Is the growth of Chinese firms constrained by internal finance?

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Abstract

Using a panel of 407,096 firms over the period 2000-2005, we examine the extent to which the growth of Chinese firms is affected by the availability of internal finance. We estimate dynamic assets growth equations augmented with cash flow and find that the growth of state owned enterprises is not affected by cash flow, while that of privately owned firms is most affected. Considering that they represent 62 percent of the observations in our sample and that, in spite of being typically discriminated against by financial institutions, private firms have experienced sensational growth rates, our results suggest that internal finance has fostered rather than constrained their growth.

Keywords: Assets growth, Cash flow, Financial constraints.

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1. Introduction

In the first part of its transition, China was still dominated by State Owned Enterprises (SOEs). However, as documented by Jefferson and Jian (2006), although the number of state owned enterprises peaked in 1993, for the first time in that year, the gross output of the non-state sector exceeded that of the state sector. 1993 marks the start of what we may call China's second transition, as it was the year in which the government started the shareholding program, which was to gradually transform China's firm ownership structure. By 2001, the number of both SOEs and collective enterprises had almost halved, while that of private companies had considerably risen. The latter phenomenon was due both to the restructuring of ownership of SOEs and to the entry of new private firms in the market. This process has been continuing: according to our data, in 2005, SOEs represent less than 5 percent of the total number of firms covered, while private firms represent more than 73 percent.

SOEs are typically characterized by soft budget constraints, as these firms' main function is not to maximize profits, but rather to maintain social stability. Specifically, as documented in Bai et al. (2006), since there is no well-functioning independent social security system in China, the main task of SOEs is to maintain the employment of surplus workers and to guarantee their welfare. The government has therefore an incentive to keep these firms alive, independent on their profitability. To do so, it provides them with large amounts of debt. Financing constraints were therefore not an issue in China when SOEs dominated the economy.

Private firms, on the other hand, are typically discriminated against by Chinese financial institutions. Until 1998, state owned commercial banks were instructed to lend only to state owned enterprises. The system was liberalized at the end of 1990s, when the Chinese Constitution acknowledged the private sector to be an integral part of the economy, and theoretically it is not in place any more. However, in practice, banks still consider private enterprises to be riskier than their public peers either due to their short credit history or lower chance of being bailed out by the government. Although they are the engine of growth in the Chinese economy[1], private firms are discriminated against in terms of access to external funding, property rights protection, taxation, and market opportunities (Allen et al., 2005).

[1] Allen et al. (2005) document that the private sector in China dominates the state and listed sectors both in terms of output size and growth trend. Specifically, they show that between 1996 and 2002, the private sector grew at an annual rate of 14.3 percent, while the combined state and listed sector only grew at 5.4 percent.

With the gradual decline of SOEs, and rise of private firms, one would expect the overall incidence of financing constraints to rise. To what extent has this been happening over the second part of China's transition? This paper answers this question, using a panel of 407,096 firms over the period 2000-2005.

Our paper contributes to the literature in two main ways. First, it adopts a novel way to test for the presence of financing constraints: instead of estimating investment equations augmented with cash flow, and evaluating financing constraints on the basis of the sensitivity of investment to cash flow, as has been traditionally done in the literature, we estimate assets growth equations augmented with cash flow. This approach was pioneered in 2002 by Carpenter and Petersen who applied it to US firms, but to the best of our knowledge, has never been applied to the case of China[2]. It is an interesting approach for two reasons. First, contrary to the investment case, it allows for a quantitative prediction about the relationship between internal finance and growth. Second, it enables us to establish a link between the micro and the macro literatures. Specifically, a vast literature has looked at the effects of financial development on growth, using macro data (see Levine, 2005 for a survey), and generally found a positive relationship. Yet, China is a counterexample to these findings, as in spite of a malfunctioning financial system, it has one of the fastest growing economies (Allen at al., 2005). The present paper tries to rationalize this puzzle by investigating the role played by the availability of cash flow in determining growth at the firm-level.

Second, our paper makes use of a very large and relatively unexplored dataset, which contains 407,096 manufacturing and mining firms (differentiated into state owned, foreign owned, privately owned, and collectively owned) over the period 2000-2005. This dataset contains a wide range of firms, including very small and very young ones, which are particularly likely to suffer from financing constraints. Using such a comprehensive dataset allows us to perform sharper tests than those typically carried out in the literature to assess the extent to which the growth of Chinese firms is constrained by the use of internal finance.

We find that the growth of SOEs is not affected by the availability of cash flow, while that of foreign firms is moderately affected, and that of collective and private firms is most affected. This suggests that the growth of most Chinese firms is

[2] See Hutchinson and Xavier (2006) for an application to Belgium and Slovenia.

restricted by their capacity to generate profits, probably because these firms are unable to obtain as much external finance as they would like to. Our results are robust to accounting for investment opportunities in several ways, to considering assets growth net of cash, to defining our ownership categories in different ways, and to distinguishing private firms into various categories based on the degree of foreign and state participation in their capital. Considering that private firms make up on average about 62 percent of the observations in our sample, the Chinese miracle, which was driven by these firms, may have been made possible by their high profitability, and ability to generate vast amounts of internal funds, which allowed them to grow, in spite of their inability to obtain external finance. For these firms, growth was therefore fostered, not constrained by the availability of internal finance. Yet, if the competitive advantage of private firms in China were to be eroded, lowering their ability to generate internal funds, financing constraints could substantially increase. This may have significant policy implications: to make sure that the Chinese economy continues to thrive, measures will have to be taken ensuring a more widespread access to institutional finance.

2. Links between finance and growth in China

A macro perspective

A number of studies have used provincial level panel data, over different time periods ranging between 1985 and 2003, to analyze the relationship between finance and growth in China, obtaining contrasting results. Among these, Liu and Li (2001) focus on the links between growth and the sources of total investment in fixed assets and argue that the growth of national bank loans and self-raised funds are both positively related to the growth of provincial output. Aziz and Duenwald (2002) find no evidence that bank lending boosts growth in Chinese provinces. Boyreau-Debray (2003) shows that credit extended by the banking sector has a negative impact on growth, which she attributes to the burden of supporting the state owned corporate sector. Chen (2006) finds that Chinese growth has been fostered by the substitution of loans for state budget appropriation, but not by loan expansion itself, while Cheng and Degryse (2006) argue that banking development spurs growth in China. Finally, Guariglia and Poncet (2008) find that traditionally used indicators of financial development and China-specific indicators measuring the level of state interventionism in finance are generally negatively associated with growth, while

indicators measuring the degree of market driven financing in the economy are positively associated with growth. These effects have been gradually declining over time, and are weaker for high *FDI* recipients, suggesting that *FDI* may be used to alleviate the costs associated with the inefficient banking sector. These studies make use of different financial indicators, and different econometric techniques, and focus on different time periods, which might explain their contrasting results.

A micro perspective

Other studies adopted a micro perspective and used firm-level data to understand the links between finance and growth in China. A group of papers looked at the links between specific sources of external finance and firm growth; another at the links between financial variables and investment in fixed capital (which is a significant component of firm growth). Among the first group, Ayyagari et al. (2008) and Cull et al. (2007) have focused on firm-level data to try and explain the high growth rates experienced in China, in spite of a poorly developed financial system. The former rely on the World Bank Investment Climate Survey data that covers 2400 Chinese firms across 18 different cities. The survey was collected in 2003 and includes information on sources of financing in 2003 and firm level information for 2000, 2001 and 2002. The authors analyze firm financing patterns, and show that a relatively small percentage of firms in their sample use formal bank finance, while reliance on informal finance is much stronger. They then show that it is finance from the formal financial system that is associated with faster firm-level growth, while informal finance is not. They conclude that it is not the non-standard financing mechanisms that promote growth in China. Cull et al. (2007), on the other hand, use data drawn from the annual accounting reports filed by industrial firms with the National Bureau of Statistics to investigate whether trade credit could have been what financed China's spectacular growth, in spite of its malfunctioning financial system. They conclude that trade credit did not play a significant role in explaining China's growth.

