Investment Financing in the Transitional China: A Panel Analysis of Chinese Listed Companies

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Abstract

The marked development in stock markets and the commercialisation of banking sector in the course of economic transition may have influenced the investment behaviours of Chinese companies. Using company accounts data in the period of 1998-2004, we estimate an error-corrected accelerator model to analyze how these changes alter the financing decisions on fixed investment of the newly-corporatized Chinese firms. The results show that the market-oriented reform measures that China adopted have influenced the propensity of listed firms to invest by industry, ownership and size. For primary and tertiary industries, we find, as in well-developed market economies, that firms are liquidity constrained in their investment decisions. For secondary industry, the reliance on internal funds increased, consistent with the interpretation that the firms lost privileged access to credit in the course of financial deregulation. Findings support the hypothesis that state-holding structure and associated corporate governance are responsible for managerial-discretion problems in China. However, we didn't find evidence that financial liberalization resulted in an easing of financing constraints for some, in particular, small firms, suggesting that the government's change in focus towards SMEs has not been effective over the sample period. The study also shows that demand-pull variables are important factors in the determination of investment behaviours, suggesting that firms started to behave consistently with profit maximization. The findings reflect the transitional nature of the Chinese corporate environment.

JEL Classification: C23; D82; P34; G32.
Key words: deregulation; firm investment; panel data; China.

I. Introduction

There have been a large number of studies that have sought to understand the pattern of firm investment and model the relationship between financial factors and firm investment. Recently, the analysis of the effects of uncertainty on investment has generated the empirical study on the role of financial constraints in investment decisions. In perfect capital markets, firms will be able to obtain finance to undertake all profitable projects at the market-clearing real interest rate (Modigliani and Miller, 1958). However in the presence of asymmetric information which creates one-sided uncertainty, firms may be financially constrained in the sense that they will have preference for using internal funds which are less expensive than external sources (Gilchrist and Himmelberg, 1995). In the face of economic downturn, there may exist a 'financial accelerator' effect in firm investment decisions (Hubbard, 1997). Empirical work has been increasingly directed to identifying whether liquidity is an important determinant of investment.

The bulk of the existing literature concerning financial factors and firm investment involves firms in developed countries with mature financial system, such as the US (Fazzari et al, 1988; Gilchrist and Himmelberg, 1995; Hubbard et al, 1995), the UK (Bond and Meghir, 1994), Japan (Hoshi et al, 1994), Italy (Schiantarelli and Semenelli, 1995), and France (Millet-Beyes, 2000). Most of these models on financial structure and investment imply that information and incentive problems lead firms to underinvest. If managers have superior information about the firm's prospects relative to the market, the firm's risky securities tend to be issued under their true value, thereby raising the cost of external finance (Myers and Majluf, 1984). Frictions in debt markets also create a cost wedge between external and internal funds, which would predict a larger impact on the investment behaviours of firms that are likely to face credit market asymmetries than the firms that have costless access to market financing (Fazzari et al, 1988). Jensen and Meckling (1976) argue that incentive problems raise the cost of external finance too. Outside financing diffuses management's ownership, thereby leading to considerable agency costs that arise when manager's interests are not perfectly aligned with those of the shareholders. In both cases, managers find it more attractive to finance investment with internal funds. If the firm's capability of generating

internal cash flows is damaged, positive NPV projects are foregone. Thus, for firms facing information and incentive problems, liquidity will be an important determinant of investment. In contrast, in the presence of free cash flow, managers prefer growth over profitability and overspend by undertaking negative NPV projects because managers may seek to derive more private benefits by increasing firm size, which lead firms to overinvest (Jensen, 1986).

There are only a handful of papers that study the investment behaviours of firms in transition countries. Tybout (1983) divides a sample of Colombian manufacturing into two groups: firms that have access to the formal subsidized capital markets and those that do not have. The results show that capital spending of excluded firms is constrained by the level of internal funds, while the favored firms, usually large firms, do not face the constraint in the presence of a high degree of financial repression in the 1970s. Anderson and Kegels (1997) use comparable firm level data for four transition economies, and find that for the fast reformers, liquidity constraints are important in their investment decisions, but less important in the slow reformers, suggesting the presence of soft budget constraints in the slowly reforming economies. Lizal and Svejnar (2002) analyze investment behaviors of firms with various types of ownership and legal status in the Czech Republic, and their findings indicate that cooperatives and small firms are credit rationed, and large firms and private firms operate under a soft budget constraint. Agung (2000) applies the Q-model to a sample of Indonesian listed companies and confirms the conventional view that small and non-chaebol-affiliated firms are most financially constrained. Athey and Laumas (1994) show that internal funds are relatively more important for large firms in India, as the industrial policy proposed by the Indian government is targeted at the development of small firms. Lavern (2002) examines heterogeneity in public Korean manufacturing companies, and finds that large and chaebol-affiliated firms tend to face the largest financing constraints, while small and independent firms are not financially constrained, concluding that the government financial policy in supporting small and medium-sized firms (SMEs) since the 1980s has been proved effective in relaxing financial constraints facing SMEs. In summary, the studies on capital investment in emerging economies have revealed that the

heterogeneity of firm investment decisions is commonly associated with the institutional infrastructure and financial policy orientations characterizing the idiosyncratic economic systems.

None of evidence yet from the panel examination of investment decisions in relation to corporate financial structure in China has been reported. This work turns out to be the first firm-level analysis of investment behaviors of Chinese listed firms at the aggregated level. Although one piece of earlier study (Chow and Fung, 2000) has provided valuable evidence on a survey of three-year investment in Shanghai manufacturing, the detailed analytical study of investment behaviors of the Chinese firms is only now being undertaken. China has been maintaining quite high levels of fixed capital formation and aggregate investment ratios driven by high investment demands resulting from rapid economic development in the last two decades, and financing through debt or equity and the functioning of credit and capital markets have played important roles in firm investment in China (Sun, 1998). Notwithstanding, the widely-held fundamental institutional differences from market economies, such as soft budget constraints and corporate governance associated with agency problems originating from state holding structure, fragmented capital markets associated with informational asymmetries, and the legal system governing the operations of companies and financial markets in the presence of governmental interventions, are all potential factors that may influence the roles of financial factors in fixed investment decisions of Chinese firms. Nevertheless, with the economic and financing sector reforms deepening on all sides in recent years, reforms measures have forcefully been taken to build proper institutions, market mechanism and financial system with commercialization of banking system accompanied by a swift development in the capital market. All these changes are expected to contribute to the financing decisions on investment of Chinese firms. However, to what extent are firm investment decisions affected in the course of transition? It is clearly of academic interest to look at how firm investment decisions are related to *ex ante* information asymmetry and agency costs in the current Chinese institutional setting. We'll use the population of the listed firms in the Chinese stock exchanges in the period of 1998-2004, to examine how the incidence and severity of information and incentive problems vary across

firms over time, and identify to what extent financial variables are important determinants of firm investment in the context of the real sector and financial sector reform being conducted in China, and an exploration of these issues is important in shaping further industry reform, banking reform and institutional reform in China.

