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## Financial constraints in China: firm-level evidence

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Sandra Poncet, Walter Steingress & Hylke Vandenbussche

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## FINANCIAL CONSTRAINTS IN CHINA: FIRM-LEVEL EVIDENCE

### NON-TECHNICAL SUMMARY

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 and to investigate conditions that may mitigate the credit constraints faced by Chinese private firms.

Several macro studies have emphasized the detrimental effect of local government interference in capital allocation in China so that China appears 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.

Our analysis is carried out on Chinese firm-level data originating from the data set ORIANA covering more than 20,000 Chinese firms over the period 1998-2005. 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.

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 the geographical and sectoral Foreign Direct Investment (FDI) and presence of state firms interact with the credit constraints that exist for Chinese private firms.

Our analysis extends the literature in several dimensions. First, it offers an explanation for the conundrum of firm growth in China despite evidence of credit constraints. Our results 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. The presence of foreign capital somehow allows Chinese private firms to bypass both the financial and legal obstacles that they face at home. It is coherent with the hypothesis put forward by Huang (2003) that FDI mitigates the credit constraints faced by Chinese private firms due to inefficiencies in the banking sector for which only macro-level evidence existed so far (Guariglia and Poncet, 2008). One possibility that we have in mind is that foreign firms may extend more trade credit to local Chinese firms which would explain why the presence of foreign firms in the region reduces credit constraints for local Chinese firms.

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 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 obtained over the period 1998-2005 suggest that the ongoing restructuring of SOE may help to circumvent credit constraints and can boost the investment and growth of private firms.

#### **ABSTRACT**

This paper uses a unique micro-level data-set over the period 1998-2005 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 Classification:* E22; G32

*Key Words:* Investment-cashflow sensitivity, China, firm level data, foreign direct investment

## CONTRAINTES FINANCIÈRES EN CHINE: ÉTUDE SUR DONNÉES DE FIRMES

### RÉSUMÉ NON TECHNIQUE

Ce travail utilise une base de données sur des entreprises chinoises entre 1998 et 2005 pour tester l'existence d'une hiérarchie politique dans l'allocation du crédit et analyser les conditions permettant d'atténuer les contraintes de crédit supportées par les firmes privées chinoises.

Plusieurs études macro-économiques ont mis en évidence l'effet négatif de l'interférence gouvernementale sur l'allocation du capital en Chine de sorte que la Chine apparaît comme un contre-exemple de la relation positive généralement observée dans la littérature entre la finance et la croissance. En effet, en dépit d'un système financier inefficace, la Chine connaît une des croissances les plus fortes du monde.

Notre analyse exploite la base ORIANA et couvre plus de 20 000 entreprises chinoises sur la période 1998-2005. Nous suivons la méthode de Harrison et al. (2004) qui introduit les coûts de financement extérieur dans une équation d'investissement d'Euler pour évaluer l'ampleur des contraintes financières en Chine. La sensibilité de l'investissement au cash-flow est interprétée comme la marque de contraintes financières : dans des marchés parfaits et en absence de contraintes de crédit, le cash-flow ne devrait pas affecter les investissements futurs.

Dans la première partie du papier, nous testons l'existence d'une hiérarchie politique dans l'allocation du crédit en vérifiant si les contraintes financières pesant sur les entreprises dépendent de leur type de propriété. Dans la seconde partie, nous étudions si les investissements directs étrangers (IDE) et la présence d'entreprises publiques dans une localité et un secteur donnés modulent les contraintes de crédit dont souffrent les entreprises privées chinoises.

Notre travail contribue à la littérature sur deux aspects. D'abord, il offre une explication de l'opposition apparente entre croissance rapide et contraintes financières généralisées des firmes chinoises : une forte présence de capitaux étrangers atténue les contraintes de crédit subies par les entreprises privées du couple localité-secteur où ils se dirigent. Les investissements étrangers semblent ainsi permettre aux entreprises privées chinoises de dépasser les obstacles financiers et légaux auxquelles elles font face. Ce constat est cohérent avec l'hypothèse formulée par Huang (2003) et ses validations empiriques, jusque-là uniquement macro-économiques (Guariglia et Poncet, 2008). L'offre de crédits commerciaux aux entreprises locales par les entreprises étrangères pourrait expliquer ce phénomène.