Among the second group of papers, Chow and Fung (1998) study the relationship between investment and cash flow using a panel of manufacturing firms operating in Shanghai over the period 1989-1992. They find that firms' investment is constrained by cash flow, and that the sensitivity of investment to cash flow is highest for private firms and lowest for foreign owned firms. State owned and collective firms also exhibit positive sensitivities, higher for the former. Chow and Fung (2000)

exploit the same data set as Chow and Fung (1998) and, focusing once again on investment equations, show that small firms exhibit lower sensitivities of investment to cash flow than large firms. They explain this finding considering that small firms are dominated by non-state, fast growing enterprises, which may be using their working capital to smooth their fixed investment. Finally, using World Bank Investment Climate Survey data, and focusing once again on firms' investment behavior, Héricourt and Poncet (2007) show that state owned firms do not appear to be credit constrained, and are not affected by foreign presence. On the other hand, private firms appear to suffer more from financial constraints, which are however alleviated in the presence of abundant foreign investment.

Our study provides a synthesis between these two groups of papers. It connects with Ayyagari et al. (2008) and Cull et al. (2007), in the sense that it also uses firm-level data to analyze firm growth. Yet, instead of focusing on the actual links between growth and specific sources of external finance, it follows the approach of the investment literature by assessing the extent to which firm growth is constrained by the availability of internal finance (proxied by cash flow). As in the investment literature (see Hubbard, 1998; and Bond and Van Reenen, 2005, for surveys), a strong dependence of assets growth on cash flow can be seen as an indicator of financing constraints. If, following a decline in its internal funds, a firm is forced to reduce its growth (by reducing its investment in fixed capital and/or working capital), one can infer that the firm finds it difficult to access external finance.

Yet, these financial constraints would not bind for firms able to generate an amount of internal funds sufficient to finance their desired growth. This could have been the case for Chinese private firms and could explain why, in spite of a malfunctioning financial system, China has one of the fastest growing economies, and can be seen as a counterexample to the findings of the finance-growth literature (Allen et al., 2005). The Chinese miracle could in fact have been driven by highly profitable private firms, which were able to finance high growth levels only through their retained earnings. Thus, internal finance may have fostered rather than constrained their growth. In the remaining part of the paper, we will formally test whether this has been the case.

3. Data and summary statistics

Data

We use data drawn from the annual accounting reports filed by industrial firms with the National Bureau of Statistics of China (NBS). Our dataset covers 407,096 mainly unlisted firms over the period 2000-2005, which corresponds to 1,057,999 firm-year observations[3]. Our panel is unbalanced, with number of observations ranging from a minimum of 130,306 in 2000 to a maximum of 233,727 in 2004[4]. Firms in our sample operate in the manufacturing and mining sectors and come from 31 provinces or province-equivalent municipal cities[5]. We dropped observations with negative sales; as well as observations with negative total assets minus total fixed assets; total assets minus liquid assets; and accumulated depreciation minus current depreciation. Firms that did not have complete records on our main regression variables were also dropped. Finally, to control for the potential influence of outliers, we excluded observations in the one percent tails for each of the regression variables.

The NBS data contains a continuous measure of ownership composition, which is based on the fraction of paid-in-capital contributed by six different types of investors, namely the state; foreign investors (excluding those from Hong Kong, Macao, and Taiwan); investors from Hong Kong, Macao, and Taiwan; corporations and legal entities; individuals; and collective investors. The rationale for dividing foreign investors into those from Hong Kong, Macao, and Taiwan, and those from other parts of the world is that the former capture the so-called "round-tripping" foreign direct investment, whereby domestic firms may register as foreign invested firms from nearby regions to take advantage of the benefits (such as tax and legal benefits) granted to foreign invested firms (Huang, 2003). Ownership by legal persons represents a form of corporate ownership. Finally, collective firms are typically owned collectively by communities in urban or rural areas (the latter are known as Township and Village Enterprises or TVEs).

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[3] The Chinese National Bureau of Statistics dataset does not allow separate identification of publicly listed companies in China. Specifically, it is difficult to track these companies as their legal identification numbers were changed as they went public (Liu and Siu, 2006). Over the period considered, there were less than 1000 listed companies operating in the manufacturing and mining sectors. This amounts to less than 0.3 percent of the total number of firms in our sample.

[4] See the Appendix for details about the structure of our panel, and complete definitions of all variables used.

[5] China is administratively decomposed into 31 provincial units, which fall into three categories: 22 provinces or *sheng*; 4 autonomous regions or *zizhiqu* (Nei Monggol, Xinjiang, Tibet, Ningxia and Guangxi); and 4 municipal cities or *zhixiashi*, under direct supervision of the central power (Shanghai, Tianjin, Beijing, and, since 1997, Chongqing).

As our measure of ownership composition suffers from miscoding problems, we have grouped all foreign owned firms (from Hong-Kong, Macao, Taiwan, and other parts of the world) into a single category (which we label *foreign*); and all firms owned by corporations, legal entities, and individuals into a single category (labelled *private*). We have then classified our firms into state owned, foreign, private, and collective, based on the average shares of paid-in-capital owned by our four types of investors over the period 2000-2005. Specifically, we have classified firms according to their largest average ownership share. For instance, if the average share of a firm's capital owned by foreign investors is 40 percent, while the state and private investors each own (on average) 30 percent of the firm's capital, then the firm is classified as foreign[6].

Table 1 presents the distribution of our observations by ownership type and year. We can see that the composition of our sample underwent considerable changes over the period 2000-2005. In particular, the share of the sample comprised by SOEs has declined from 21.37 percent in 2000 to just 4.34 percent in 2005, while the share comprised by private investors has increased from 41.48 to 73.53 over the same period, as a consequence of an ongoing process of privatization. The share of collectively owned firms also suffered a significant decline from 24.10 percent to 6.33 percent. Collective enterprises have been extremely successful in the 1980s, and were typically granted tax advantages and easy bank loans. Yet, in the 1990s, as a consequence of the increased competition by private firms and of the banking reforms, whereby banks started to scrutinize loan applications more carefully, these enterprises experienced declining profitability, and a slowdown in their growth. Reforming their ownership structure became a priority to reverse these trends (Ho et al., 2003). Finally, the share comprised by foreign investors rose only moderately (from 12 to 15 percent) over the period.

Summary statistics

In our empirical analysis, we will focus on firm growth, where growth is intended as the growth of total assets. Total assets include tangible fixed assets; intangible fixed assets; other fixed assets; accounts receivable; inventories; and other current assets.

[6] We derived ownership categories on the basis of the fraction of capital paid in by the various groups, rather than using registration codes. These codes are in fact not entirely reliable, as they are updated only with considerable delay. Moreover, firms might have an incentive to falsely register as foreign firms simply to take advantage of the tax benefits accorded to the latter.

