also suggest that the stronger the presence of foreign capital in a sector or region, the lower the financial constraints faced by Chinese private firms operating in the same region and sector. This suggests that the presence of foreign capital somehow allows Chinese private firms to bypass both the financial and legal obstacles that they face at home. Our results for China differ from earlier findings in the literature. For instance Harrison and McMillan (2003) for the Ivory Coast find that the presence of foreign firms crowds local firms out of domestic capital markets. Our results suggest otherwise for China.

Second, we also assess the extent to which the effectiveness of financial constraints on private firms' activity is contingent on state firms' presence in the local economy. Our results show that state presence aggravates credit constraints faced by domestic Chinese firms which points at a "crowding-out" effect where stronger presence of state firms makes it more difficult for private firms to access capital.

From a methodological point of view we follow Harrison et al. (2004). We introduce external financing costs in the investment Euler equation to evaluate the magnitude of financial constraints in China. Sensitivity of investment to cash flow is associated with financial constraints. In perfect capital markets and in the absence of credit constraints, cash flow should not affect future investment. If results show otherwise this can be interpreted as an indication that capital markets are not perfect and that credit constraints exist.

Our work is related to the existing literature on capital market imperfections and firm investment in transition and developing economies (see Konings et al. (2003), Lizal and Svejnar (2002) and Harrison and McMillan (2003)).

In the first part of the paper, we test the "political pecking order" by analyzing whether different types of firm ownership face a different degree of financial constraints. In the second part, we investigate how Foreign Direct Investment (FDI) and the presence of state firms interact with the credit constraints that exist for Chinese private firms. More precisely we test whether the geographical and sectoral presence of foreign investment in China play an important role in modulating private firms' credit constraints and similarly for the geographical and sectoral presence of state-owned firms.

Our analysis is carried out on Chinese firm-level data originating from the data set ORIANA[7] covering more than 20,000 Chinese firms over the period 1999-2005. Our findings confirm the "pecking order" hypothesis put forward by Huang (2003), where private firms face the highest degree of financial constraints, whereas State Owned enterprises (SOE) and foreign firms do not experience any financial constraints. We find that the sensitivity of private firms' investment to cash flow softens in a context of abundant foreign investment. By contrast, credit constraints are reinforced when the presence of state-owned firms is strong. These results show that the ongoing restructuring of SOE may help to circumvent credit constraints and can boost the investment and growth of private firms.

The remainder of this paper is organized as follows. Section 2 provides a theoretical justification for our measure of financing constraints. Section 3 describes the data. Section 4 presents estimation results of the baseline model which tests whether firms face different credit constraints depending on their capital ownership (private, foreign or State-owned status). Section 5 allows for provincial and industry heterogeneity and tests whether direct foreign investment and state presence affects the credit constraints faced by private firms. Section 6 concludes.

2. Theoretical background

We estimate a version of the Euler equation, combining insights from Whited (1992), Bond and Meghir (1994) and Love (2003) to test for the political pecking order in China. The main advantage of the model is that under the maintained structure, the model captures the influence of current expectations of future profitability on current investment decisions. This simple model allows us to formalize the political pecking order hypothesis and consistently estimate financial constraints for different types of firms. The Euler equation characterizes a firm's optimal investment path and relates it to marginal adjustment costs in adjacent periods. A credit constrained firm behaves as if it has a higher discount rate for a given level of today's adjustment costs. Ceteris paribus, constrained firms will then substitute investment tomorrow for investment today. We closely follow Harrison et al. (2004) and define the value of the firm as V_t:

[7] This database contains detailed financial information on contact information, activities, ownership and financing.

$$V_t(K_t,\xi_t) = \max_{I_{t+s}\,{}_{s=0}^{\infty}} D_t + E_t\left(\sum_{s=1}^{\infty} \beta_{t+s-1} D_{t+s}\right) \tag{1}$$

where

$$D_t = \Pi(K_t,\xi_t) - C(K_t,I_t) - I_t - wL_t \tag{2}$$

$$K_{t+1} = (1-\delta)K_t + I_t \tag{3}$$

$$D_t \geq 0 \tag{4}$$

Where the value of a firm in (1) is defined as the discounted stream of future dividends paid out to shareholders; β_{t+s-1} is the discount factor from the period t+s to period t and D_t is the dividend. Equation (2) shows that the dividend that is paid out to shareholders in each period equals profits $\Pi(K_t,\xi_t)$ minus the adjustment cost of new investment $C(K_t,I_t)$ minus investment expenditure I_t. The costs of adjusting the stock of capital $C(K_t,I_t)$ correspond to disruption costs, costly learning, delivery lags and time to install any new or replacement capital. It is assumed to result in a loss of a portion of the investment. Additionally to the model of Harrison et al. (2004), we also subtract the costs of employees, wL_t in (2). By subtracting the cost of employees, the adjustment cost of investment $C(K_t,I_t)$ is net of labor costs. In the capital accumulation constraint (Eq. 3), K_t is the capital stock at the beginning of the period, I_t is the investment expenditure and δ is the depreciation rate. The restricted profit function is denoted by $\Pi(K_t,\xi_t)$, where ξ_t is a productivity shock specific for each firm. Credit constraints are modeled as a non-negative dividend constraint (Eq. 4). Let the multiplier on this constraint be denoted by λ. This multiplier is interpreted as a shadow cost associated with raising new equity, which implies that external (equity) financing is costly.