The remainder of this paper is organized as follows. In Section 2, we briefly review the current investment financing and constraints of the firms in China. In Section 3, we introduce the investment model for the empirical analysis and discuss estimation issues. Section 4 presents the empirical results, and Section 5 concludes with a discussion of the findings and policy implications.

II. Investment financing and institutional constraints in China

Mobilisation and allocation of financial resources have been dominated by the government sector in China in the pre-reform period. The key sources for fixed investment were mainly from interest-free central and local governments' budgetary funds. The allocation of funds largely depends on the government industry policies, which put strong emphasis on strategic development in mainstream industries, such as, mining, utilities, chemistry industry and heavy industries. Supported by the government policies, these industries were generally operating on a large scale and were mostly owned by the state. The economic reform pursued in China since 1979 has resulted in radical changes in industrial structure and financial sector, which have seen the gradual introduction of market incentives, ownership changes and more diversified channels of financing as the main part of reform programs. First of all, the role of free market forces has been instrumental in altering China's sectoral make-up: a diversified industrial structure has taken shape, which was represented by moving away from single structure to more market-based tertiary industrial structure in achieving higher productivity. Table 1 (see Appendix) shows that the share of tertiary industry in the national economy increases from 21.4 percent in 1979 to 31.8 percent in 2004, and the average growth rate of tertiary industry, among the three industries, is the highest. The evidence clearly indicates that tertiary industry plays an increasingly important role in the national economy, and the industry structure in China has changed fundamentally since the implementation of market economic reform in 1979.

Secondly, China is undergoing transformation of its economic system, and this has been initially seen in the breakthrough in the administrative decentralization and incentive policies. In the agricultural sector, the communes were abolished and the Household Responsibility System was established, in which collective land was assigned to households for up to fifteen years, allowing farmers freedom of land use rights and decision-making. This institutional system generates incentives for production by linking rewards closely with their performance, and local governments took the strong initiative of transferring production decisions and profits from communes to households. As a result, China's agriculture has been dramatically revived. Agricultural reforms became the cornerstone of the reforms in the entire economy, providing the basis for the industrial reforms. In the industrial sector, state-owned enterprises (SOEs) were given discretion with respect to production and profit distribution by the introduction of the massive incentive program − Contract Responsibility System in the early 1980s. SOEs are able to run their operations freely through the increased availability of both internal and external funds, and consequently, productivity and efficiency are seen to have greatly increased in the real sector. Thirdly, since 1992, ownership reform has been undertaken with the target of constructing a socialist market economy and establishing a modern corporate system, i.e., corporatisation. Some large- and medium-sized SOEs were restructured into shareholding firms in one way or another in the stock markets. The majority of newly listed firms are hybrid ownership, which is mainly composed of non-tradable state-owned shares, legal shares and public small shareholders. In addition, non-state enterprises were also given the opportunity to list on the stock markets. With the *Security Law* governing public listing taking effect in 1998, private sector has more equal access to the stock markets, and public shareholding rose from 23.58 percent in 1993 to 32.56 percent in 2004. The rise of stock markets has promoted enterprise reform, diversified ownership structure and fostered the rapid development of the non-state sector (Jefferson and Rawski, 1994).

The industrial reform and structure adjustment have driven the changes of the country's financial system. The banking system has been assigned the task of administrating the financial operations of the real sector since 1984. This was the first step for Chinese firms

in the shift towards a modern financing investment system. At the early stage of transition, the major role of the banking system was to direct interest-bearing loans from the government to attain certain government objectives — speed up the development of the industrial sector and supervise the proper uses of funds by enterprises in accordance with the central plans (Tam, 1986). As commercialisation of banking system was promoted since 1992, decentralisation of credit controls and the development of other financial institutions have helped to channel the financial resources towards a broad range of sectors in the economy. The real sector has also seen a rapid emergence of financial products, such as short-term commercial credits and long-term capital financing since the 1990s. Hence, the functioning development of various financial institutions and instruments may have improved the market incentives and relaxed the financial constraints faced by firms in their investment decisions. One of the landmarks in strengthening the role of the financial sector in channelling financial resources is that the government came to recognize the need to stress the development of tertiary industry and SMEs and put forth an important effort to improve the credit environment for these sectors. In view of supporting SMEs, some specialized supporting service systems at the local government level, including SMEs loan guarantee system and credit-guarantee institutions, SMEs Service Center, and SME credit departments within financial institutions, have been established or put into force to provide specialized supporting loan services. By 2001, the *Provisional Regulation of SME Credit Guarantee System* and *Management Methods of Credit Guarantees for SMEs* have been published to strengthen the government support in SME financing (Wang, 2004). These measures taken have greatly promoted the development of these unprivileged sectors. Furthermore, to meet the increasing demands for capital from the real sector and facilitate the investment financing of firms, in the early 1990s, two stock exchanges, the Shanghai Stock Exchange and the Shenzhen Stock Exchange, were established and have developed rapidly ever since. The Chinese firms are provided opportunities to raise capital from domestic and foreign investors as a substitute for continued central government funding and bank credit of such capital investment. By the end of 2004, there were 1,378 companies listed in the two stock exchanges. Market

capitalization increased from 1.23 billion RMB in 1990 to 3,694.63 billion RMB in 2004, and total raised funds increased from 1.85 billion RMB in 1990 to 62.53 billion RMB in 2004 (see Table 2, Appendix). Increased reliance on public capital markets indicates that the growth in the market has brought significant changes in corporate financing, and the financing channels have been thus diversified.