Table 2 shows that in the full sample, tangible assets represent 36.34 percent of the total; accounts receivable, 17.87 percent; inventories, 19.04 percent; and other current assets, 20.26 percent. Table 2 also shows the composition of total assets by ownership types. We can see that the share of the total assets of SOEs made up by tangibles is much higher than average (42.44 percent versus 36.34 percent for the full sample). SOEs are also characterized by lower shares of accounts receivable and inventories (12.60 and 17.17 percent). This suggests that, compared to other ownership types, SOEs are fairly different in terms of assets composition.

Table 3 presents sample means for a number of variables for the full sample and for our four ownership types. Once again, we see that SOEs are notably different from the other groups. Specifically, they exhibit very low growth rates: their mean assets growth is equal to 0.60 percent compared to a value of 7.99 percent for the full sample. Their average sales growth is 0.84 percent compared to 10.08 percent for the full sample, and their average employment growth rate is negative (-8.09 percent compared to 1.22 percent for the full sample). SOEs are typically larger (in terms of assets and number of employees) and older than average: they employ an average of 347.42 employees compared to 215.20 for the full sample; their total assets are worth 390.50 (thousands of yuan) compared to 221.73 for the full sample; and their average age is 24.71, compared to 9.53 for the full sample. SOEs also display very low levels of cash flow, and high levels of leverage: their cash flow to assets ratio is in fact 2.44, compared to 8.05 percent for the full sample; their cash flow to tangible fixed assets ratio is 11.6 percent compared to 40.36 percent for the full sample; and their total leverage to total assets ratio is 68.92, compared to 57.80 for the full sample[7]. It is also interesting to note that SOEs make a considerably lower use of accounts payable compared to the average firm in the total sample: their average ratio of accounts payable to total liabilities is equal to 20.20, compared to an average value for the full sample of 30.46[8].

As for foreign firms, they are much larger than average, employing 278.48 people. They are also very young: their average age is 6.35 years. Compared to the other three ownership categories, they display the highest levels of labor productivity (measured as the ratio of sales to total number of employees), and the lowest ratio of

[7] Leverage is defined as current plus non-current liabilities over total assets. This measure includes formal borrowing from banks as well as accounts payable, which represent short term financing provided by suppliers..

[8] Note that data for accounts payable are only available for 2004 and 2005.

leverage to total assets. They make a relatively high use of accounts payable: their average ratio of accounts payable to total liabilities is in fact 44.19 percent, compared to 20.20 percent for SOEs, 28.37 percent for private firms, and 28.35 percent for collective firms.

Despite being typically the smallest of the four groups in terms of number of employees, private firms exhibit the highest average assets growth and sales growth rates, respectively 10.74 percent and 13.06 percent. They also exhibit the second highest cash flow to assets ratio (8.73 percent).

It is interesting to note from Table 3 that, in the full sample, the percentage of firm-years that export is 27.06. The corresponding percentage is highest for foreign firms: 67.33 percent, and lowest for SOEs (12.14 percent) and collective firms (14.86 percent). Furthermore, the foreign, private, and collective firms all exhibit a cash flow to tangible fixed assets ratio in excess of 40 percent. This figure is very high compared to corresponding figures registered for the US or Europe. For instance, Bond et al. (2003) report cash flow to capital ratios of 13.4 percent for the UK; 17.8, percent for Belgium; 11.9 percent, for France; and 16 percent, for Germany. Similarly, Cummins et al. (2006) report a ratio of 19 percent for US firms. The high cash flow to capital ratios displayed by Chinese firms suggest that these firms have the ability to generate high profits. Also considering the high growth characterizing foreign and private firms, one could question whether these two factors are linked, i.e. whether it is actually the ability to generate high profits that makes it possible for Chinese firms to grow at such high rates.

In the Sections that follow, we will estimate firm-level growth equations for our four categories of firms, in order to assess the extent to which the growth of firms in each of the categories is affected by the availability of internal finance, and to understand what the determinants of this firm-level growth may be.

3. Empirical specifications and estimation methodology

Baseline model

We initially estimate a simple dynamic assets growth model augmented with cash flow, of the following type[9]:

$$GROWTH_{it} = a_0 GROWTH_{i(t-1)} + a_1 (CF/TA)_{it} + u_i + v_t + e_{it}, \quad (1)$$

where $GROWTH_{it}$ denotes the assets growth of firm i at time t, and $(CF/TA)_{it}$, the ratio of cash flow to total assets of firm i at time t[10]. The error term in Equation (1) is made up of three components: v_i, which is a firm-specific component; v_t, a time-specific component accounting for possible business cycle effects; and e_{it}, an idiosyncratic component. We control for v_i by estimating our equation in first-differences and for v_t by including time dummies in all our specifications. We estimate Equation (1) for the full sample, as well as separately for the four ownership groups.

As discussed in Carpenter and Petersen (2002), in the presence of capital market imperfections, one should expect the coefficient a_1 to be slightly greater than one for those firms more likely to face financial constraints. This is because in these circumstances, external finance is typically more expensive than internal finance. Thus, should cash flow increase, financially constrained firms would be able to increase their assets one-for-one. However, as a higher cash flow also indicates a more healthy balance sheet, firms that benefit from a higher cash flow are also likely to find it easier to obtain loans. Thus, in the presence of an increase in cash flow, firms more likely to face financing constraints will be able to increase their total assets more than one-for-one. On the other hand, financially healthy firms can always access external finance: their assets are therefore unlikely to display a one-for-one relationship between changes in their cash flow and their assets growth.

[9] This specification differs from that estimated by Carpenter and Petersen (2002) in two main respects. First, we estimate a dynamic model, while they estimate a static one. We chose a dynamic model, as the static model was clearly rejected by our specification tests. Second, as Carpenter and Petersen's (2002) sample is made up of listed US firm, they include Tobin's *Q* as an additional regressor. As most of the firms in our sample are not listed, we were unable to construct Tobin's *Q*, and therefore exclude it from our regression. Later, we will show that our results are robust to controlling for investment opportunities in various ways.

[10] All results were robust to including cash flow divided by beginning-of-period total assets instead of cash flow over contemporaneous total assets.

Figure 1 illustrates this argument[11]. The horizontal axis measures cash flow (*CF*) and the change in assets (*ΔTA*), and the vertical axis measures the cost of finance and the return on expansion. *S* denotes the supply of finance. The horizontal portion of this schedule reflects a situation in which internal finance (*CF*) is used and priced at a constant shadow cost *R*. Once internal finance is exhausted, the firm must obtain loans, the cost of which increases the higher the loan asked for: this is reflected by the upward sloping portion of the *S* curve[12]. Once the firm has borrowed from banks up to a certain threshold, it will make use of borrowing from alternative sources, such as accounts payable, which are typically more expensive than bank loans. The cost of accounts payable is assumed to be constant[13]. The threshold on bank borrowing can be determined either by credit rationing or by the cost of bank borrowing becoming prohibitive. Firms with unlimited access to bank credit should, in theory, never make use of the more expensive accounts payable. The *IO* schedule represents the firm's investment opportunities. If cash flow rises from *CF* to *CF'*, then the horizontal portion of the *S* curve becomes longer, and, if the *IO* curve intersects the *S* curve in its upward sloping portion, *ΔA* rises to *ΔA'*. Moreover, due to the increase in net worth that the firm benefits, the upward portion of the *S* curve becomes slightly flatter. This implies that a given increase in cash flow may be associated with a more than one-for-one increase in total assets.