Following Harrison et al. (2004), we obtain the Q-model of investment as a first order condition from the above model and after combining it with the envelope condition and rearranging it we get the Euler equation:

$$1+\frac{\partial C(I_t,K_t)}{\partial I_t}=\beta_t E_t\left[\Omega_t\left[\frac{\partial \Pi_{t+1}}{\partial K_{t+1}}+(1-\delta)\left(1+\frac{\partial C(I_{t+1},K_{t+1})}{\partial I_{t+1}}\right)\right]\right] \tag{5}$$

where

$$\Omega_t=\frac{1+\lambda_{t+1}}{1+\lambda_t} \tag{6}$$

Here, $\frac{\partial \Pi_{t+1}}{\partial K_{t+1}}$ is the marginal profit of capital, i.e. the contribution of an extra unit of capital to the firm's profits. In the Euler equation the factor $\Omega_{i,t}$ is the relative shadow cost of external finance in periods t and t+1 and serves as a proxy for the degree of financing constraints. If $\lambda_{t+1}=\lambda_t=0$ then $\Omega_{i,t}$ =1, we are in a perfect capital market and the external costs of financing is 1[8]. If the shadow cost of external funds is higher in period t than in period $t+1$, so $\Omega<1$, then current funds are relatively more expensive today than tomorrow. In this case we say that the firm is financial constrained. If the shadow cost ($\Omega>1$) then current funds are less expensive than tomorrow and the firm will invest today.[9] Firms do not face financial constraints if the shadow cost of investment $\lambda_{t+1}=\lambda_t=0$ for all time periods.

Common to the literature is that financial constraints are measured by the sensitivity of investment with respect to internally generated funds. The sensitivity of investment to internal generated funds such as cash flow, is a well reported fact in the literature (Fazzari et al., 1988; Carpenter and Peterson, 2002). We assume that firms make their decision for period t investment at the beginning of the year. Therefore the decisive value of cash flow is in period $t-1$ since the firm gauges its previous cash flow to determine the current investment decision.

In this paper we focus on institutional imperfections in Chinese credit markets, i.e. the political pecking order that leads to a gap between the costs of internal versus external financing. According to the political pecking order in China, firms are discriminated against in their access to credit based on their ownership. To test for different

[8] Another possibility would be if $\lambda_{t+1}=\lambda_t\neq 0$, then current firms are constrained by the same factor in period t and $t+1$. Since the shadow cost depends also on the productivity shock ξ_t it is unlikely that $\lambda_{t+1}=\lambda_t$ in all periods, although for some firms in some periods this is possible. Still we argue as in Love (2003) that in estimating ownership-wide constraints given firm specific investment opportunities such a situation is unlikely to occur.

ownership effects, we split our sample between private, state-owned and foreign companies.

To derive the estimation equation, we assume a constant returns to scale production function with quadratic adjustment costs of investment. Similar to the previous literature, Harrison et al. (2004) and Love (2003), we include the lagged investment to capital ratio ($\frac{I_{it-1}}{K_{i,t-1}}$) in the cost function to allow for correlation between the previous and actual investment decision. We expect the labor to capital ratio (L/K) to proxy for the marginal product of profits with respect to capital as it is conceivable that higher investment leads to a higher capital to labor ratio. Moreover, if we assume rational expectations, we can replace the future realizations of the variables with the real terms together with a measurement error $\varepsilon_{i,t}$. Firm-specific investment oppportunies are approximated by the change in turnover over capital ($\frac{\Delta TU_{it}}{K_{i,t}}$). Our main variable of interest is the cash-flow ratio ($\frac{CF_{it-1}}{K_{i,t-1}}$) whose sign and significance is our measure of credit constraints. Given our assumptions, the empirical equation that we seek to estimate has the following standard specification:

$$\frac{I_{it}}{K_{i,t}} = \beta_1 \frac{I_{it-1}}{K_{i,t-1}} + \beta_2 \frac{L_{it}}{K_{i,t}} + \beta_3 \frac{\Delta TU_{it}}{K_{i,t}} + \beta_4 \frac{CF_{it-1}}{K_{i,t-1}} + \lambda_{k,t} + \varepsilon_{i,t} \tag{7}$$

In the above equation, I denotes gross investment in fixed assets,[10] L is the number of employees, K is the level of the real capital stock (proxied by total assets), ΔTU corresponds to the change in turnover and CF stands for cash flow. The subscripts i, k and t denote the firm, industry and time period, respectively; and $\lambda_{k,t}$ captures the sector-time specific effects, $\varepsilon_{i,t}$ is the error term. We expect that in (7) actual investment is negatively related to past investment and to the employment over assets ratio. We further expect current investment to be positively related to favorable prospects captured by the current change in turnover over assets ratio. As we

No previous mentioning of r

[10] It is defined as the change in the tangible fixed assets of firm i between time t and time $(t-1)$ plus the firm specific depreciation rate of capital. Almeida and Campello (2006) argue that excluding intangible assets (patents, copyrights, trademarks, etc) from the definition of investment reduces measurement errors of investment.

discussed above, we measure financing constraints by the sensitivity of investment to cash flow. We argue that the larger this sensitivity, the more constrained the firm is since it has to rely on its internal funds to finance its investment. In order to validate our hypothesis of the *political pecking order*, we would expect an insignificant coefficient on the cash flow indicator (β_4) when the sample is restricted to state-owned or to foreign firms, but a positive and significant coefficient when private firms are considered since they rank lowest in the political pecking order. To study the contingency of credit constraints for Chinese private firms we include variables measuring the presence of foreign investment and state-firms by province and by province/sector and interact those with our proxies for credit constraints.