Ensuite, nous évaluons dans quelle mesure l'impact des contraintes financières sur l'activité des entreprises privées dépend de la présence d'entreprises étatiques dans leur localité et secteur.

Nos résultats économétriques confirment l'existence d'une hiérarchie politique dans l'allocation du crédit : les entreprises chinoises privées sont contraintes financièrement tandis que les entreprises publiques et étrangères ne le sont pas. Si la

sensibilité des investissements des entreprises privées à leur cash-flow est atténuée dans un contexte d'abondance d'IDE, elle est, à l'inverse, renforcée lorsque la présence d'entreprises étatiques est forte dans leur localité et secteur. Ces résultats obtenus sur la période 1998-2005 laissent penser que le processus de restructuration en cours du secteur étatique et la libéralisation accrue des investissements directs étrangers en Chine pourraient atténuer les contraintes financières des entreprises privées et ainsi encourager leurs investissements.

### **RÉSUMÉ COURT**

Ce travail utilise une base de données sur des entreprises chinoises entre 1998 et 2005 pour tester l'existence d'une hiérarchie politique dans l'allocation du crédit. Nos résultats sont de trois ordres. Premièrement, les entreprises chinoises privées sont contraintes par le crédit tandis que les entreprises publiques ne le sont pas ; deuxièmement, la présence de capitaux étrangers atténue les contraintes de crédit subies par les entreprises privées chinoises du couple localité-secteur où ils se dirigent ; troisièmement, la forte présence d'entreprises d'État aggrave les contraintes financières des firmes privées des mêmes localité et secteur, attestant d'un effet d'éviction. Le processus de restructuration en cours du secteur étatique et la libéralisation accrue des investissements directs étrangers en Chine pourraient atténuer les contraintes financières des entreprises privées et ainsi encourager leurs investissements.

*Classification JEL* : E22; G32

*Mots-clefs* : Sensibilité investissement-cashflow, Chine, données de firmes, investissements directs étrangers

## FINANCIAL CONSTRAINTS IN CHINA: FIRM-LEVEL EVIDENCE<sup>\*</sup>

Sandra Poncet<sup>\*\*</sup>, Walter Steingress<sup>\*\*\*</sup> & Hylke Vandenbussche<sup>\*\*\*\*</sup>

### 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.<sup>1</sup>

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 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<sup>2</sup>, with only a few studies at the micro-level.<sup>3</sup> 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.

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<sup>\*\*</sup> Paris School of Economics (Université Paris 1) and CEPII, [sandra.poncet@univ-paris1.fr](mailto:sandra.poncet@univ-paris1.fr)

<sup>\*\*\*</sup> Boston College, US, [steingre@bu.edu](mailto:steingre@bu.edu)

<sup>\*\*\*\*</sup> Corresponding author, Université catholique de Louvain, CORE, B-1348 Louvain-la-neuve, Belgium ; T : +321047 43 16 ; F : +3210 47 43 01 ; [hylke.vandenbussche@uclouvain.be](mailto:hylke.vandenbussche@uclouvain.be)

<sup>1</sup> See Stein (2003) and Hubbard (1998) for a review.

<sup>2</sup> Allen (2005), Levin (2005), Guariglia and Poncet (2008).

<sup>3</sup> Héricourt and Poncet (2008), Guariglia, Liu and Song (2008).