It should be noted that Figure 1 is unlikely to apply to SOEs. As widely documented in the literature, these firms are in fact able to receive as many loans from the state owned banks as they need, independent on profitability (Boyreau-Debray, 2003). Being typically large, the state aims in fact at keeping them alive, to avoid the social unrest that would follow their closure. The supply of funds schedule is therefore likely to be horizontal for SOEs, and we do not expect their asset growth to be significantly affected by their cash flow. On the other hand, we would expect a rise in cash flow to generate more than a one-for-one rise in total assets for the other firms.

[11] This Figure is adapted from Carpenter and Petersen (2002).

[12] The more leveraged a firm is, the more incentives it will have to undertake more risky investment projects: this moral hazard situation explains why the supply of funds schedule is increasing once the firm has exhausted its internal funs (Hubbard, 1998).

[13] Contrary to Carpenter and Petersen (2002), our Figure 1 does not interpret the upper horizontal portion of the *S* curve as equity issuance. This is because our sample consists mainly of unlisted firms, and to the fact that equity markets are still poorly developed in China.

Equation (1) does not take into account investment opportunities. These are reflected in shifts in the *IO* curve in Figure 1. Typically, investment opportunities are accounted for through Tobin's *Q*, which is defined as the market value of the firm over the replacement value of its total assets. Yet, because our sample is essentially made up of unlisted firms, we are unable to calculate *Q*. We therefore account for investment opportunities in two alternative ways. First, we proxy if with the growth of the firm's sales. This variable has been frequently used in the literature to proxy for demand factors (see for instance Konings et al., 2003). Second, we include in our model time dummies interacted with industry dummies (in addition to the aggregate time dummies). This approach can be seen as an indirect way to account for investment opportunities, or more in general demand factors, as the dummies account for industry-specific demand shocks. If a correlation of cash flow with investment opportunities were an important source of bias, then the financial coefficients should decline substantially when we include sales growth or industry-level time dummies in our specification.

Extended model

We next estimate a more general model of firm growth, aimed at highlighting what might be other determinants of growth (see Becchetti and Trovato, 2002; Haeshmati, 2001; Honjo and Harada, 2006, etc. for a similar approach). In particular, we estimate the following Equation for the full sample, as well as separately for the four ownership groups:

$$GROWTH_{it} = a_0 GROWTH_{i(t-1)} + a_1(CF/TA)_{it} + a_2(LEVERAGE/TA)_{it} + \\ + a_3 COLLATERAL_{it} + a_4(NB.\ OF\ EMPLOYEES)_{it} + \\ + a_5(TOTAL\ SALES/NB.\ OF\ EMPLOYEES)_{it} + \\ + a_6 EXPORT_{it} + u_i + v_t + e_{it} \qquad (2)$$

Our choice of regressors in Equation (2) is aimed at mirroring the regressors usually included in cross-country growth models. In particular, in addition to the cash flow to assets ratio, we include two additional financial variables, namely the total current and non-current liabilities to assets ratio *(LEVERAGE/TA)* and the collateral to assets ratio (*COLLATERAL)*. We expect the latter to exert a positive effect on growth, as firms able to post higher collateral find it easier to obtain loans necessary to fund their

investment opportunities. The effect of leverage is ambiguous: more leveraged firms could, on the one hand, grow faster having more resources. On the other hand, a higher leverage would make it more difficult for these firms to obtain further loans, making it harder to grow (Lang et al., 1996). This regressor is particularly interesting for linking our results with those obtained by macro studies on China's growth. For instance, using provincial data over the period 1989-2003, Guariglia and Poncet (2008) show that traditionally used indicators of financial development, as well as China specific measures of the distortions characterizing the financial system (such as the proportion of total loans provided by sate-owned commercial banks) are negatively related with growth. However, they find that this relationship has become less negative, and in some cases has even become positive, after 2000, i.e. after major reforms of the banking system were undertaken in China (Podpiera, 2006; Allen et al., 2006). By including, leverage in our growth equations, we aim at testing at the micro level the extent to which firms owned by different agents employ leverage as a means of expanding their size. If loans were systematically allocated inefficiently towards the worst performing firms, we could observe a negative relationship between leverage and growth.

We next include three non-financial variables: the number of employees (*NB. OF EMPLOYEES*), which is a measure of size, aimed at testing whether small firms tend to grow faster; a measure of labor productivity (*TOTAL SALES/NB. OF EMPLOYEES*); and a dummy equal to 1 if firm *i* exports at time *t*, and 0 otherwise (*EXPORT)*. We expect the latter two variables to positively affect growth[14]. Furthermore, even in this extended model, we expect the coefficient associated with the cash flow to assets ratio, a_1, to be precisely determined and larger than one for firms more likely to face financing constraints.

Estimation methodology

All equations will be estimated in first-differences, to control for firm-specific, time-invariant effects. Given the possible endogeneity of the regressors, we will use a first-

[14] Authors like Evans (1987, a, b), who also focus on firm growth, show that growth also depends on firm's age. As age is missing for a number of observations in our sample, we did not include it in our preferred regression. The regression results including age, based on a smaller sample, showed that this variable was generally not precisely determined. The signs and significance of the other regressors were unchanged. These regressions are not reported for brevity, available from the authors upon request.

difference Generalized Method of Moments (GMM) approach[15]. Two or more lags of each of the regressors will be used as instruments.

To check whether the first-difference GMM estimator is likely to suffer from finite sample bias, we compared the GMM and the Within Groups estimates of the coefficient on the lagged dependent variable in Equation (1). Because the Within Groups estimate is typically downward biased in short panels (Nickell, 1981), one would expect a consistent estimate of the coefficient on the lagged dependent variable to lie above this estimate. As our GMM coefficient was larger than its Within Groups counterpart, we concluded that the first-difference GMM estimates are unlikely to be subject to serious finite sample bias[16].

In order to evaluate whether our model is correctly specified, we use two criteria: the Sargan test (also known as *J* test) and the test for second-order serial correlation of the residuals in the differenced equation (*m2*). If the model is correctly specified, the variables in the instrument set should be uncorrelated with the error term in the relevant equation. The *J* test is the Sargan test for overidentifying restrictions, which, under the null of instrument validity, is asymptotically distributed as a chi-square with degrees of freedom equal to the number of instruments less the number of parameters. The *m2* test is asymptotically distributed as a standard normal under the null of no second-order serial correlation of the differenced residuals, and provides a further check on the specification of the model and on the legitimacy of variables dated *t*-2 as instruments in the differenced equation[17].

4. Regression results

Baseline model

Table 4 presents estimates of Equation (1). Column 1 refers to the full sample, and columns 2 to 5, respectively to SOEs, foreign owned firms, private firms, and collective firms. Although small in magnitude, the coefficient associated with the lagged dependent variable is negative and precisely determined for all groups of

[15] See Arellano and Bond (1991) on the application of the GMM approach to panel data.

[16] If the estimates obtained using the first-difference GMM estimator lie close or below the Within Groups estimates, one could suspect the GMM estimate to be downward biased as well, possibly due to weak instruments**.** In such case, the use of a GMM system estimator (which combines in a system the original specification expressed in first differences and in levels) would be required (Blundell and Bond, 1998).