We anticipate the sensitivity of investment to cash flow to be lower for private firms located in provinces/sectors where FDI is abundant. An opposite result would in contrast point to a crowding-out effect. As far as the effect of state corporate presence is concerned, we expect that the higher the presence of the state-owned corporate sector, the more crowding-out there will be and the stronger the credit constraints for private firms will be.

3. Data

3.1. Firm-level data

The data that we use are firm-level data originating from the Oriana data set.[11] This database contains detailed financial information on contact information, activities, and ownership of more than 20,000 Chinese firms in the time period of 1998 to 2005. Our data was collected by local governments based on the Accounting Standards for Business Enterprises (ASBE) system promulgated by the Ministry of Finance in 1992. We distinguish among different types of legal ownership: State and collective Owned Enterprises, Foreign Invested Enterprises, and private Chinese companies. A firm is classified by Oriana as a State Owned Enterprize (SOE) if the ownership share of the state (no matter whether direct or indirect) is more than 25 percent.[12] In our empirical estimations we pool SOE with urban and rural collectively owned enterprizes (COE), and include also township and village enterprizes (TVEs). The collective-owned

[11] Oriana dataset is made available by Bureau van Dijk. It is constructed from Huaxia credit.
[12] See Huygebaert et al. (2006).

enterprize is an independent economic organization and legal corporation with means of production and property belonging to laboring masses and managed by local government. COEs are thus ranked quite high in the political pecking order and are expected to receive preferential treatment over private firms in the access to credit.

Private firms in our sample refer to profit-making economic organizations, which can either be sole proprietorships, partnerships, limited liability companies, or shareholding cooperatives.[13] Foreign firms or Foreign Invested Enterprises refer to any enterprise domiciled in mainland China that has at least 25 percent of the total equity stake of the firm owned by a foreign entity.

The construction of the sample used in our regressions is essentially driven by the dynamic nature of our model (Eq. 7). Our sample is restricted to companies that report at least two consecutive years. Furthermore, we delete the upper and the lower one percentile of the distribution of the dependent variable to get rid off outliers. Table 1 reports the summary statistics of the firms used in our empirical work according to their ownership structure. The values in column (1) represent the statistical means together with the standard errors in (2), minimum (3) and maximum values (4) over the sample period. In terms of ownership representation, 38% of the total firms are private firms, while 35% are foreign firms. State owned firms and collective firms represent 27% of our sample.

Insert Table 1 here

Overall, the summary statistics in Table 1 are already indicative of the political pecking order in China Despite the fact that private firms also appear the most efficient in investing their capital.

4. Investment Equation Estimates

Results for our baseline specification in (7) are reported in Table 2. They are shown for different types of ownership i.e. domestic private firms (col.1, 4 and 7), public SOE firms (col. 2, 5 and 8) and foreign firms (col. 3, 6 and 9). All regressions include time dummies defined at the two-digit sector level to control for all shifts in

[13] Another form of individual businesses, known as Getihu, are not included in the data set since they are by law

investment demand or expectations due to changes in industry-level conditions (for example, industry-wide technology changes, industry demand shocks, or the entry of new firms). Our main variable of interest is the coefficient on the cash-flow. When investment significantly depends on a firm's internally generated cash flow this can be regarded as an indication that the firm is credit constrained. We estimate successively our model with OLS, IV and finally firm-fixed effects to check the robustness of our results. We start by reporting OLS results in columns 1 to 3. The focus of our attention goes to the sign and magnitude of the coefficient on the lagged cashflow which is our measures of credit constraints. As conjectured, we find that private firms in China significantly rely on their cash flow to finance their investments which is evidence of credit constaints, while SOEs and foreign firms do not. The results are robust to the inclusion of sector-time effects or time effects only. However, the OLS estimates may be biased due to the endogeneity of the cash flow, our proxy for internal finance. In columns 4 to 6 we apply an IV technique to address this where we use the cash flow over assets in periods t-2 and t-3 as instruments.[14] The results go through be it with a weaker significance of the positive coefficient on the private firms, suggesting that the endogeneity of the cash flow is not too serious an issue. We systematically check the validity of our instruments with Sargan's J-test of overidentifying restrictions. Insignificant test statistics indicate that the orthogonality of the instruments and the error terms cannot be rejected, and thus that our choice of instruments is appropriate.[15] In the case of private firms (column 4), the overidentifying restrictions are accepted. By constrast the Sargan test rejects the validity of our instruments for state and foreign firms, a problem encountered also in previous work emphasizing the weakness of IV instruments in this kind of estimations (Aghion et al. 2008). We also report the cluster-robust F-stat form of the Cragg-Donald statistic; this statistic has been suggested by Stock and Yogo (2002) as a global test for the presence of weak instruments (i.e., it tests the null hypothesis that a given group of instruments is weak against the alternative that it is strong). The test rejects if the computed statistic exceeds the critical value. Results of weak

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not allowed to have more than eight employees and are thus too small to be included.