However, the Chinese firms do not benefit in an equal way from the diversification of financing sources. There is obvious difference in treatment for firms with different characteristics in terms of size, ownership and industry type in obtaining loans from financial institutions and raising funds from capital markets. China's current banking institutions that have originated from the highly centralized banking system are still characterized by large financial inefficiencies, lack of competition, and extensive government involvement in credit allocation (Miurin and Sommariva, 1993). The government intervention over bank financing of fixed investment has disabled state banks to fully perform their role as financial intermediaries on the one hand, and caused company managers to fail to observe financial disciplines on the other, which are believed to lead to the problems of soft budget constraints. Consequently, the risk of default is high, and the increasing amount of non-performing loans has become very critical to the health of the entire banking system. Bankruptcy, even if enforced, may not be very efficient, because of a lack of clearly defined private property rights and effective property rights markets. Hence, this lack of rigorous bankruptcy enforcement may not effectively affect financing decisions of firms. Although in recent years the problems are being tackled, soft budget constraints take various forms via indirect ways, such as tax arrears, deferred payments or preferential bank loans (Schaffer, 1997). Therefore, debt financing may not yet serve as a signal of hard budget constraint. Besides, although the Chinese government has begun placing an emphasis on supporting tertiary industry and SME development in recent years, the allocation of credit by state-owned financial institutions is always biased in favor of SOEs, as China still lacks a long-term and relatively independent development strategy and policy system for SMEs and tertiary industry. The insufficiency of financial supports and difficulties in obtaining credits and raising funds has blocked the development in these unprivileged sectors.

Different from capital markets in developed countries, the primary reason for creating stock markets in China was to allow SOEs, which often were companies soon-to-be-bankrupted if they were not injected with new funding, to raise funds from capital markets. Despite the recent privatization and corporatization, by which many SOEs have been transformed into modern PLCs, China maintains major institutional differences from the US and the UK. Firstly, the Chinese government retains large equity positions in listed firms, and such flaws are believed to have a direct bearing on corporate financing problems associated with principal-agency costs. Secondly, government interference in the functioning of capital markets is doomed to fail to achieve strategic restructuring in newly-corporatized SOEs and standardize corporate governance.

The above overview raises a question how the traditional models of investment-sensitivity to cash flows have explanatory power on the investment decisions of the Chinese firms that are still largely controlled by the state that is undergoing economic transition. Given the condition that shareholder's rights and legal protections of investors are not clear and well defined, it's arguable that Chinese-type agency problems are overwhelming. However, as decentralization and devolution have been carried out rapidly in both financial sector and real sector, the economic agents are inclined to follow the basic rules of a market economy in response to profit maximization. Hence, the investment decisions of Chinese firms may reflect a tension between economic rationale resulting from market-based mechanism and institutional deficiencies arising from state-holding structure.

III. Model and estimation issues

Model

The classical investment model postulates that fluctuations in sales motivate changes in capital spending in perfect markets. An important implication of the model is that the size of a firm's investment is proportional to its output as an accelerator. At the macro level, this investment model is normally specified by relating the aggregate investment to total output and capital stock in the form

$$(I/K)_{i,t} = \alpha + \beta(Y/K)_{i,t} + \varepsilon_{i,t} \qquad (1)$$

where $I_{i,t}$ represents gross investment in fixed assets for firm *i* in period *t*; $Y_{i,t}$ represents the sale level of firm *i*; $K_{i,t}$ is the beginning-of-period book value for capital stock. The principle holds that the rate of investment will be primarily determined by the rate of change of output. At the start of economic transition, most of the Chinese firms had to invest heavily to modernize their obsolete capital stock to cope with increasing consumer demands and fast expansion of the national economy, and as a consequence, the Chinese enterprises have a form of 'investment hunger' for years, which is a well-known feature in planned economics. This can be seen from the trend in the increase in fixed investment presented in Table 3 (see Appendix). A mechanism in which the so-called "overheated" investment generated by the state investment system is restricted by supply constraints is needed in the model to prevent investment departing from its long-run path. Bean (1981) suggests that the investment model can incorporate the firm's long-run optimal capital stock into the model by introducing an error-correction term to control the deviations of actual investment from the desired investment driven by cost-minimising demand for capital input, which is thought to be particularly suitable for the investment decisions of the Chinese firms. We then specify a dynamic adjustment mechanism between k_t and y_t as an autoregressive distributed lag of length two (an ADL(2, 2) specification) in Equation 2 to present a long-run equilibrium co-movement between the real investment level and supply to investment expansion. In addition, to examine the dynamic property of this equation, we add the lagged dependent variable to take into account of slow adjustment of the actual capital stock to the desired capital stock. Ongoing growth opportunities, $\Delta y_{i,t}/K_{i,t-1}$, is incorporated into the equation to capture the effect of profitable opportunities driving investment. In the panel estimation, we also control for panel variation in the ratio of output price to user cost of capital ratio by including firm-specific fixed effects and time dummy variables in estimation and by estimating the equation separately for the different categories of firms (Bond et al, 2003; Hall et al, 1999). The general specification for the investment equation, thus, become

$$\frac{I_{i,t}}{\mathrm{K}_{i,t-1}} = \phi \frac{I_{i,t-1}}{\mathrm{K}_{i,t-2}} + \beta_0 \frac{\Delta y_{i,t}}{\mathrm{K}_{i,t-1}} + \gamma(\kappa - y)_{i,t-2} + \alpha_i + \alpha_t + \varepsilon_{i,t} \qquad (2)$$

The parameter α_i represents an unobserved firm-specific effect, and α_t is a time dummy variable. The coefficient, γ, represents the disequilibrium adjustment of the investment by decision makers toward a dynamic equilibrium in the error-correction process.

Accelerator models suggest that fluctuations in output will impact the investment spending as the determinant of investment. Financial variables should have no impact on the investment decision of firms, as internal and external finance are perfect substitutes in perfect capital markets. However, it's well-documented that firms perceive the wedge between external and internal finance in the studies of market imperfections (Hubbard, 1997). To investigate the role of financial variables in investment decisions of the firms that face frictions in capital markets, current and lagged cash flow terms, $CF_{i,t}/K_{i,t-1}$ and $CF_{i,t-1}/K_{i,t-2}$, are included in Equation 3.