[17] If the undifferenced error terms are *i.i.d.*, then the differenced residuals should display first-order, but not second-order serial correlation. Note that neither the *J* test nor the *m2* test allow to discriminate between bad instruments and model specification.

firms. This can be interpreted as evidence of convergence. Except for the SOEs, the coefficient associated with cash flow is positive, precisely determined, and slightly higher than one, for all groups of firms. This indicates that the growth of these firms is restricted by their profit generating capacity. Moreover, the more than one-for-one rise in assets growth is probably due to the fact that a higher cash flow leads to an improved net worth, and hence makes it easier for the firms to obtain additional loans. The coefficient associated with cash flow is largest for privately owned and collective firms, which also exhibit the largest cash flow to total assets ratios (respectively, 8.73 and 9.38 percent), and are less likely than state owned or foreign firms to access external finance. The coefficient is much smaller (although still larger than one) for foreign owned firms, which may suffer from a lower degree of financing constraints, being also able to obtain financing from their parent company. As for SOEs, the fact that cash flow does not affect their growth, reflects on the one hand, the very low level of cash flow to total assets (2.44 per cent), and on the other, the fact that these firms may still likely to benefit from soft budget constraints. State owned banks typically lend to these firms, independently of their profitability, preventing them to go bankrupt, as this would generate a significant social unrest (Bai et al., 2006; Boyreau-Debray, 2003). In terms of Figure 1, this suggests that SOEs indeed face a horizontal *S* curve. Our results compare favourably to Héricourt and Poncet (2007) and Chow and Fung (1998), who, focusing on investment, also find that SOEs are the least constrained by cash flow, while private firms are the most constrained.

Table 5 presents estimates of variants of Equation (1), which also control for investment opportunities. Columns 1, 3, 5, 7, and 9 contain the estimates of the Equation where demand factors are accounted for with sales growth, while columns 2, 4, 6, 8, and 10 contain the estimates of the Equation which includes time dummies interacted with industry dummies. From the even columns, we can see that sales growth always attracts a negative and precisely determined coefficient, which is largest in absolute value for the foreign firms. This suggests that sales growth does not necessarily capture greater investment opportunities[18]. As for the coefficient on cash flow, we can see that it remains poorly determined for SOEs, while for private and collective firms, it remains statistically significant and slightly larger than 1, both in the even and in the odd columns. Yet, the coefficient for foreign firms becomes

[18] Sales growth is measured as the growth rate of real sales. Our results were robust to using the change in real sales as a fraction of total assets, as in Konings et al. (2003).

slightly lower than 1 (0.62) when investment opportunities are accounted for with sales growth, while it remains slightly larger than 1 when we include time dummies interacted with industry dummies. These results confirm our initial finding that the growth of SOEs is unaffected by the availability of internal finance, while the growth of private and collective firms is most affected.

Firms' total assets include the stock of cash and equivalents. It is possible that firms might absorb some of the short-run fluctuations in cash flow with cash and equivalents, leading to a positive relationship between changes in assets and cash flow, even in the absence of financing constraints (Carpenter and Petersen, 2002). To rule out this effect, we remove the "other current assets category" from our definition of growth and re-estimate our Equation (1) using this alternative definition of assets growth[19]. We account for investment opportunities by including time dummies interacted with industry dummies. The results are presented in Table 6. The coefficient on cash flow declines substantially for all firms, except the collective ones. This is not surprising as the dependent variable no longer captures all potential uses of finance. The fact that the coefficient is still precisely determined for foreign, private, and collective firms suggests that these firms do face a certain degree of financial constraints.

Table 7 presents results where firm ownership categories are defined on the basis of a 100 percent of paid-in-capital rule. According to this rule, a firm is defined as privately owned if private agents own 100 percent of its capital in each of the six years making up our sample. Foreign owned, state owned, and collectively owned categories are defined in a similar way. The results are once again similar to those reported in Table 4: growth at SOEs is not affected by internal finance, growth at foreign owned firms is moderately affected, and growth at private and collective firms is most affected[20].

[19] Our data do not allow us to separately identify cash and equivalents. These are included in the "other current assets category", which also includes prepaid expenses and advances, other current assets, deferred charges, and short term investments.

[20] Similar results, not reported for brevity, but available from the authors upon request, were obtained using the 50 percent of paid-in-capital rule, whereby a firm is defined as foreign owned, privately owned, state owned, or collectively owned, if at least 50 percent of its average paid-in-capital over the 6 years is owned by foreign agents, private agents, the state, or collectively.

Extended model

Table 8 presents the estimates of our extended model (Equation 2). Column 1 refers to the full sample, and columns 2 to 5, respectively to SOEs, foreign owned firms, private firms, and collective firms. Once again, investment opportunities are accounted for by including industry-specific time dummies. As in the simple model, the coefficient on the lagged dependent variable is negative and precisely determined for all types of firms. A similar pattern as in Table 4 is observed for the cash flow coefficients, which are statistically significant and slightly larger than 1 for private, foreign, and collective firms, and insignificant for SOEs. The coefficient is largest for the private firms. Our main result that the growth of all firms, except the SOEs, is affected by internal finance is therefore robust to estimating an extended growth model.

As for the other financial variables, it is interesting to note that leverage plays a positive and significant effect on the growth of all types of firms. This effect is slightly smaller for the foreign compared to the private ones, the collectives, and the SOEs. Collateral displays a positive and precisely determined effect both for private and collective firms, but not for SOEs and foreign firms, which are typically favored by the banking system. These findings suggest that SOEs finance their growth mainly through leverage. Since collateral does not affect the growth of these firms, these findings confirm our priors that SOEs benefit from soft budget constraints, whereby they can obtain loans independently on their performance and financial conditions. Foreign owned firms on the other hand, do not seem to rely on domestic loans to finance their growth. Private firms, which display the highest assets growth rate in the sample, make use of both their internal funds and leverage to finance their growth. A similar pattern holds for collective firms. Although the banking system was characterized by a high degree of inefficiency in the first part of China's transition, given that it channelled funds to inefficient SOEs, our findings suggest that this problem has become less severe in the second part of the transition process, mainly because SOEs have become fewer, and because the banking system is being gradually reformed. This finding is in line with Guariglia and Poncet (2008). It is likely that once China will have established a proper social security system, the "multitask" role of SOEs will come to an end. These firms will therefore either further decrease in number, or start operating on the basis of profit maximization, as the government, having no more incentives to keep them alive, will stop providing them with endless

loans. The banking system will therefore be free to allocate financial resources to the most profitable firms, fostering growth even further.

Except for private firms, our measure of productivity generally does not affect growth appreciatively. The same holds for the firm's size measured in terms of the number of its employees: this variable only displays a positive and significant coefficient for private firms, indicating that in this group, larger firms are likely to exhibit faster assets growth. Being an exporter plays a negative and significant effect on the growth of private firms, but displays a poorly determined coefficient for other groups.

To what extent does foreign and state participation affect the relationship between private firms' growth and cash flow?

Considering that private firms are the engine of growth in the Chinese economy, and that these firms are not always 100 percent privately owned, we now investigate the extent to which foreign and state participation affects the sensitivity of their growth to internal finance. We differentiate our private firms into those with average share of capital paid-in by foreign agents or by the state of at least 10 percent, and those with shares lower than 10 percent. 7.75 percent of our private firms have a share of foreign capital greater than 10 percent, and 4.63 percent, a share of state capital greater than 10 percent.

Table 9 presents descriptive statistics for these sub-samples of private firms. We can see that firms without significant foreign participation exhibit slightly higher growth rates than firms with foreign participation (columns 1 and 2). Moreover, firms with significant foreign participation are typically, larger, more productive, and more export-oriented than those without foreign participation. Comparing firms with and without significant state participation (columns 3 and 4), we can see that the former exhibit slower growth rates, lower cash flow to assets (and tangible fixed asserts) ratio, and lower productivity. Yet, they are typically larger and more leveraged.