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 continue to have access to capital markets abroad or rely on intra-firm financial transfers provided by affiliated firms abroad. 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. This paper does not argue that the presence of foreign firms can affect the lending policies of local banks.<sup>4</sup> Instead, it empirically validates at the micro-level the hypothesis put forward by Huang (2003) that FDI mitigates the credit constraints faced by Chinese private firms due to inefficiencies in the banking sector for which only macro-level evidence existed so far (Guariglia and Poncet, 2008). 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. Our data do not allow us to verify the channels of this geographical spillover. One possibility that we have in mind is that foreign firms may extend more trade credit to local Chinese firms, which would explain why the presence of foreign firms in the region reduces credit constraints for local Chinese firms.

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)).

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<sup>4</sup> This paper focuses on the role of FDI as an alternative source of funding to loans from the banking system. It does not make any attempt to study the various ways by which the presence of foreign firms can affect the lending policies of local banks. Though interesting the questions of whether local banks become more reluctant to lend money because private firms are facing more severe competition from foreign-owned enterprises or whether central/local governments incite (state-owned) banks to lend money to private firms in a context of harsher competition from foreign-owned enterprises are out of scope of the paper.

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<sup>5</sup> covering more than 20,000 Chinese firms over the period 1998-2005. 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 obtained over the period 1998-2005 suggest 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

The central idea of the literature on financing constraints is that investment should not be determined by a firm’s net worth or internal funds but only by the firm’s expected future profitability. The seminal work of Modigliani and Miller (1958) indeed suggests that in perfect capital and credit markets the financing decision of a firm is irrelevant for its investment behavior and vice-versa. However, in the presence of market imperfections, financing constraints will be reflected in firms’ investment decisions. Empirically, financing constraints could be identified via the sensitivity of investment to internal funds. A number of recent papers have called into question the validity of using investment-cash flow correlations as proxies for financing constraints. Based on statements contained in annual reports, Kaplan and Zingales (1997) argue that firms identified in Fazzari et al. (1988a) as financially constrained are in fact not constrained. However, many authors still support the use of investment-cash flow sensitivity as an indicator of credit constraints (Fazzari et al., 2000 and Allayannis and Muzomdar, 2004) while others are more doubtful (Gomes, 2003 and Altı, 2003). As explained by Harrison et al. (2004), most papers which question this methodology relate more directly to the Q-model of investment rather than the Euler equation model (although some of the criticisms apply to both models). While it is

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<sup>5</sup> This database contains detailed financial information on contact information, activities, ownership and financing.

true that no theoretical consensus has been reached and that the relationship between investment and cash flow sensitivities continues to be an important empirical question, numerous recent results and survey evidence support the intuition that investment-cash flow sensitivities are indeed a reflection of the extent of financing constraints (Love, 2003 and Beck et al., 2005).

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 it 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 had 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  $V_t$ :

$$V_t(K_t, \xi_t) = \max_{I_t} D_t + E_t \left( \sum_{s=1}^{\infty} \beta_{t+s} D_{t+s} \right) \quad (1)$$

where

$$D_t = \Pi(K_t, \xi_t) - C(K_t, I_t) - I_t \quad (2)$$

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

$$D_t \geq 0 \quad (4)$$

Where the value of a firm in (1) is defined as the discounted stream of future dividends paid out to shareholders, where  $\beta_{t+s}$  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 restricted profit function is denoted by  $\Pi(K_t, \xi_t)$ , where  $\xi_t$  is a productivity shock specific for each firm. 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. 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  $\delta$  is the depreciation rate. Credit constraints are modeled as a non-negative dividend constraint (Eq. 4). Let the multiplier on this constraint be denoted by  $\lambda_t$ . This multiplier is interpreted as a shadow cost associated with raising new equity, which implies that external financing is costly.

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

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

where

$$\Omega_t = \frac{1 + \lambda_{t+1}}{1 + \lambda_t} \quad (6)$$

In (5),  $\frac{\partial \Pi_{t+1}}{\partial K_{t+1}}$  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  $\Omega_t$  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  $\Omega_t = 1$ , we are in a perfect capital market and the external costs of financing is 1<sup>6</sup>. 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 of current funds  $\lambda_t$  is less expensive today than tomorrow ( $\Omega > 1$ ), then the firm will invest today.<sup>7</sup> Firms do not face financial constraints if the shadow cost of investment  $\lambda_{t+1} = \lambda_t = 0$  for all time periods.