In imperfect markets, financial leverage is also an important determinant of investment decisions (Bond and Meghir, 1994). High leverage is related to bankruptcy costs and agency costs and, thus, to the premium on external finance, leading to a negative effect on their investment. A large number of studies show that the variability of investment increases with higher leverage (Myers, 1977; Miurin and Sommariva, 1993). In China, corporate borrowing increased since 1984, with banking sector dominating corporate financing. Higher level of leverage means that a greater portion of cash flows that are generated by the Chinese firms must be used to meet interest payments on debt. Should cash flows fall, firms may not be easily able to meet these obligations, and the likelihood of bankruptcy increases. Firms with high leverage may also be expected to meet higher agency costs. The agency costs arise from 'moral hazard' generated by the firm managers by making an excessively risky investment. The reason for this risky behaviour is that with high leverage, the firms may retain most of the profit from any success but lenders incur most of the losses from failure due to the limited liability nature of debt contracts (Jensen and Meckling, 1976; Myers, 1977). To test whether the firms' investment decisions in China are responsive to the debt-related costs, we include debt variables, $TD_{i,t}/K_{i,t-1}$ and lagged $TD_{i,t-1}/K_{i,t-2}$, in Equation 3.

After taking these conditions into consideration, the final estimating equation is thus the following

$$\left[\frac{I_{i,t}}{\mathrm{K}_{i,t-1}}\right]=\phi\left[\frac{I_{i,t-1}}{\mathrm{K}_{i,t-2}}\right]+\beta\frac{\Delta y_{i,t}}{\mathrm{K}_{i,t-1}}+\gamma(\kappa-y)_{i,t-2}+\rho_0\frac{CF_{i,t}}{K_{i,t-1}}+\rho_1\frac{CF_{i,t-1}}{K_{i,t-2}}+\varphi_0\frac{TD_{i,t}}{K_{i,t-1}}+\varphi_1\frac{TD_{i,t-1}}{K_{i,t-2}}+\alpha_i+\alpha_t+\varepsilon_{it} \quad (3)$$

This expresses the investment ratio as a function of growth rate, an error correction term of the log of output-capital ratio, cash flow-capital ratio and debt-capital ratio. With regard to the long-run property of this specification, the coefficient, γ, is to test whether the demand-pull variable plays the role of a long-run determinant of investment. The importance and types of capital market imperfections are reflected in the significance and signs of the coefficients on the leverage and cash flow terms. If $\varphi<0$, this can be taken as evidence that the firm faces an increasing premium for external finance, which may lead to bankruptcy or agency costs of debt finance. If $\varphi\geq 0$, this means that firms may not face a threat of bankruptcy with the increasing debt level, and as a result, they would experience a zero or positive impact of financial leverage on their investment. A prediction on cash flow coefficients depends on the classification which contains the information on agency costs or informational asymmetries. If $\rho>0$, it indicates that the firm is financially constrained in the case of SMEs, non-SOEs and firms in primary industry and tertiary industry, as these firms are more likely to have difficulty raising funds and therefore to rely on retained earnings for investments. But in the case of SOEs, a positive coefficient may be linked with agency problems, as SOE managers are very likely to derive more private benefits by undertaking negative NPV projects as long as there is excessive liquidity in the firms. If $\rho\leq 0$, it indicates that, in the case of a poor-performing firm, which are usually SOEs, the firm can still access to bank credit for investment irrespectively of its profitability, hereby presenting a soft budget constraint. Hence, the cash flow-sensitivity may represent underinvestment associated with informational asymmetries or overinvestment associated with agency costs in the case of China.

Data

In examining the effects of financial variables on Chinese firm investment decisions in the context of economic transition, we use the annual company accounts data of the non-financial companies listed in Shanghai Stock Exchange and Shenzhen Stock Exchange in the

period of 1998-2004. The starting period is chosen because China reformed the accounting system of enterprises, and the new accounting system, *Limited Liability Company Accounting System* replacing the old *Accounting System for Joint-Stock Enterprises on Trial Basis*, was promulgated from 1st January 1998, and hence, companies are assumed to operate under the accounting norms in line with international practice. In this study, firms are distributed across 12 types of industry and different sizes of both active and inactive. All firms, which traded in A shares only, are included in the analysis. Special Transfer and Particular Transfer companies in both markets are also included to avoid survival bias. Our sample ends up with 1327 companies for this analysis. The key variables in the estimation contain: turnover (*Y*), proxied for output; cash flows (*CF*), obtained from cash flow statements; investment spending (*I*), represented by new fixed tangible assets; capital stock (*K*), derived from a perpetual inventory method based on reported investment figures; total debts (*TD*), comprising both short-term and long-term debts. All variables are expressed as 1 RMB Yuan (unit RMB). *Y* and *CF* have been deflated by an ex-factory price index of industrial products at 1995 constant price, and TD has been deflated by retail price index at 1995 constant price, while *I* and *K* have been deflated by the price index of investment in fixed assets at 1995 constant price. Details on data sources and construction are provided in the Appendix.

To observe the idiosyncratic investment behaviours of the Chinese listed firms, we classify firms by industry types, ownership structure and size of firms. First of all, we group firms based on the tiers of industry: primary industry, secondary industry and tertiary industry. The classification scheme is shown in Table 4. It is generally believed that the secondary industry is priority or controlled industry in the national economy and firms in these industries enjoyed the favorable treatment in obtaining external funds. Aggregated fixed investment financing (see Table 3, Appendix) shows that the supply of funds for investment mainly consists of two sources: government budgetary subsidies and self-raised funds. Historically, secondary industry obtained the largest proportion of budgets from the government for their fixed investment, while the primary and tertiary industries reply more on the self-raised funds. This classification allows us to examine the investment financing

patterns across industries and the possible influence of government protections on priority industry. However, along with the process of market transition, the declining trend in the appropriation of budgets in recent years shown in Table 3 (see Appendix) indicates that the firms in priority industry are losing the privileged grounds. If there are imperfections in financial markets, firm investments would become sensitive to liquidity constrained by marketable asset structure against firm borrowing (Poterba, 1988), cash flows would matter in investment. If the firms in priority industry still rely heavily on government budgets, the liquidity constraint on investment is not binding. Therefore, testing the sensitivity of investment to cash flow is testing not only for imperfections in the financial market, but also for the separation or independence of firms from the government.