Table 10 presents estimates of our simple and extended assets growth models for private firms with high and low foreign participation, and high and low state participation. Time dummies interacted with industry dummies were included in all specifications to account for investment opportunities. In the simple model, the coefficient associated with the cash flow to assets ratio is equal to 1.29 for firms with significant foreign participation, and to 1.51 for those without. Yet, for the extended

model, the corresponding coefficients are 1.70 and 1.25. There is therefore no systematic evidence that foreign participation reduces the sensitivity of private firms' growth to cash flow. State participation, on the other hand, reduces the sensitivity of growth to cash flow, both in the simple and extended models[21]. Yet, the coefficient remains positive, statistically significant, and larger than one even for those private firms with a share of capital paid-in by the state greater than 10 percent.

These results suggest that, even if part of their capital is paid in by the state or foreign agents, the growth of Chinese private firms remains restricted by their profit generating capacity. Focusing on the extended model, it is also interesting to note that leverage does not significantly affect the growth rates of firms with significant state and/or foreign participation, while it affects those without. This could be explained considering that those private firms without state or foreign participation display higher growth rates than their counterparts with state or foreign participation (see Table 9). For these firms, internal funds may therefore be insufficient to finance growth.

6. Conclusions

We have used data for 407,096 firms over the period 2000-2005 to investigate the extent to which the growth of Chinese firms is constrained by internal finance. We have found that the growth of SOEs is not affected by the availability of cash flow, while that of foreign firms is moderately affected, and that of collective and private firms is most affected. Considering that private firms represent on average 62 percent of all firms in our sample, that they exhibit the highest growth rate among all ownership categories examined, as well as the second highest cash flow to assets ratio, we can conclude that for these firms, internal funds have fostered rather than constrained growth.

Our paper complements therefore Ayyagari et al. (2008) and Cull et al. (2007), who found that neither informal financing, nor trade credit played an important role in explaining the Chinese growth miracle, by suggesting that firms' ability to generate cash flow may have been an important factor instead. Chinese private firms' ability to

[21] We performed a formal test for whether the difference in the coefficients associated with cash flow is statistically significant for firms with high and low foreign participation. The *t*-statistic for the test was 0.24 for the simple model, and 0.16 for the extended model, suggesting that the difference is not statistically significant. The corresponding *t*-statistics for firms with high and low state participation were -2.38 and -1.96, suggesting that state participation does imply a statistically different effect of changes in internal finance on firm growth.

generate internal finance may represent the solution to the puzzle of why, despite a malfunctioning financial system, the Chinese economy has grown at stellar rates in recent years.

Yet, if the competitive advantage of Chinese private firms were to be eroded, limiting their ability to generate high profits, financial constraints would quickly become increasingly pervasive. This may have significant policy implications: to make sure that the Chinese economy continues to thrive, measures will have to be taken ensuring a more widespread access to institutional finance.

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Appendix: Data

Structure of the unbalanced panel

Number of obs. per firm	*Number of observations*	*Percent*	*Cumulative*
1	129,608	12.25	12.25
2	234,072	22.12	34.37
3	160,593	15.18	49.55
4	155,784	14.72	64.28
5	149,540	14.13	78.41
6	228,402	21.59	100.00
Total	1,057,999	100.00	

Year	*Number of observations*	*Percent*	*Cumulative*
2000	130,306	12.32	12.32
2001	139,596	13.19	25.51
2002	151,013	14.27	39.78
2003	166,402	15.73	55.51
2004	236,955	22.40	77.91
2005	233,727	22.09	100.00
Total	1,057,999	100.00	

Definitions of the variables used

Total assets: sum of the firm's fixed and current assets, where fixed assets include tangible fixed assets, intangible fixed assets, and other fixed assets; and current assets include inventories, accounts receivable, and other current assets.

Other current assets: sum of cash and equivalents, prepaid expenses and advances, other current assets, deferred charges, and short term investments.

Cash flow: net income plus depreciation.

Leverage: ratio of current liabilities plus non-current liabilities to total assets, where current liabilities include loans, accounts payable, and other current liabilities; and non-current liabilities include long-term debt and other non-current liabilities.

Collateral: ratio of tangible assets to total assets.

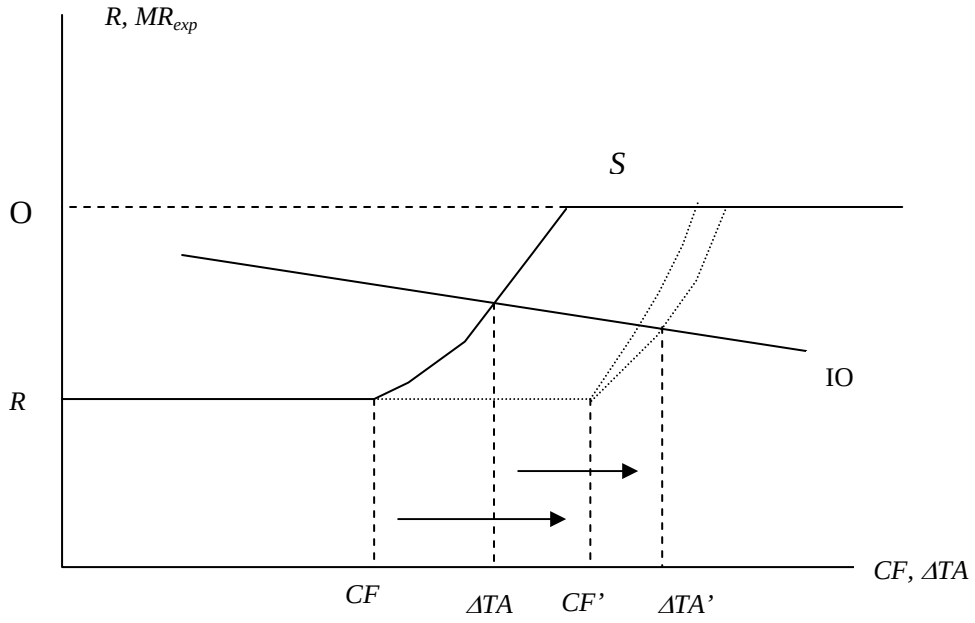
Sales: firm's total sales (including domestic and overseas sales).

Employees: total number of people employed by the firm.

Export: dummy variable equal to 1 if the firm exports a positive amount.

Deflators: all variables are deflated using provincial GDP deflators, taken from various issues of the China Statistical Yearbook.

Figure 1: Financing hierarchy and investment opportunities



Note: *CF*= cash flow; *ΔTA* = change in total assets; *R*= constant shadow cost of internal finance; *IO* = investment opportunities schedule; *O* = cost of borrowing from other sources.
Source: Adapted from Carpenter and Petersen (2002).

Table 1: Distribution of observations by ownership type

	State-owned	*Foreign*	*Private*	*Collective*
	(1)	(2)	(3)	(4)
All	10.27	14.24	61.68	12.62
2000	21.37	12.22	41.48	24.10
2001	16.15	13.40	49.50	19.24
2002	13.00	13.35	56.47	15.55
2003	9.03	14.32	63.73	11.31
2004	5.67	15.23	70.12	7.66
2005	4.34	15.38	73.53	6.33

Note: All numbers in this Table are percentages.

Table 2: Asset composition by ownership type

	Full sample	*State-owned*	*Foreign*	*Private*	*Collective*
	(1)	(2)	(3)	(4)	(5)
Tangibles	36.34	42.44	33.43	35.67	34.42
Intangibles	1.86	2.09	2.11	2.08	1.13
Other fixed assets	4.63	5.93	3.90	4.35	4.51
Accounts receivable	17.87	12.60	19.19	19.20	19.44
Inventories	19.04	17.14	20.71	18.86	19.35
Other current assets	20.26	19.81	20.66	19.83	21.15

Note: All numbers in this Table are percentages.