[14] Javorcik and Spatareanu (2008) in addition to the cash-flow also instrument several other independent variables using a GMM approach. However, due to the short time dimension of our panel we can not pursue the same approach.

[15] Under the joint null hypothesis that instruments are valid instruments and that the excluded instruments are correctly excluded from the estimated equation, the test statistic is distributed as χ^2 in

identification tests are overall quite satisfactory. Our instruments pass comfortably the Cragg-Donald test in all cases since our first stage F-statistics are consistently above 10, verifying the Staiger-Stock (1997) "rule of thumb".

Another drawback of the OLS results presented in the first three columns of Table 2 is that firm-level factors such as the user cost of capital are omitted. In columns 7 to 9, we include firm fixed effects to control for all unobserved time-invariant variables as in the related work of Bond and Meghir (1994) and Harrison and McMillan (2003). It also controls for the possibility of a correlation between a time-invariant component of the error and the regressors which would make the pooled OLS estimation inconsisten[16].t. In addition we also include a squared cash-flow term to allow for non-linearities in credit constraints. The results with the firm-fixed effects in the last three columns of Table 2 show that the coefficient on cash-flow again is positive (and highly significant) for private firms. The negative and significant sign on the squared term suggests that a higher cash flow moderates the extent of the credit constraint for private Chinese firms. Conversely, public companies' and foreign companies' investments are not positively affected by cash-flow. The specification in column 7 for Chinese private firms suggests that holding other factors constant, a 10% increase in the cashflow ratio CF/K of private firms raises investment by about 0.7%. Using a standardized impact approach, we can compute that a one standard deviation increase over the mean in the cashflow ratio CF/K of private firms (1.52=0.105/0.069, cf. Table 1) raises investment by 10.5%. Since the average investment rate over our sample is 15%, this would mean an additional 1.5 percentage point increase which is economically significant.

Insert Table 2 here

In Table 3 we turn to an alternative measure of internal finance as an additional robustness check. Following Whited (1992) and Harrison and McMillan (2003), we use the ratio of total liabilities over total assets which reflects the indebtedness of a firm. This ratio can be interpreted as both a measure of the firm's lack of collateral

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the number of other identifying restrictions. Significance is judged at the 10% level.

[16] The inclusion of firm-level fixed effects together with a lagged dependent variable can render the coefficients biased and inconsistent. Nickell (1981) shows that the bias approaches 0 as the sample size tends to infinity. The within-groups estimator is thus likely to perform well when the time dimension of the panel is large which is the case here.

and a measure of the firm's current demand for borrowing relative to its capacity to borrow. Similar to Harrison and McMillan (2003) and Héricourt and Poncet (2008) we anticipate that credit constrained firms display a negative sensitivity of investment to debt burdens.

As expected, we find the coefficient on total liabilities to assets to be negative (and highly significant) only for private companies, meaning that high existing liabilities reduces the firm's capacity to invest. This confirms our earlier results in Table 2 i.e. that private Chinese firms are credit constrained. The results on the indebtedness of private firms contrast strongly with those on other type of firms where the debt ratio does not affect the public companies' and foreign companies' investment. For the SOE firms in China we interpret this as evidence in support of the notion of a soft budget constraints (Qian and Roland, 1998) where irrespective of their indebtedness, state-owned firms still find the financial means outside the firm to engage in investment. For foreign firms, the irrelevance of firm-level indebtedness for investment purposes may be related to intra-group financial means at their disposal.

Insert Table 3 here

Since findings of significant discrimination of private firms by financial institutions (but not of state-owned firms) are at odds with the observation that these firms are the engine role of growth in the Chinese economy, we move on to investigate whether there are some circumstances (related to FDI and state presence) that may modulate the effectiveness of the credit restrictions of private Chinese firms.

5. Contingency of the relationship between investment and cash flow

At the beginning of the 1980s, the Chinese government decided to gradually liberalize its regime for inward FDI by creating several "special economic zones" (SEZ) to attract foreign investment.[17] In these zones foreign investment was encouraged through lower tax rates, fewer and simplified administrative and customs procedures and, most importantly, duty free import of components and suppliers (Naughton, 2007). Based on this we would expect private firms to face significantly

[17] SEZs are entitled to set their own policies and allowed to have a more liberal economic law than the country's

lower financing constraints in provinces that have a greater intensity of foreign direct investment. On the contrary, firms located in provinces where the FDI rates are low (like the northern and western provinces) are expected to have a higher sensitivity of investment to cash flow. To see whether FDI alleviates financial constraints, we use the basic specification of equation (7) and include variables measuring the importance of foreign investment, both as a main effect and interacted with our proxy for credit constraints. Similarly, it can be argued that state-presence in a province may have the opposite effect and may aggravate credit constraints for private Chinese firms caused amongst others by banks preference to lend to state-owned enterprises.