Table 4. Industry classification

Type of industry	
Primary industry	Agriculture, Hunting, Forestry and Fishing
Secondary industry	Mining and Quarrying Manufacturing Utility Construction
Tertiary industry	Transport and Storage Telecommunications Wholesaling and Retailing Real-estate business Public service Media and Education Conglomerates

Source: National Statistics Bureau of China

Secondly, firms are grouped according to their ownership structure. Agency theory (Jensen, 1986) suggests that the more concentrated ownership the firm has, the more closely managers' interests should be aligned with those of shareholders, and thus potential investors face a lowered risk that the firm will misrepresent the quality of its investment projects. SOEs, in principle, are owned by the state, but has no real owner, as differential rights of owners and managers remains ambiguous in the absence a clearly-defined property rights. The control rights are shared between government bureaucrats and firm managers too. Typically being the proxy of true owner, the Chinese government has the ultimate

control rights over the selection and dismissal of top managers, and serves to monitor managerial performance, while the managers are given the control rights over operations, use of assets and distribution of income. This dual control system skews the incentives of SOE managers in optimizing the firm's long-run growth in the owners' interests. As a consequence, managers take bribery and present asset-substituting behaviours (Green, 2003). On the other hand, SOEs were not fully responsible for their losses; the state-owned commercial banks absorbed some of them in the form of soft budgets, so that hard budget constraints could not be strictly imposed on SOEs in case of their unfavourable operating conditions. Hence, we argue that SOEs operate in the institutional environment that appears to aggravate agency problems in the capital markets as a result of prevailing problems of corporate governance associated with ownership structure and the nature of the relations between SOEs and state-owned banks. In contrast, non-SOEs, not affiliated to the government, have weaker banking ties, and are likely to face greater difficulty when seeking for external finance. Hence, the cash flow-investment sensitivity on SOEs will be regarded as indication of agency problems that lead to overinvestment, and the cash flow-investment sensitivity on non-SOEs will be taken as indication of asymmetric information that leads to underinvestment. In order to evaluate cash flow effects in relation to market imperfections, the firms are classified based on the percentage of state ownership over total shares within a firm. If state shares account for more than 50 percent of total shares a firm holds, or the state controls less than 50 percent of the firm, but state shareholder or state legal shareholder is the top 1 shareholder, the firm is classified as state-owned enterprises (SOEs); otherwise, non-state-owned enterprises (Non-SOEs). To examine the effect of state-ownership concentration on firm investment behaviours, we further split two sub-samples into four, i.e., out of total shares, if state shares a firm holds accounts for 0%-25%, the firm is classified as Non-SOE1, 25%-50% as Non-SOE2; 50%-75% as SOE1 and >75% as SOE2.

Thirdly, firms are grouped based on their size. It is argued that financial factors are more important for small firms because of their limited access to capital markets (Gilchrist and Himmelberg, 1995; Hubbard et al, 1995). Larger companies are expected to have greater access to external financial resources because of their collateralisable assets, established

track records on operations and credits, and stable relationships with the banks and capital market, and hence, they will be less reliant on internal funding than smaller firms. In China, this phenomenon is even more obvious as large firms tend to be state-owned and be consequently supported by local governments, while small firms, mainly composed of collective and township enterprises, are widely believed to be financially constrained in their investment activities. However as has been shown, one of the major objectives of the economic reform in China is to promote the development SMEs and improve the financing environment for SMEs. If the policies to support SMEs are effective, SMEs should have relatively easier access to the limited investment funds and internal funds should be relatively less important for SME capital spending compared with what it, otherwise, would be, as reported by Athey and Laumas (1994) for India and Lavern (2002) for Korea. In recent years, driven by commercial interests, the national commercial banks use collectables, AA rating and minimum loan applications as the benchmarks when making loan decisions. These new criteria may have created more obstacles for SMEs to obtain bank loans. To test the differential effects of financial variables on the firms of different size and assess the effects of changing financial policies on firm investment behaviours, we classify firms according to China's National Statistics Bureau size classification (国经贸中小企[2003]143号) shown in Table 5. The number of employees was not used because the employee statistics are not comparable as some companies report the figure at the subsidiary level and some report it at the consolidated level.

Table 5. Size classification

Industry	Index (10th yuan)	Large	Medium	Small
Industry[1]	Sales	>=30000	<3000-30000	<3000
	Total assets	>=40000	<4000-40000	<4000
Construction	Sales	>=30000	<3000-30000	<3000
	Total assets	>=40000	<4000-40000	<4000
Wholesaling	Sales	>=30000	<3000-30000	<3000
Retailing	Sales	>=15000	<3000-15000	<3000
Transport, Communication	Sales	>=30000	<3000-30000	<3000
Posts	Sales	>=30000	<3000-30000	<3000
Hotel, Restaurant	Sales	>=15000	<3000-15000	<3000
Agriculture, Forestry, Fishing[2]	Sales	>=15000	<3000-15000	<3000
Media, Conglomerates[2]	Sales	>=15000	<3000-15000	<3000

1. Industry includes mining, manufacturing, utilities. Source: National Statistics Bureau of China.
2. Agriculture, forestry, fishing, media and conglomerates are based on the authors' inferences.

The distributions of firms in our study by the three classifications are presented in Table 6. Firstly, almost two-thirds of the firms are in secondary industry, accounting for 64 percent, with the next being tertiary industry and primary industry, accounting for 33 percent and 3 percent respectively. Secondly, 60 percent of firms are SOEs in our sample, reflecting the majority of the listed firms are controlled by the government. Thirdly, large firms account for more than half of the listed firms, and small and mediums-sized firms account for 43 percent, indicating that SMEs is playing an important role in the Chinese capital market.

Table 6: Distribution of firms across classifications

Industry	Number of firms
Primary industry	37
Secondary industry	865
Tertiary industry	425
Total	1327
Ownership[1]	
Non-state-owned firms (0-25% state-ownership)	482
Non-state-owned firms (25-50% state-ownership)	443
State-owned firms (50-75% state-ownership)	607
State-owned firms (>75% state-ownership)	433
Total	1965
Size[1]	
Small firms	104
Medium firms	588
Large firms	1126
Total	1818

1. The total number of firms in ownership classification and size classification exceeds the total number of firms due to the nature of changing status of some firms in these classifications in the sample period (see Tables 8a-8c in Appendix).