Table 3: Sample means

	Full sample	*State-owned*	*Foreign*	*Private*	*Collective*
	(1)	(2)	(3)	(4)	(5)
Assets growth	7.99	0.60	7.02	10.74	4.16
Sales growth	10.08	0.84	10.98	13.06	4.55
Employment growth	1.22	-8.09	5.65	2.84	-2.45
Assets	221.73	390.50	351.41	176.99	158.72
Sales	222.07	213.24	365.04	197.11	187.49
Nb. of employees	215.20	347.42	278.48	180.83	209.15
Age	9.53	24.71	6.35	7.05	14.35
Cash flow/total assets	8.05	2.44	7.98	8.73	9.38
Cash flow/tangible fixed assets	40.36	11.63	47.12	41.83	47.44
Total leverage / total assets	57.80	68.92	48.68	57.70	60.11
Accounts payable / total liabilities	30.46	20.20	44.19	28.37	28.36
Tangible fixed assets/total assets	35.85	42.44	33.43	35.67	34.42
Sales/nb. of employees	132.26	66.85	165.76	137.19	119.69
Exports	27.06	12.14	67.33	22.40	14.86
Nb. of observations	1057999	104520	154395	650475	121705

Notes: Assets and sales are expressed in thousands of yuan. Growth rates are expressed in percentage terms. *Export* is a dummy variable equal to 1 if the firm exports, and 0 otherwise. All variables were deflated using provincial GDP deflators. See the Appendix for complete definitions of all variables.

Table 4: Simple assets growth model

	Full sample	*State-owned*	*Foreign*	*Private*	*Collective*
	(1)	(2)	(3)	(4)	(5)
Assets growth $_{i(t-1)}$	-0.075***	-0.052***	-0.090***	-0.066***	-0.112***
	(0.004)	(0.010)	(0.009)	(0.005)	(0.01)
(Cash flow / total assets) $_{it}$	1.391***	0.375	1.114***	1.557***	1.567***
	(0.11)	(0.29)	(0.13)	(0.18)	(0.44)
J (p-value)	0.00	0.065	0.05	0.00	0.03
m2	1.46	0.07	0.54	0.63	1.11
Number of observations	316652	47067	55400	159967	47759

Notes: All specifications were estimated using a GMM first-difference specification. The figures reported in parentheses are asymptotic standard errors. Time dummies were included in all specifications. Standard errors and test statistics are asymptotically robust to heteroskedasticity. Instruments in all columns are *(Assets growth)*$_{i(t-2)}$, *(Cash flow / total assets)*$_{i(t-2)}$, and further lags. Time dummies were always included in the instrument set. *m2* is a test for second-order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The *J* statistic is a test of the overidentifying restrictions, distributed as chi-square under the null of instrument validity. Also see Notes to Table 1. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level.

Table 5: Simple assets growth model controlling for investment opportunities

	Full sample	*Full sample*	*State-owned*	*State-owned*	*Foreign*	*Foreign*	*Private*	*Private*	*Collective*	*Collective*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Assets growth $_{i(t-1)}$	-0.056***	-0.075***	-0.041***	-0.053***	-0.060***	-0.090***	-0.047***	-0.066***	-0.109***	-0.112***
	(0.005)	(0.004)	(0.013)	(0.010)	(0.02)	(0.009)	(0.007)	(0.005)	(0.01)	(0.01)
(Cash flow / total assets) $_{it}$	0.967***	1.381***	0.020	0.331	0.623***	1.115***	1.230***	1.575***	1.327***	1.590***
	(0.05)	(0.11)	(0.33)	(0.29)	(0.22)	(0.18)	(0.18)	(0.18)	(0.44)	(0.40)
Sales growth$_{it}$	-0.325***		-0.172*		-0.398***		-0.308***		-0.342***	
	(0.04)		(0.10)		(0.15)		(0.06)		(0.07)	
Time dummies interacted with ind. dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
J (p-value)	0.00	0.00	0.11	0.05	0.06	0.06	0.00	0.00	0.28	0.03
m2	1.55	1.48	0.85	-0.06	0.28	-0.57	1.29	1.24	0.81	1.18
Number of observations	316652	316652	47067	47067	55400	55400	159967	159967	47759	47759

Notes: All specifications were estimated using a GMM first-difference specification. The figures reported in parentheses are asymptotic standard errors. Time dummies were included in all specifications. In columns 2, 4, 6, 8, and 10, time dummies interacted with industry dummies were also included. Standard errors and test statistics are asymptotically robust to heteroskedasticity. Instruments in all columns are *(Assets growth)*$_{i(t-2)}$, *(Cash flow / total assets)*$_{i(t-2)}$, and further lags. In columns 1, 3, 5, 7, and 9, (*Sales growth*)$_{i(t-2)}$ and further lags are also included in the instrument set. Time dummies were always included in the instrument set. In columns 2, 4, 6, 8, and 10, time dummies interacted with industry dummies were also included. *m2* is a test for second-order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The *J* statistic is a test of the overidentifying restrictions, distributed as chi-square under the null of instrument validity. Also see Notes to Table 1. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level.

Table 6: Simple assets growth model augmented with industry-specific time dummies: firm growth measured net of other current assets

	Full sample	*State-owned*	*Foreign*	*Private*	*Collective*
	(1)	(2)	(3)	(4)	(5)
Assets growth $_{i(t-1)}$	-0.105***	-0.101***	-0.113***	-0.099***	-0.132***
	(0.004)	(0.01)	(0.009)	(0.005)	(0.01)
(Cash flow / total assets) $_{it}$	0.939***	0.725*	0.635***	0.797***	1.650***
	(0.13)	(0.40)	(0.14)	(0.20)	(0.50)
J (p-value)	0.00	0.596	0.477	0.00	0.151
m2	0.21	-0.37	0.18	0.63	-0.85
Number of observations	199037	23225	36936	109634	25781

Notes: All specifications were estimated using a GMM first-difference specification. The figures reported in parentheses are asymptotic standard errors. Time dummies and time dummies interacted with industry dummies were included in all specifications. Standard errors and test statistics are asymptotically robust to heteroskedasticity. Instruments in all columns are $(Assets\ growth)_{i(t-2)}$, $(Cash\ flow\ /\ total\ assets)_{i(t-2)}$, and further lags. Time dummies and time dummies interacted with industry dummies were always included in the instrument set. *m2* is a test for second-order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The *J* statistic is a test of the overidentifying restrictions, distributed as chi-square under the null of instrument validity. Also see Notes to Table 1. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level.

Table 7: Simple assets growth model augmented with industry-specific time dummies: alternative ownership definitions (based on the 100 percent ownership criterion)

	State-owned	*Foreign*	*Private*	*Collective*
	(1)	(2)	(3)	(4)
Assets growth $_{i(t-1)}$	-0.055***	-0.082***	-0.049 ***	-0.107***
	(0.01)	(0.01)	(0.008)	(0.02)
(Cash flow / total assets) $_{it}$	0.228	1.061***	1.153***	1.413***
	(0.45)	(0.18)	(0.29)	(0.61)
J (p-value)	0.927	0.864	0.001	0.089
m2	-0.05	-0.00	1.25	-1.98
Number of observations	26735	23572	52365	17203

Notes: All specifications were estimated using a GMM first-difference specification. The figures reported in parentheses are asymptotic standard errors. Time dummies and time dummies interacted with industry dummies were included in all specifications. Standard errors and test statistics are asymptotically robust to heteroskedasticity. Instruments in all columns are $(Assets\ growth)_{i(t-2)}$, $(Cash\ flow\ /\ total\ assets)_{i(t-2)}$, and further lags. Time dummies and time dummies interacted with industry dummies were always included in the instrument set. *m2* is a test for second-order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The *J* statistic is a test of the overidentifying restrictions, distributed as chi-square under the null of instrument validity. Also see Notes to Table 1. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level.