It is important to stress that there is no implicit assumption on the source of external funds. The model is consistent with the Chinese specificity that private domestic firms rely principally on informal sources of finance that are based on reputation and relationships such as loans from family and friends and from private (unofficial) credit agencies (Allen et al., 2005).<sup>8</sup> Our model will uncover whether alternative and informal financing channels in China are effective in preventing credit constraints. 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.

<sup>6</sup> 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  $\xi_t$  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.

<sup>7</sup> We thank an anonymous referee for raising this issue.

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 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  $\left(\frac{I_{i,t-1}}{K_{i,t-1}}\right)$  in the cost function to allow for a correlation between the

previous and current 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

opportunities are approximated by the change in turnover over capital  $\left(\frac{\Delta TU_{i,t}}{K_{i,t}}\right)$ . Our

main variable of interest is the cash-flow ratio  $Foreign\_Firm_{i,pk,t}$  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:

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

In the above equation,  $I$  denotes gross investment in fixed assets,<sup>9</sup>  $L$  is the number of employees,  $K$  is the level of the real capital stock (proxied by total assets),  $\Delta TU$  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  $\mu_{k,t}$  captures the sector-time specific effects,  $\varepsilon_{i,t}$  is the error term. We expect that in (7) current 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 business prospects captured by the current change in turnover over assets ratio. As we 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 ( $\beta_4$ ) 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

<sup>9</sup> 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.

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.

### 3. DATA

The data that we use are firm-level data originating from the Oriana data set.<sup>10</sup> 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 were 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 Enterprise (SOEs) if the ownership share of the state (no matter whether direct or indirect) is more than 25 percent.<sup>11</sup>

The companies included in the database are either publicly listed or satisfy at least one of the following size criteria: minimum number of employees is 150, or annual turnover and total assets are at least 10 million and 20 million USD, respectively. For the purpose of this study, we retrieved detailed information on 23,613 firms in the People's Republic of China. Although no data exist on the extent of informal sources of financing and the types of financing (actions, bonds, loans...), one should note that our methodology of eliciting credit constraints through the correlation of debt and cash flows with investment would still be relevant.

As far as data cleaning is concerned, firm-level data from transition and developing economies often suffer from accounting deficiencies, and usually contain missing values and outlier observations that may bias the estimated coefficients. After eliminating the observations that were based on irregular reports or unreasonable data values in the levels of variables (such as negative values for material costs), we have a total of 22,311 observations from 14,967 firms.<sup>12</sup>

In our empirical estimations we pool SOEs with urban and rural collectively owned enterprises (COEs). The collective-owned enterprise 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

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<sup>10</sup> Oriana dataset is made available by Bureau van Dijk. It is constructed from Huaxia credit.

<sup>11</sup> See Huygebaert et al. (2006).

<sup>12</sup> As far as the data coverage of our sample is concerned, a comparison of our data with the China Economic Census Yearbook 2004 reveals that the Oriana data covers 52 percent of total manufacturing sales of medium-size and large-size enterprises in China (Abraham et al., 2007). A closer look at the regional and sectoral composition of Oriana reveals that it is quite similar to the Census: 87 percent of the firms in Oriana are operating in the manufacturing sector compared to 93 percent in the Census. In the Oriana data set as pointed out by Abraham et al. (2007), both the state sector and foreign firms are slightly over-represented: 16 percent of the firms in Oriana are owned by the state, versus 13 percent in the Census, and 36 percent (Oriana) versus 20 percent (Census) of firms are foreign-owned (including Hong Kong, Macau, and Taiwan). It is however hard to determine to which extent these differences could affect the reliability of our results.

over private firms in the access to credit which is why we consider them together with SOEs in the analysis.<sup>13</sup>

Private firms in our sample refer to profit-making economic organizations, which can either be sole proprietorships, partnerships, limited liability companies, or shareholding cooperatives.<sup>14</sup> 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 of outliers. We verified that our results are robust to the deleting of the upper and the lower five percentile of the distribution. Although this procedure excludes several hundred observations, it does not alter significantly the main results.<sup>15</sup>

Since the use of an alternative outlier detection method does not modify the results qualitatively, we did not change our regression method. 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.