To evaluate whether foreign investment in China and state presence affect the magnitude of credit constraints, we will use three types of measures.[18] A first set of indicators are traditional province-level indicators of the abundance of foreign capital and of the relative size of the state corporate sector: the ratio of FDI over GDP and the ratio of employment in state-owned firms over total employment respectively. Both indicators are taken from the China Statistical Yearbooks. A second set of measures rely on information of the fixed asset investment by source of financing. Typically the source of financing is broken down into domestic loans, state budgetary appropriation, foreign investment, and self-raised funds.[19] We will use the "share of fixed assets investment financed by foreign sources" as a proxy of foreign capital and the "share of fixed assets investment financed by the state budget" as a proxy for state presence.

A third set of indicators relies on Oriana data to measure the importance of the foreign and state sector. We use four alternative size measures by looking at tangible assets, total assets, turnover and sales held by foreign firms versus state firms respectively at the province p and sector (2-digit) k level as follows:

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one.

[18] Ideally we would need to have detailed information on ownership changes over time. However, the data limitation that we face is that we have information on ownership structure but only for the first year a firm enters the dataset.

[19] Domestic loans include funds borrowed from domestic banks and non-bank financial institutions by local enterprises and institutions. State budgetary appropriation consists essentially of appropriation in the government budget earmarked for capital construction and infrastructure projects. Foreign investment refers to foreign funds in fixed assets, foreign funds borrowed and managed by the government or by individual units, as well as foreign funds in joint-ventures. Self-raised funds include funds raised by various types of enterprises through non-state channels such as bonds, stocks, venture capital, and retained earnings. This data come from the China Statistical Yearbooks.

$$FDI_{pk,t} = \frac{\sum_i X_{i,pk,t} * Foreign_Firm_{i,pk,t}}{\sum_i X_{i,pk,t}} \tag{8}$$

where $Foreign_Firm$ is a dummy that equals 1 when the firm is foreign and X denotes the alternative variables: tangible assets, total assets, turnover or sales.
Symmetrically, we measure the importance of state owned corporate sector at the province p and sector (2-digit) k level as:

$$State_{pk,t} = \frac{\sum_i X_{i,pk,t} * State_Firm_{i,pk,t}}{\sum_i X_{i,pk,t}} \tag{9}$$

where $State_Firm$ is a dummy that equals 1 when the firm is state-owned and X denotes the alternative variables: tangible assets, total assets, turnover or sales.
After defining the measures above, our purpose is to analyze their interactions with the cashflow variable in our baseline specification in (7). Since our proxies of foreign investment and state-presence are introduced in a our preferred specification including firm-level fixed effects, their conditioning impact on credit constraints will be identified through the time dimension of the data. We believe that our estimates are unlikely to suffer from reverse causality as our indicators of foreign investment and state importance are computed at the province p and sector (2-digit) k level while the explained variable is firm specific. It is indeed unlikely that a firm shock translates into a change in province-industry level foreign or state presence.[20]

Table 4 reports results on all the separate indicators that proxy for the abundance of foreign capital at the provincial and province/sector level. While column 1 reproduces the baseline model for private firms, columns 2 to 7 introduce successively various indicators of province-level foreign capital (share of fixed assets investment financed by foreign sources; ratio of FDI over GDP; share of foreign enterprises in tangible assets; in total assets; in turnover and in sales). Our wide selection of indicators allows us to account for different aspects of the foreign presence and to test the

[20] When the dependent variable is at the finest level possible, shocks in the error term will be less likely to affect the right-hand side variables. Moreover, if the explanatory variables are more aggregated, endogeneity is again less likely since shocks to individual variables affect regional variables only slightly.

robustness of our results.

Insert Table 4 here

Almost all specifications in Table 4 suggest that FDI eases Chinese private firms' credit constraints, as compared to estimates from the specification including only CF/K, reproduced in column 1. The coefficients on the interaction terms, CF/K times our proxies for foreign capital, which are almost all negative and significant for private firms, suggest that the presence of foreign firms reduces credit constraints. Hence, there is no evidence of crowding-out. Those findings are in line with those of Harrison et al. (2004) from a cross-country firm-level panel which showed that foreign FDI flows are associated with a reduction in firm-level financing constraints. However they contrast with the results in Harrison and McMillan (2003) on Ivory Coast data, where the presence of foreign firms crowds local firms out of domestic capital markets. These diverging results highlight differences in financial sector organization and practice: the scope of crowding out is much more limited in China because of the lack of incentives of most banks to lend to non state-owned companies. Our results thus overall indicate that abundance of foreign capital constitutes a circumstance under which financial distortions may not represent an impediment to private economic activity.

In addition we look at the presence of the state-owned corporate firms which may also be a conditioning factor of the effectiveness of private firms' credit constraints in China. According to Huang (2003), there exists anecdotal evidence that the degree of the political pecking order differs among locations/industries. For example, the political pecking order in the Garment industry, one of the few industries private entrepreneurs can enter relatively freely, is argued to be characterized by a high degree of discrimination of private firms compared to State owned firms. In particular, firms high on the political pecking order (State Owned Enterprises) have an advantageous access to credit compared to the lower-tiered firms. Moreover, if a firm competes directly with a State owned firm in the same industry the chances to get a loan diminish substantially. If the conjecture by Huang (2003) is correct, then one should see that it is more difficult for private firms, lowered-tiered on the political pecking order, to have access to credit, in provinces/sectors where the relative size of

the State-owned corporate sector is high. We thus expect that private firms have a higher sensitivity of investment to cash flow i.e. are more financially constrained, in locations/industries where the state presence is high.