Source: CSMAR Financial Database, Guo Tai An Information Technology Company Ltd, 2005.

Further examination of the medians of the key variables across classifications identifies some interesting patterns. Table 7 shows that the firms in secondary industry have a higher level of cash flow-capital ratio and output-capital ratio than the firms in tertiary industry and primary industry, while investment-capital ratio is shown to be highest in primary industry. Table 7 also indicates that the investment rate is increasing in size and state ownership on average. This is consistent with our conjecture that large firms and SOEs invest the most, while small firms and non-SOEs invest the least. In addition, cash flow-capital ratio is found to be increasing with state ownership, and the output-capital ratio is generally higher in SOEs too. But contrary to common wisdom that SMEs are fast growing normally with

higher output-capital and cash flow-capital ratios than large firms (Carpenter et al, 1998), we find publicly listed SMEs in China show a lower level of these ratios than their counterparts. In a recent study, Yang (2005) finds that the post-listing performance of listed SMEs is well below before they were listed. We conjecture that, in common with the SMEs in other countries, the production and management of the SMEs is not stable due to scale limitations; in addition, SMEs in China meet three challenges once being on the market: firstly, fierce competition from large firms, especially from those in government-favored industries; secondly, no full government policies to support SME capital refinancing. A typical case is that high requirements for refinancing in the capital markets turn out to be the major obstacle for SMEs to seek for growth and expansion. The refinancing requirements of meeting a certain criterion of returns on net assets for 3 consecutive years in the case of large firms apply unanimously to SMEs. This can be arguably one of the reasons responsible for the general poorer performances of listed SMEs; thirdly, SMEs have much less capacity to get credit finance from banks than large firms, and even none of them can raise funds from bond markets. Hence, hampered by these constraints, SMEs have difficulties in sustaining their pre-listing growth, and in the worst situation, make losses and are eventually driven out of the market.

We can already note that the debt-capital ratios are monotonically increasing in size classification and industry classification, but monotonically decreasing in ownership classification. The patterns confirm that large firms tend to have larger leverage ratios than small firms, which is consistent with the hypothesis that stresses the importance of size in access to credit, and that the firms in tertiary industry tend to receive proportionally more credit relative to their capital stock than those in other industries as a result of the government's favored credit policy in supporting tertiary industry in recent years. In terms of the lower level of leverage in SOEs, we consider that there are two reasons. In the process of privatization, the leverage of former SOEs is expected to drop as the gradual withdrawal of debt guarantees would increase their cost of borrowing, although the costs of raising funds remain lower as the SOEs still carry implicit government guarantees. The lower level of debt can also imply that capital investment of SOEs is largely financed by share capital

rather than debt. Recent studies (Chen, 2004; Huang and Song, 2005) show that Chinese listed companies have preference to share capital than debt in their capital structure.

Table 7. Descriptive statistics[1] of the key variables in the estimations

	$CF_{i,t}/K_{i,t-1}$	$I_{i,t}/K_{i,t-1}$	$\Delta Y_{i,t}/K_{i,t-1}$	$(k-y)_{i,t-2}$	$TD_{i,t}/K_{i,t-1}$
Size					
Small firm	0.001	0.003	-0.176	17.821	0.869
	(0.347)	(0.138)	(2.475)	(1.406)	(2.042)
Medium firm	0.081	0.096	0.019	18.922	1.089
	(0.523)	(0.446)	(0.809)	0.970)	(2.058)
Large firm	0.207	0.184	0.297	20.319	1.100
	(0.508)	(0.279)	(1.512)	(1.035)	(1.790)
Industry					
Primary industry	0.122	0.225	0.131	19.672	0.946
	(0.558)	(0.505)	(1.602)	(0.825)	(1.861)
Secondary industry	0.180	0.176	0.219	20.024	1.003
	(0.436)	(0.245)	(1.136)	(1.392)	(1.612)
Tertiary industry	0.152	0.114	0.141	19.817	1.297
	(0.637)	(0.454)	(1.746)	(1.616)	(2.292)
Ownership					
Non-state-owned firms	0.149	0.158	0.195	19.552	1.244
(0-25% state-ownership)	(0.553)	(0.343)	(1.562)	(1.788)	(2.342)
Non-state-owned firms	0.133	0.147	0.154	19.834	1.221
(25-50% state-ownership)	(0.615)	(0.302)	(1.499)	(1.045)	(1.815)
State-owned firms	0.188	0.176	0.232	20.174	0.993
(50-75% state-ownership)	(0.521)	(0.409)	(1.298)	(1.233)	(1.827)
State-owned firms	0.228	0.157	0.189	20.427	0.611
(>75% state-ownership)	(0.379)	(0.261)	(0.891)	(1.546)	(1.748)

1. The values are medians and standard deviations are in parentheses.
Source: CSMAR Financial Database, Guo Tai An Information Technology Company Ltd, 2005.

What's worth noting is that all the variables are time-dependent in the estimations. We allow firms to switch between their financial regimes over time, taking into account of the varying severity of market imperfections in relation to investment dynamics in the estimation. Table 8 (see Appendix) shows the transition rates for each classification.

The generalized method of moments (GMM) was used to estimate the parameters in Equation 3. All the variables were first differenced to remove individual firm effect. Then the parameters in the model were estimated using orthogonal conditions, in which t-2 instrument variables were used. Arellano and Bond (1991) demonstrate that in a first differenced model as in Equation 3, good instruments are the endogenous explanatory variables dated t-2 and at earlier dates as they are not correlated with the contemporaneous

first differenced error term. To ensure exogenous instruments of the equation, m1 test and m2 test were used for the first-order and second-order serial correlation in disturbances respectively. As the panel progresses, an increasing number of instruments can be used to increase the efficiency of the estimates. All the possibilities of moment conditions for the estimation are considered given the available instruments. The Sargan test was used to test the validity of instrumental variables when we have more instruments than parameters to estimate.