Overall, the summary statistics in Table 1 show amongst others that private Chinese firms are smaller than SOEs, generate more internal funds and are typically more efficient in investing their capital.

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<sup>13</sup> Following an anonymous referee's suggestion, we verified that findings of no credit constraints for state-owned firms were robust to the exclusion of the collective firms from the SOE category. Results are available upon request.

<sup>14</sup> Another form of individual businesses, known as Getihu, are not included in the data set since they are by law not allowed to have more than eight employees and are thus too small to be included.

<sup>15</sup> We thank an anonymous referee for this suggestion. Results of this alternative outlier correction procedure are available upon request.

**Table 1: Summary statistics**

Variable	Mean (1)	Standard deviation (2)	Minimum (3)	Maximum (4)
<b>Private firms (1):5669</b>				
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
<b>State Owned Enterprises (2): 2357</b>				
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
<b>Collective Owned Enterprises (3): 1640</b>				
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
<b>Foreign Invested Enterprises (4): 5301</b>				
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.

#### 4. INVESTMENT EQUATION ESTIMATES

Results for our baseline specification (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 sector-level specific time dummies defined at the two-digit sector level (26 sectors) to control for all shifts in 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 firm-fixed effects to check the robustness of our results. We start by reporting OLS results in columns 1 to 3. As conjectured, we find that private firms in China significantly rely on their cash flow to finance their investments, which is evidence of credit constraints, 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.<sup>16</sup> The results go through but 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.<sup>17</sup> In the case of private firms (column 4), the overidentifying restrictions are accepted. By contrast 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. The results we obtain for weak 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, in line with the Staiger-Stock (1997) "rule of thumb".

<sup>16</sup> 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.

<sup>17</sup> 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  $\chi^2$  in the number of other identifying restrictions. Significance is judged at the 10% level.

Another drawback of the OLS results presented in the first three columns of Table 2 is that some firm-level factors such as the user cost of capital are omitted.<sup>18</sup> 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 term and the regressors which would make the pooled OLS estimation inconsistent<sup>19</sup>. In addition we also include a squared cash-flow term to allow for non-linearities in credit constraints. The motivation to include a squared cash-flow term is to allow for non-linearity in the investment sensitivity to cash flows.<sup>20</sup> As uncovered by Hansen and Tarp (2001) in the context of the conditional impact of aid on growth it is crucial to control for non-linearity (such as decreasing returns) before investigating potential conditionality of the impact.<sup>21</sup> The significance of the interactive term in most specifications attests to the pertinence of the quadratic specification compared to the linear specification.

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.

<sup>18</sup> Another potential concern is the difficulty to properly account for firm-specific investment opportunity. So far they were approximated by the change in turnover over capital (between  $t-1$  and  $t$ ), which is likely to be a poor proxy. Firm fixed effects (together with time-varying sector level fixed effects) should mitigate the issue. In any case, we checked that our results were robust to the use of alternative proxies. We relied on the change in turnover over capital as well as the change in sales over capital over different periods (between  $t-1$  and  $t$  as well as between  $t$  and  $t+1$ ). Results available upon request confirm our main findings.

<sup>19</sup> 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.

<sup>20</sup> Firms with a higher level of cash flow are supposed to depend more on their internal generated funds, which implies that the degree of financial constraints is increasing the size of the cash flow dependency. In the literature, non linearity in financial constraints is more often apprehended using the quadratic term of the lagged dependent variable in parallel to the lagged dependent variable (Harrison et al., 2004; Hubbard, 1998). In order to check that our results are robust to this alternative way of accounting for non-linearity in the cash-flow investment sensitivity we rerun our regression including both the cash flow squared and the lagged dependent variable. Our results (unreported but available upon request) attest to the robustness of our findings.