Table 5 confirms that the effect of the political pecking order of firms on external finance costs of private firms is conditional on the relative size of the state-owned corporate sector. In columns 2 through 7, a variable measuring the importance of state presence is included in the baseline specification (in column (1)), both as a main effect and interacted with our proxy for credit constraints. We use each of the 6 indicators presented earlier to proxy for the size of the state sector at the provincial and province/sector level. In columns 2 and 3, we use indicators built at the province level with data taken from the China statistical yearbook measuring the "province-level share of employment in state units" and the "share of investment financed by state budget over total investment". In columns 4 to 7, we rely on proxies computed from the Oriana dataset of the "state share in tangible assets, total assets, turnover and sales" by province & sector.

Insert Table 5 here

Table 5 shows that in most cases (especially using proxies based on the Oriana dataset), the interaction is positive and significant suggesting that a greater size of the state-owned corporate sector amplifies credit constraints for private firms. The results confirm our prediction that the impact of the political pecking order is more severe in industries with a high share of state owned enterprizes. This micro-level evidence is coherent with macro-level findings of Guariglia and Poncet (2008) and Boyreau Debray and Wei (2005).

These results suggest that privatization and the further reduction of the state-owned corporate sector in China is likely to boost the investment and growth of private firms.

6. Conclusion

This paper investigates both the magnitude and the conditioning factors of the "political pecking order" of credit allocation to Chinese firms. To identify credit constraints we follow the investment literature pioneered by Fazzari et al. (1988) by examining the extent to which Chinese firms' investment is affected by the

availability of internal finance.

The results suggest that private Chinese firms face severe financial constraints while we find no such constraints for state-owned and foreign enterprises. Our findings thus confirm the hypothesis of Huang (2003) that the Chinese capital market is characterized by political pecking order based on firms' ownership type. This finding of discrimination against private firms by financial institutions is at odds with the observation that these firms are the engine role of growth in the Chinese economy. Theferefore, we aimed to shed further light on the circumstances under which financial distortions may not represent an impediment to economic activity. We test two conditioning factors of the effectiveness of the discrimination of private firms by financial institutions: (1) the role of FDI in funding the Chinese corporate sector and (2) the size of the state-owned corporate sector. We identify that FDI is one mechanism that helps firms to overcome financial constraints. FDI brings in scarce capital, eases financing constraints and spurs growth and investment of private firms. The size of the state-owned corporate sector also appears to affect the extent to which private firms investment depends on internal finance. Financing constraints are found to be increasing with the relative size of the state sector. Indeed, firms competing directly with numerous state-owned enterprises in the same province/industry depend more strongly on their internal generated funds for their investment.

Overall, our results support the conjecture of Boyreau-Debray and Wei (2005) that the state-owned banking sector favors inefficient State Owned firms at the expense of private owned firms, which face financial constraints that hinder them to grow. Moreover, our results indicate that private firms located in a location/sector where foreign capital is abundant and where the state sector is low are more in a position to overcome the financial market inefficiencies caused by Chinese economic institutions and policies. Our findings allow us to predict the likely impact of the ongoing reforms inducing further liberalization and state firms restructuring on the economic dynamism of the Chinese economy. We interpret our findings as evidence that credit constraints for private firms are likely to be mitigated by the growing importance of foreign firms in the Chinese economy as well as the ongoing decline of the state economic predominance.

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Table 1: Summary statistics

Variable	Mean (1)	Standard deviation (2)	Minimum (3)	Maximum (4)
Private firms (1):5669				
Investment over Capital	0.086	0.150	-0.487	1.605
Lagged investment over Capital	0.103	0.162	-0.483	1.600
Change in turnover over capital	0.290	1.061	-32.699	21.975
Cash flow over capital	0.069	0.105	-1.460	2.503
Employment over capital	0.006	0.013	0.000	0.454
Total employment	1829	3534	5	88547
Total assets	1273416	3746566	873	145000000
State Owned Enterprises (2): 2357				
Investment over Capital	0.075	0.144	-0.442	1.159
Lagged investment over Capital	0.080	0.134	-0.442	1.217
Change in turnover over capital	0.158	0.411	-5.784	6.767
Cash flow over capital	0.051	0.076	-0.357	0.938
Employment over capital	0.004	0.005	0.000	0.082
Total employment	4623	21989	1	439220
Total assets	3461728	27800000	5571	778000000
Collective Owned Enterprises (3): 1640				
Investment over Capital	0.076	0.151	-0.540	1.679
Lagged investment over Capital	0.091	0.157	-0.369	1.388
Change in turnover over capital	0.395	1.285	-13.295	23.060
Cash flow over capital	0.106	0.188	-1.435	4.602
Employment over capital	0.008	0.020	0.000	0.379
Total employment	1624	3918	6	99147
Total assets	749479	2203650	2396	42400000
Foreign Invested Enterprises (4): 5301				
Investment over Capital	0.063	0.142	-0.834	1.642
Lagged investment over Capital	0.076	0.147	-0.670	1.624
Change in turnover over capital	0.264	0.952	-18.584	19.566
Cash flow over capital	0.109	0.175	-1.385	8.458
Employment over capital	0.009	0.020	0.000	0.441
Total employment	1367	3455	10	140000
Total assets	699955	2075153	1102	38900000