IV. Estimation results

Table 9 presents GMM results for the error-correction accelerator model across the three classifications. The m2 statistic does not reject the hypothesis of no second-order serial correlations in the differenced residuals, and the Sargan statistic is statistically insignificant in all the cases, accepting validity of over-identification of instrumental variables. The coefficients of the lagged investment-capital ratio for each classification consistently indicate persistence in investment-capital ratios in the error-correction specification. Except for secondary industry, fundamentals represented by the sales term to control for investment opportunities are statistically significant. Among them, its contribution to the investment decisions of tertiary industry, small firms and non-SOE1 firms is the highest, suggesting that the short-run investment decisions in these firms are more likely to be related to growth opportunities. Whereas, the marginal significance on secondary industry indicates that the growth expectations are not a determinant of investment decisions in the short run. The firms in secondary industry are largely composed of those either holding a monopoly position, such as utilities, or owned by the state, such as construction and mining. We would argue that this may serve as one of the contributing factors to "overheated" investment in fixed assets, which has occurred in the last decade in China. In general, we find the behaviors of most types of firms to be consistent with profit maximization in the short run.

Turning to the long-run response of investment to output, we find that the error correction terms are significant with the feedback parameters ranging from −0.053 to −0.446, suggesting that firms remove investment decision errors in the each period to achieve the desirable investment level in the equilibrium. The relatively small values of the feedback parameters on SOEs and secondary industry, compared with those of non-SOEs and other

industries, suggest that their investment decisions do not adjust actively in response to expected future demand, and hence, it will take a lengthier time for the investment to reach its equilibrium. Our interpretation is that the nature of fixed capital formation in the secondary industry and the government protections for SOEs and the state-controlled industry may have caused the lack of structural adjustment in terms of the shares of output and investment, implying that the investment in these classifications is not purely based on market criteria.

Evidence from the role of cash flows in the investment equation indicates the existence of financial constraints for firms that are *a priori* believed to be financially constrained. Small firms and, to a lesser extent, medium-sized firms appear to be cash-flow constrained, a result often observed in the market economies. However, we didn't find that cash flows have a significant role in the investment decisions of large firms. The results imply that SMEs are more reliant on internal sources of funding than large firms, and any disruption to cash flows would thus have a larger impact on their investment. Similar to other developing economies as McKinnon (1994) argues, the capital market in China is also "fragmented", meaning that smaller firms are excluded from formal credit markets that mainly provide loans to large firms because of their strong relationships with the national state-owned banks.

Table 9 further shows the interesting results about industry classification. We've observed that cash flows have a small effect on investment of secondary industry, as the coefficient on cash flows, although small in magnitude, is positive and marginally statistically significant. This indicates that moving away from government budgetary financing to market-based bank financing has effectively reduced the reliance on the government the industry used to have in the pre-reform period, and hence increased its cash-flow sensitivity in response to the changes in interest rates. For primary and tertiary industries, the financial factors are found to have a more economically and statistically important influence on investment behaviors of the firms. Our study tends to support the priors of correlation of cash-flow sensitivity with marketability of company assets. As the firms in primary and tertiary industries largely provide services or operate in the industries with low asset marketability

Table 9. GMM estimates of the error-correction accelerator model

	Size			Industry			Ownership			
	Small	Medium	Large	Primary	Secondary	Tertiary	Non-SOE1	Non-SOE2	SOE1	SOE2
$I_{i,t-1}/K_{i,t-2}$	-0.561	-0.115	-0.284	-0.615	-0.494	-0.529	-0.122	-0.285	-0.219	-0.707
	(-0.068)	(0.041)	(0.061)	(0.207)	(0.082)	(0.059)	(0.054)	(0.053)	(0.054)	(0.177)
$(k-y)_{i,\,t-2}$	-0.392	-0.446	-0.152	-0.184	-0.053	-0.279	-0.347	-0.271	-0.116	-0.095
	(0.191)	(0.091)	(0.073)	(0.082)	(0.028)	(0.073)	(0.062)	(0.096)	(0.036)	(0.022)
$\Delta Y_{i,t}/K_{i,t-1}$	0.311	0.207	0.101	0.223	0.075	0.382	0.264	0.231	0.101	0.072
	(0.072)	(0.031)	(0.007)	(0.106)	(0.043)	(0.172)	(0.033)	(0.062)	(0.052)	(0.033)
$CF_{i,t}/K_{i,t-1}$	0.375	0.306	0.265	0.259	0.082	0.317	0.124	0.112	0.211	0.298
	(0.034)	(0.042)	(0.276)	(0.125)	(0.038)	(0.051)	(0.073)	(0.069)	(0.105)	(0.149)
$CF_{i,t-1}/K_{i,t-2}$	0.106	0.111	-0.043	-0.175	-0.001	-0.025	0.081	-0.065	0.101	0.131
	(0.053)	(0.062)	(0.032)	(0.126)	(0.007)	(0.013)	(0.048)	(0.039)	(0.143)	(0.187)
$TD_{i,\,t}/K_{i,t-1}$	-0.145	-0.125	0.066	-0.178	-0.102	-0.148	-0.183	-0.176	0.151	0.156
	(0.071)	(0.053)	(0.032)	(0.083)	(0.060)	(0.072)	(0.054)	(0.102)	(0.261)	(0.224)
$TD_{i,t-1}/K_{i,t-2}$	-0.094	-0.072	0.021	0.098	0.091	-0.116	-0.125	-0.107	0.013	-0.019
	(0.045)	(0.041)	(0.013)	(0.049)	(1.059)	(0.059)	(0.062)	(1.062)	(0.982)	(1.013)
m1 test	-4.12	-3.62	-5.58	-8.36	-9.33	-7.98	-4.29	-4.22	-3.37	-3.21
m2 test	-1.58	-1.54	-1.61	-1.41	-1.61	-1.25	-1.09	-1.66	-1.08	0.51
Wald test (df=7)	619.97	140.73	138.2	177.6	508.12	169.52	129.22	93.41	125.82	104.51
Sargan test (df=47)	39.78	43.67	45.73	20.82	36.67	50.26	42.03	61.83	50.03	47.28

1. The values are t-statistics and standard errors (in parentheses), which are asymptotically robust to general time-series and cross-section heteroskedasticity.
2. Dependent variable: $I_t/K_{t-1.}$
3. The instrument set used are I_{t-1}/K_{t-2} (t-2, t-3,...), $\Delta Y_t/K_{t-1}$ (t-2, t-3,...), C_t/K_{t-1} (t-2, t-3,...), TD_t/K_{t-1} (t-2, t-3,...).
4. Time dummy variables, ownership dummy variables and size dummy variables are included in the estimation (not reported).
5. m1 and m2 are tests for first and second order serial correlation in the differential residuals, asymptotically distributed as normal distribution under the null of no serial correlation.
6. Wald test is a test of joint significance of the coefficients, asymptotically distributed χ^2 as under the null of no-significance.
7. Sagan test is to test the over-identifying restriction, asymptotically distributed as χ^2 under the null of instrument validity.

and of high business risk, internal sources of funding are more important for these firms. Whereas the firms operating in secondary industry are mostly capital intensive, and many of the assets possessed by the firms have less specificity and can be used as collateralization for debt to reduce lender's risk, and thus, the firms show less cash flow sensitivity (Williamson, 1987). The finding suggests that banking institutions are semi-commercial, as asset tangibility has become an important criterion in banks' lending policy. In general, the study on industry classification shows that the structure of a firm's balance sheet and the adequacy of internal sources of funds can influence investment, and that the problem of asymmetric information in capital markets, which constitutes a main reason for financing constraints in western economies, has been identified to be important in China.