<sup>21</sup> We claim that controlling for non-linearity in the cash-flow sensitivity strengthens the paper findings of significant conditional impact of cash flow sensitivity depending on SOE or Foreign presence.

**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*** (0.014)	-0.009*** (0.002)	0.100*** (0.019)	0.125*** (0.025)	-0.048 (0.039)	0.114*** (0.020)	-0.365*** (0.016)	-0.623*** (0.024)	-0.528*** (0.018)
Change in turnover over assets i, t	0.021*** (0.004)	0.108** (0.047)	0.012*** (0.003)	0.027*** (0.007)	0.070*** (0.025)	0.013*** (0.003)	0.038*** (0.003)	0.062*** (0.005)	0.010*** (0.003)
Employment over assets i, t	-0.357 (0.251)	-1.489** (0.617)	-0.247*** (0.094)	-3.219*** (1.002)	-7.320** (3.342)	-0.598 (0.543)	-6.906*** (1.423)	-14.646*** (2.793)	-5.827*** (1.779)
<b>Cash flow over assets i, t-1</b>	0.121*** (0.037)	-0.088 (0.159)	0.028 (0.023)	0.109* (0.058)	0.076 (0.203)	0.013 (0.019)	0.134*** (0.033)	0.090 (0.087)	-0.019 (0.033)

	(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
<b>Cash flow squared over assets i, t-1</b>							-0.149*** (0.025)	-0.062*** (0.018)	0.016** (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 (0.776)	5.956** (0.0147)	3.077* (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.

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 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.

**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 by lagged total assets) i, t-1	-0.370*** (0.015)	-0.630*** (0.027)	-0.545*** (0.017)	-0.366*** (0.016)	- 0.624*** (0.024)	- 0.530*** (0.018)
Change in turnover over assets i, t	0.033*** (0.002)	0.051*** (0.005)	0.012*** (0.003)	0.039*** (0.003)	0.062*** (0.005)	0.010*** (0.003)
Employment over assets i, t	-5.970*** (1.393)	-31.137*** (0.877)	-3.636*** (1.363)	-6.938*** (1.422)	- 14.663** * (2.795)	- 5.898*** (1.780)
<b>Total liabilities over total assets i, t-1</b>	-0.042*** (0.010)	-0.051 (0.032)	0.013 (0.012)	-0.032*** (0.011)	-0.007 (0.030)	0.017 (0.013)
<b>Cash flow over assets i, t-1</b>				0.110*** (0.033)	0.089 (0.087)	-0.008 (0.034)
<b>Cash flow squared over assets i,t-1</b>				-0.140*** (0.025)	- 0.062*** (0.018)	0.016** (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%.

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. Our findings suggest that the documented abundance of alternative and informal financing channels did not succeed to solve entirely private firms' credit constraints.

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.

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.<sup>22</sup> 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). As suggested by Huang (2003) and Luo (2007), pervasive distortions in the banking sector in China may force private Chinese firms to look for foreign investors. By establishing cross-border relationships with foreign firms, private domestic firms can bypass both the financial and legal obstacles that they face at home. Hence, FDI can in fact be seen as a form of equity financing (Harrison et al., 2004).

It is quite possible that on top of that direct "capital injection" effect, indirect mechanisms are at work which are however impossible to uncover due to data limitations. More specifically, foreign firms may extend more lenient trade credit financing to local firms to a greater extent than non foreign firms, thus reducing the credit constraints faced by the local firms. However no information is available in this dataset (and in others we know of) on trade credit to test this hypothesis.<sup>23</sup>

<sup>22</sup> SEZs are entitled to set their own policies and allowed to have a more liberal economic law than the country's one.