(1) Private firms in our sample refer to 100 percent domestically owned profit-making economic organizations in accordance with the Company Law of the People's Republic of China. The legal form of private Chinese firms can be private Limited Liabilities, Private Partnership, Private Share Holding or Private Sole Investment.
(2) State Owned Enterprises (SOE) refers to 100 percent domestically owned firms where the state (no matter whether direct or indirect) has at least 25 percent of ownership stake. These arrangements can be either be fully State-owned or Jointly State-owned with another party.
(3) Collective Owned Enterprises (COE) refers to 100 percent domestically owned corporation where the means of production and property belonging to labouring masses and are managed by local governments.
(4) Foreign Invested Enterprise (FIE) groups firms with more than 25 percent of registered capital by a foreign party.

Table 2: OLS, IV technique and Firm-fixed effects to test for credit constraints across ownership types

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable: Investment over lagged total assets	Private	SOE	Foreign	Private	SOE	Foreign	Private	SOE	Foreign
	OLS	OLS	OLS	IV	IV	IV	FE	FE	FE
Lag dependent (investment divided by lagged total assets) i, t-1	0.095***	-0.009***	0.100***	0.125***	-0.048	0.114***	-0.365***	-0.623***	-0.528***
	(0.014)	(0.002)	(0.019)	(0.025)	(0.039)	(0.020)	(0.016)	(0.024)	(0.018)
Change in turnover over assets i, t	0.021***	0.108**	0.012***	0.027***	0.070***	0.013***	0.038***	0.062***	0.010***
	(0.004)	(0.047)	(0.003)	(0.007)	(0.025)	(0.003)	(0.003)	(0.005)	(0.003)
Employment over assets i, t	-0.357	-1.489**	-0.247***	-3.219***	-7.320**	-0.598	-6.906***	-14.646***	-5.827***
	(0.251)	(0.617)	(0.094)	(1.002)	(3.342)	(0.543)	(1.423)	(2.793)	(1.779)
Cash flow over assets i, t-1	0.121***	-0.088	0.028	0.109*	0.076	0.013	0.134***	0.090	-0.019
	(0.037)	(0.159)	(0.023)	(0.058)	(0.203)	(0.019)	(0.033)	(0.087)	(0.033)
Cash flow squared over assets i, t-1							-0.149***	-0.062***	0.016**
							(0.025)	(0.018)	(0.007)
Sector-year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Firm fixed effects	no	no	no	no	no	no	yes	yes	yes
Observations number	9229	5766	7316	4152	1607	1994	9229	5766	7316
R-squared	0.074	0.191	0.026	0.110	0.124	0.027	0.195	0.386	0.314
Cragg-Donald F statistic (weak identification test):				727	210	1605			
Sargan statistic (overidentification test of all instruments): Chi-sq(1) P-val				0.084	5.956**	3.077*			
				(0.776)	(0.0147)	(0.0794)			

Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%
In columns 4 to 6, Cash flow over assets i, t-1 is instrumented with Cash flow over assets i, t-2 and Cash flow over assets i, t-3.

Table 3: Robustness check: alternative proxy for credit constrains across ownership types

	(1)	(2)	(3)	(4)	(5)	(6)
	FE	FE	FE	FE	FE	FE
Dependent variable: Investment over lagged total assets	Private	SOE	Foreign	Private	SOE	Foreign
Lag dependent (investment divided	-0.370***	-0.630***	-0.545***	-0.366***	-0.624***	-0.530***
by lagged total assets) i, t-1	(0.015)	(0.027)	(0.017)	(0.016)	(0.024)	(0.018)
Change in turnover over assets i, t	0.033***	0.051***	0.012***	0.039***	0.062***	0.010***
	(0.002)	(0.005)	(0.003)	(0.003)	(0.005)	(0.003)
Employment over assets i, t	-5.970***	-31.137***	-3.636***	-6.938***	-14.663***	-5.898***
	(1.393)	(0.877)	(1.363)	(1.422)	(2.795)	(1.780)
Total liabilities over total assets i, t-1	-0.042***	-0.051	0.013	-0.032***	-0.007	0.017
	(0.010)	(0.032)	(0.012)	(0.011)	(0.030)	(0.013)
Cash flow over assets i, t-1				0.110***	0.089	-0.008
				(0.033)	(0.087)	(0.034)
Cash flow squared over assets i,t-1				-0.140***	-0.062***	0.016**
				(0.025)	(0.018)	(0.007)
Firm fixed effects	yes	yes	yes	yes	yes	yes
Sector-year fixed effects	yes	yes	yes	yes	yes	yes
R-squared	0.201	0.581	0.341	0.198	0.386	0.315
Observations number	9481	5996	7527	9229	5766	7316
Number of firms	5829	4264	5407	5669	4138	5301