Table 8: Extended assets growth model

	Full sample	*State-owned*	*Foreign*	*Private*	*Collective*
	(1)	(2)	(3)	(4)	(5)
Assets growth $_{i(t-1)}$	-0.074***	-0.056***	-0.095***	-0.060***	-0.122**
	(0.004)	(0.01)	(0.01)	(0.006)	(0.01)
(Cash flow / total assets) $_{it}$	1.282***	-0.212	1.119***	1.353***	0.996***
	(0.04)	(0.31)	(0.16)	(0.18)	(0.36)
(Leverage / total assets) $_{it}$	0.373***	0.392***	0.147*	0.305***	0.404***
	(0.04)	(0.08)	(0.10)	(0.06)	(0.10)
Collateral $_{it}$	0.350***	0.153	0.147	0.271***	0.580***
	(0.05)	(0.11)	(0.18)	(0.06)	(0.15)
Nb. of employees$_{it}$	0.004	-0.005	-0.020	0.018**	-0.007
	(0.004)	(0.005)	(0.03)	(0.008)	(0.01)
(Sales / nb. of employees) $_{it}$	0.057**	-0.029	-0.037	0.148***	0.014
	(0.03)	(0.05)	(0.04)	(0.04)	(0.07)
Export $_{it}$	-10.918***	6.519	-5.546	-8.027**	1.830
	(2.40)	(4.91))	(4.86)	(3.28)	(5.09)
J (p-value)	0.00	0.070	0.001	0.00	0.002
m2	2.38	-0.61	-0.84	1.77	1.59
Number of observations	316652	47067	55400	159967	50237

Notes: All specifications were estimated using a GMM first-difference specification. The figures reported in parentheses are asymptotic standard errors. Time dummies and time dummies interacted with industry dummies were included in all specifications. Standard errors and test statistics are asymptotically robust to heteroskedasticity. Instruments in all columns are *(Assets growth)*$_{i(t-2)}$; *(Cash flow / total assets)*$_{i(t-2)}$; *Leverage*$_{i(t-2)}$, *Collateral*$_{i(t-2)}$; *(Nb. of employees)*$_{i(t-2)}$; *(Sales / nb of employees)*$_{i(t-2)}$; *Export*$_{i(t-2)}$; and further lags. Time dummies and time dummies interacted with industry dummies were always included in the instrument set. *m2* is a test for second-order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The *J* statistic is a test of the overidentifying restrictions, distributed as chi-square under the null of instrument validity. Also see Notes to Table 1. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level.

Table 9: Sample means for private firms with different degrees of foreign and state ownership

	Share of foreign capital >10%	*Share of foreign capital ≤10%*	*Share of state capital > 10%*	*Share of state capital ≤10%*
	(1)	(2)	(3)	(4)
Assets growth	8.66	10.95	3.57	11.20
Sales growth	11.33	13.23	6.67	13.46
Employment growth	4.01	2.72	-4.25	3.28
Assets	314.76	165.42	518.02	160.45
Sales	325.35	186.35	377.08	188.38
Nb. of employees	244.80	175.46	396.76	170.35
Age	6.52	7.11	16.36	6.67
Cash flow/total assets	8.25	8.77	4.86	8.92
Cash flow/tangible fixed assets	47.36	41.37	26.41	42.58
Total leverage / total assets	56.69	57.79	63.69	57.41
Accounts payable / total liabilities	30.52	28.21	23.17	28.53
Tangible fixed assets/total assets	31.64	36.01	36.85	35.62
Sales/nb. of employees	155.52	135.65	112.66	138.38
Exports	52.09	19.90	19.76	22.53
Nb. of observations	50386	600089	25122	399070

Note: Assets and sales are expressed in thousands of yuan. Growth rates are expressed in percentage terms. *Export* is a dummy variable equal to 1 if the firm exports, and 0 otherwise. All variables were deflated using provincial GDP deflators. See the Appendix for complete definitions of all variables.

Table 10: Effects of foreign and state participation

	Share of foreign capital > 10%	*Share of foreign capital > 10%*	*Share of foreign capital ≤10%*	*Share of foreign capital ≤10%*	*Share of state capital > 10%*	*Share of state capital > 10%*	*Share of state capital ≤10%*	*Share of state capital ≤10%*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Assets growth $_{i(t-1)}$	-0.052***	-0.0094	-0.066***	-0.063***	-0.046***	-0.036***	-0.068***	-0.060***
	(0.02)	(0.023)	(0.005)	(0.006)	(0.02)	(0.04)	(0.05)	(0.006)
(Cash flow / total assets) $_{it}$	1.291**	1.702***	1.510***	1.254***	1.241***	1.125***	1.491***	1.375***
	(0.34)	(0.45)	(0.20)	(0.20)	(0.40)	(0.44)	(0.18)	(0.19)
(Leverage / total assets) $_{it}$		0.255		0.310***		0.227		0.307***
		(0.23)		(0.06)		(0.16)		(0.06)
Collateral $_{it}$		0.493*		0.243***		0.394*		0.257***
		(0.24)		(0.07)		(0.18)		(0.07)
Nb. of employees$_{it}$		0.113**		0.013*		0.012		0.030**
		(0.04)		(0.008)		(0.01)		(0.012)
(Sales / nb. of employees) $_{it}$		0.093		0.167***		0.148***		0.148***
		(0.06)		(0.04)		(0.06)		(0.04)
Export $_{it}$		4.617		-8.783**		-3.457		-6.812
		(8.78)		(3.51)		(3.16)		(3.50)
J (p-value)	0.464	0.714	0.00	0.00	0.247	0.120	0.00	0.00
m2	0.35	1.18	0.82	1.96	0.343	-0.12	0.74	2.05
Number of observations	17207	17207	142760	142760	13918	13918	146049	146049

Notes: All specifications were estimated using a GMM first-difference specification. The figures reported in parentheses are asymptotic standard errors. Time dummies and time dummies interacted with industry dummies were included in all specifications. Standard errors and test statistics are asymptotically robust to heteroskedasticity. Instruments in columns 1, 3, 5, and 7 are *(Assets growth)*$_{i(t-2)}$, *(Cash flow / total assets)*$_{i(t-2)}$, and further lags. Instruments in columns 2, 4, 6, and 8 are *(Assets growth)*$_{i(t-2)}$; *(Cash flow / total assets)*$_{i(t-2)}$; *Leverage*$_{i(t-2)}$; *Collateral*$_{i(t-2)}$; *(Nb. of employees)*$_{i(t-2)}$; *(Sales / nb of employees)*$_{i(t-2)}$; *Export*$_{i(t-2)}$ and further lags. Time dummies and time dummies interacted with industry dummies were always included in the instrument set. *m2* is a test for second-order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The *J* statistic is a test of the overidentifying restrictions, distributed as chi-square under the null of instrument validity. Also see Notes to Table 1. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level.