<sup>23</sup> We thank an anonymous referee for this remark.

Based on this we would expect private Chinese firms to face significantly 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 use three types of measures.<sup>24</sup> 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.<sup>25</sup> We 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 carried out by foreign firms versus state firms respectively at the province  $p$  and sector (2-digit)  $k$  level as follows:

$$FDI_{pk,t} = \frac{\sum_i X_{i,pk,t} * Foreign\_Firm_{i,pk,t}}{\sum_i X_{i,pk,t}} \quad (8)$$

where  $Foreign\_Firm_{i,pk,t}$  is a dummy that equals 1 when firm  $i$  is foreign and  $X_{i,pk,t}$  denotes the different variables: tangible assets, total assets, turnover or sales.

<sup>24</sup> 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.

<sup>25</sup> 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. These data come from the China Statistical Yearbooks.

Symmetrically, we measure the importance of state-owned corporate sector at the province  $p$  and sector (2-digit)  $k$  level as:

$$State_{pk,t} = \frac{\sum_i X_{i,pk,t} * State\_Firm_{i,pk,t}}{\sum_i X_{i,pk,t}} \quad (9)$$

where  $State\_Firm_{i,pk,t}$  is a dummy that equals 1 when firm  $i$  is state-owned and  $X_{i,pk,t}$  denotes the different 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.<sup>26</sup>

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 robustness of our results.

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<sup>26</sup> 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.

**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)
<b>Province level share of fixed asset investment financing</b>	0.252						
source CSY i, t	(0.175)						
Interaction with cash flow i, t		-1.492*					
		(0.876)					
<b>Province level FDI/gdp</b>			-0.001				
source CSY i, t			(0.002)				
Interaction with cash flow i, t			-0.013				
			(0.014)				
<b>Share of foreign enterprises in tangible assets</b>				-0.104**			
source Oriana i, t				(0.051)			
Interaction with cash flow i, t				-0.473***			
				(0.145)			
<b>Share of foreign enterprises in total assets</b>					-0.063		
source Oriana i, t					(0.058)		
Interaction with cash flow i, t					-0.521***		
					(0.155)		
<b>Share of foreign enterprises in turnover</b>						0.003	
source Oriana i, t						(0.048)	
Interaction with cash flow i, t						-0.390***	
						(0.140)	
<b>Share of foreign enterprises in sales</b>							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						
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.

Almost all specifications in Table 4 suggest that FDI eases Chinese private firms' credit constraints, as compared to estimates from the specification including only the cash flow term ( $CF/K$ ), 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. It is unlikely that this FDI-mitigation of credit constraints is an artifact due to the endogenous location choice process of foreign firms which localize especially in regions where credit constraints are limited. Indeed empirical results on the importance of local bank lending practices as determinants of FDI location choice suggest that FDI flows in regions characterized by imperfections in the banking sector and state investment policies (Havrylchyk and Poncet, 2007). Findings that FDI inflows are positively related to the restricted access to external funding by private enterprises in coherence with Huang (2003)'s "demand perspective" on FDI, which stresses that private Chinese enterprises are forced to look for foreign investors because they are constrained in their activity due to, inter alia, distortions in the state-dominated financial system.