Standard errors in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4: Estimation of Investment to Cash flow sensitivities depending on the share of Foreign Direct Investment for private Chinese firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lagged dependent var i, t-1	-0.365***	-0.365***	-0.270***	-0.367***	-0.366***	-0.365***	-0.365***
(investment divided by lagged total assets)	(0.016)	(0.016)	(0.022)	(0.016)	(0.016)	(0.016)	(0.016)
change in turnover over assets i, t	0.038***	0.039***	0.063***	0.039***	0.039***	0.039***	0.039***
	(0.003)	(0.003)	(0.008)	(0.003)	(0.003)	(0.003)	(0.003)
cash flow over assets i, t-1	0.134***	0.208***	0.205***	0.233***	0.245***	0.233***	0.234***
	(0.033)	(0.054)	(0.077)	(0.045)	(0.047)	(0.048)	(0.048)
employment over assets i, t	-6.906***	-6.977***	-4.553*	-7.609***	-7.584***	-7.301***	-7.302***
	(1.423)	(1.423)	(2.449)	(1.434)	(1.434)	(1.429)	(1.429)
cash flow over assets squared i, t	-0.149***	-0.129***	0.178**	-0.122***	-0.112***	-0.102***	-0.102***
	(0.025)	(0.027)	(0.089)	(0.026)	(0.027)	(0.030)	(0.030)
Province level share of fixed asset investment financed b		0.252					
source CSY i, t		(0.175)					
Interaction with cash flow i, t		-1.492*					
		(0.876)					
Province level FDI/gdp			-0.001				
source CSY i, t			(0.002)				
Interaction with cash flow i, t			-0.013				
			(0.014)				
Share of foreign enterprises in tangible assets				-0.104**			
source Oriana i, t				(0.051)			
Interaction with cash flow i, t				-0.473***			
				(0.145)			
Share of foreign enterprises in total assets					-0.063		
source Oriana i, t					(0.058)		
Interaction with cash flow i, t					-0.521***		
					(0.155)		
Share of foreign enterprises in turnover						0.003	
source Oriana i, t						(0.048)	
Interaction with cash flow i, t						-0.390***	
						(0.140)	
Share of foreign enterprises in sales							0.003
source Oriana i, t							(0.048)
Interaction with cash flow i, t							-0.391***
							(0.140)
sector (2 digits)-year fixed effects	yes	yes	yes	yes	yes	yes	yes
Observations	9229	9229	7203	9229	9229	9229	9229
Number of id	5669	5669	5513	5669	5669	5669	5669
R-squared	0.204	0.341	0.331	0.208	0.207	0.205	0.205

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
CSY: Chinese Statistical Yearbook
Oriana: firm-level database from which we aggregated variables like province/sector tangible assets, total assets, turnover and sales.

Table 5: Estimation of Investment to Cash flow sensitivities depending on the share of State Owned firms per industry for private Chinese firms .

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lag dependent i, t-1	-0.365***	-0.366***	-0.365***	-0.364***	-0.364***	-0.364***	-0.364***
(investment divided by lagged total assets)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
change in turnover over assets i, t	0.038***	0.038***	0.038***	0.039***	0.039***	0.039***	0.039***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
cash flow over assets i, t-1	0.134***	0.097**	-0.095	0.096**	0.080*	0.086**	0.085**
	(0.033)	(0.044)	(0.162)	(0.041)	(0.041)	(0.040)	(0.040)
employment over assets i, t	-6.906***	-6.932***	-6.988***	-6.994***	-7.033***	-7.089***	-7.091***
	(1.423)	(1.423)	(1.425)	(1.424)	(1.424)	(1.425)	(1.425)
cash flow over assets squared i, t	-0.149***	-0.138***	-0.129***	-0.149***	-0.149***	-0.148***	-0.148***
	(0.025)	(0.026)	(0.028)	(0.025)	(0.025)	(0.025)	(0.025)
Province level state share of employment		-0.150					
source CSY i, t		(0.100)					
Interaction with cash flow i, t		0.383					
		(0.266)					
Province level share of investment financed by state budget			0.071				
source CSY i, t			(0.086)				
Interaction with cash flow i, t			0.687				
			(0.574)				
Share of foreign enterprises in tangible assets				-0.041			
source Oriana i, t				(0.036)			
Interaction with cash flow i, t				0.217			
				(0.140)			
Share of foreign enterprises in total assets					-0.036		
source Oriana i, t					(0.043)		
Interaction with cash flow i, t					0.336**		
					(0.155)		
Share of foreign enterprises in turnover						0.029	
source Oriana i, t						(0.044)	
Interaction with cash flow i, t						0.346**	
						(0.173)	
Share of foreign enterprises in sales							0.028
source Oriana i, t							(0.044)
Interaction with cash flow i, t							0.350**
							(0.173)
sector (2 digits)-year fixed effects	yes	yes	yes	yes	yes	yes	yes
Observations	9229	9229	9229	9229	9229	9229	9229
Number of id	5669	5669	5669	5669	5669	5669	5669
R-squared	0.204	0.341	0.205	0.204	0.205	0.205	0.205

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

CSY: Chinese Statistical Yearbook

Oriana: firm-level database from which we aggregated variables like province/sector tangible assets, total assets, turnover and sales.