Hence, there is no evidence of crowding-out in China. This finding is in line with that 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 of Harrison and McMillan (2003) on the 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. As suggested in Harrison and McMillan (2003), Côte d'Ivoire is very peculiar in the sense that foreign firms borrow heavily on domestic credit markets. The authors suggest that local banks found lending to foreign enterprises less costly because they were generally considered less risky and more profitable than domestic firms. Thus, financing constraints of domestic firms in Côte d'Ivoire were exacerbated by the presence of foreign firms, which benefited from a preferential treatment from domestic credit markets. The situation is clearly opposite in China where lending dominated by state banks is still determined by policy reasons, rather than by commercial motives (Park and Sehn, 2001) thus favoring state-owned firms. Very little information is available in order to compare how foreign firms and domestic firms differ in the way they actually finance their operations in China. In the World Bank investment climate survey (2003), firms are asked about their credit record without differentiating between domestic and foreign credit. The proportion of Chinese firms that declare to have a bank loan is virtually the same (22%) irrespective of the degree of foreign capital. In this respect there does not seem to be any indication as in Côte d'Ivoire that foreign firms borrow more heavily on (domestic) credit markets. If anything, it seems that they rely to a greater extent on foreign sources. Another question in the World Bank survey involves the "the share of a firm's total borrowing (loans, accounts payable) denominated in foreign currency". The responses show that foreign ownership indeed has an impact on the share of loans that is denominated in foreign currency i.e. 18.6% for 100% foreign firms, 7.3% for firms with 50% foreign capital and 1.8% for firms with 0% foreign capital on average.<sup>27</sup> These statistics indicate that while

<sup>27</sup> No information exists on the extent to which foreign firms are financed by means of their mother company abroad.

foreign firms rely to a lower extent on domestic capital markets compared to domestic firms, their demand for local credit is not insignificant. Hence it invalidates the assumption that foreign firms have no demand for credit in the local market, making it easier for private firms to obtain the demanded funds.

The major problem in China's corporate sector is a political pecking order of firms which leads to the allocation of China's financial resources to the least efficient firms (state-owned enterprises), while denying the same resources to China's most efficient firms (private enterprises). Establishing joint-ventures with foreign firms may allow private firms to bypass both the financial bias (by using foreign firms as sources of finance) and the legal bias (by accessing the superior legal protection and regulatory treatment granted to foreign firms).

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.

**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)
<b>Lag dependent i, t-1</b>	-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)
<b>change in turnover over assets i, t</b>	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)
<b>cash flow over assets i, t-1</b>	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)
<b>employment over assets i, t</b>	-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)
<b>cash flow over assets squared i, t</b>	-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)
<b>Province level state share of employment</b>		-0.150					
source CSY i, t		(0.100)					
Interaction with cash flow i, t		0.383					
		(0.266)					
<b>Province level share of investment financed by state budget</b>			0.071				
source CSY i, t			(0.086)				
Interaction with cash flow i, t			0.687				
			(0.574)				
<b>Share of foreign enterprises in tangible assets</b>				-0.041			
source Oriana i, t				(0.036)			
Interaction with cash flow i, t				0.217			
				(0.140)			
<b>Share of foreign enterprises in total assets</b>					-0.036		
source Oriana i, t					(0.043)		
Interaction with cash flow i, t					0.336**		
					(0.155)		
<b>Share of foreign enterprises in turnover</b>						0.029	
source Oriana i, t						(0.044)	
Interaction with cash flow i, t						0.346**	
						(0.173)	
<b>Share of foreign enterprises in sales</b>							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						
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.

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 enterprises. 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 over the period 1998-2005 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. Therefore, we subsequently study 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 obtained over the period 1998-2005 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 beneficial 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. Indeed, recent developments demonstrate a continuing shift away from state ownership. The 2004 Economic Census in China indicates declines of over 45 percent in each of the two most prominent forms of public ownership, i.e. state-owned firms and collectives from 2000. This substantial privatization move has placed increasing shares of assets and profits under the control of profit-seeking entrepreneurs and managers. In parallel, China has experienced a fundamental change with regard to the means of allocating financial resources with its entry in the WTO in 2001. China engaged into a dramatic removal of restrictions on the activities of foreign banks. Perkins and Rawski (2007) further argue that removing restrictions on the sale of formerly nontradable corporate shares, while still incomplete, represents another important advance. For all the reasons listed above, we can anticipate rapid change in the Chinese allocation of credit in future reducing Chinese private firms' credit constraints.

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TÉL : 01 53 68 55 14 - FAX : 01 53 68 55 04

[sylvie.hurion@cepii.fr](mailto:sylvie.hurion@cepii.fr)

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