Table 9 reveals the importance of financial factors in investment behaviours of firms by ownership classification. The impact of cash flows is statistically significant for SOEs, and its positive impact is largest for firms with the higher level of state-ownership, confirming that the managerial-discretion problem is largely present in the listed SOEs. In China, the listed SOEs are not cash-starved (Green, 2003), which is consistent with the statistics shown in Table 7 where SOEs have the highest cash flow-capital ratio, but the SOE managers' interests are not aligned with those of shareholders, as has been discussed in connection with state ownership structure, and thus managers are likely to waste free cash flows at the expense of the shareholders' wealth by investing as much as possible in seeking for expansion. Size in China is often regarded as a symbol of power, and it can be used to get promotion and strengthen political status. Therefore, SOE managers are motivated to increase their firm size so as to realize their political ambition and pursue their personal interests. In addition, the 'too big to fail' doctrine is particularly prevalent in China for such political reasons as social security and stability, which directly affects the life chances of a Chinese firm. These agency problems specific to the Chinese institutional setting have inevitably led SOE managers to overinvest, so that 'investment fever' in fixed assets becomes a prominent problem for the current economic development. If managers can be monitored perfectly, they would not overinvest. However, monitoring and incentive structures in China are far from perfect, so that 'blind' investment and low-level repeated construction are still prevalent. The situation is difficult to be effectively controlled under

the current corporate governance regime. But we didn't find the evidence for soft budget constraints in the case of newly-corporatized SOEs. This is because listed SOEs, although being soon-go-bankrupt enterprises before listing, have met strong competition from other sectors and hence, are forced to adopt commercial practices and improve their efficiency and competitiveness to survive in the market. As shown in Table 7, cash flow-capital ratio and output-capital ratio turn out to be the highest in the state-ownership classification, indicating that publicly listed SOEs in stock markets are not operating under soft budget constraints, even though SOEs not listed in the markets may do so. Taken together, these findings provide strong evidence that state-ownership structure and associated corporate governance are responsible for the managerial-discretion problem in China.

We next turn to the discussion of leverage effects on the firm investment decisions. The results consistently show that the coefficients on debt-capital ratio are statistically significant in most cases, but with opposite sign and of different magnitudes. The investment spending by non-SOEs, firms in primary and tertiary industries and SMEs, in the order of their coefficient magnitudes, responds negatively to the degree of financial leverage. This is not surprising as the increased leverage raises financial obligations of the firms, hereby leading to increased probability of financial distress. In addition, agency costs arising from moral hazard problems are higher when the amount of debt is relatively large, and this is particularly true for these types of firms as their investment behaviors are commonly perceived to be riskier and hereby they face higher charges imposed by the Chinese banks. In the two cases, the firms have to pay greater premiums on external finance, which leads to a negative impact on investment. This result is consistent with the market imperfection model in terms of debt-related agency costs and bankruptcy costs in western economies. The less leverage effect on secondary industry provide further evidence that loans granted to the real sector are now made based on commercial criteria against collateral, which is in line with the *Security Law* and *Commercial Banking Law*, statutory frameworks governing the lending practice of banking institutions. The positive sign on the Chinese large firms indicates that a high degree of leverage may act as a signal of diversification, creditworthiness and their interlocking relationship with national banks, thus, they are less exposed to the risk of bankruptcy. These findings are consistent with Rajan and Zingales

(1995) and Wald (1999) who show that size in developed countries is positively correlated with debt. In contrast, there is no statistically significant indication that the potential costs related to financial distress or bankruptcy will have effects on investment behaviours of SOEs. SOEs enjoy a favored relationship with state banks, and in case of failures, the government will bail them out, which is perceived to lead to the irrelevance of financial distress and bankruptcy costs to SOE debt financing. The coefficients on the lagged TD/K are negative as expected, although they are not statistically significant in all the cases, which suggests that most of firms are acting rationally in face of bankruptcy costs, expect in the case of SOEs. In general, the empirical results show that there exists a strong link between debt financing and investment behaviours of Chinese listed firms.

V. Conclusion

The marked development in stock markets and the privatization of banking sector in the course of economic transition may have influenced the investment behaviours of Chinese companies. This paper uses firm level data to analyse how these changes alter the financing decisions on fixed investment of Chinese listed firms for the period of 1998 - 2004. Importantly, the investment function with an error-correction process is estimated by classifications of size, industry and ownership to observe the idiosyncratic investment behaviours of these firms. It is found that the demand-pull variable is an important factor in the determination of firm investment behaviours in the short run, while the correction mechanism suggests that the economic growth will lead firm investment to the equilibrium in the long run. This has shown that the investment activities of Chinese listed firms have generally presented a profit-oriented nature despite large presence of institutional inefficiencies.

We provide evidence on the propensity to invest by ownership, size and industry. The market-oriented reform measures that China adopted are found to have influenced the investment decisions of the listed firms. For primary and tertiary industries, we find, as in well-developed market economies, that firms are liquidity constrained in their investment decisions. For secondary industry, the reliance on internal funds increased, consistent with the interpretation that the firms lost privileged access to credit in the course of financial

deregulation. However, we didn't find evidence that financial liberalization resulted in an easing of financing constraints for some, in particular, small firms. The results have confirmed that frictions in capital markets have led to underinvestment. We also find that the positive impact of cash flows on firms' investment expenditures is higher in the firms with the high level of state-ownership, indicating the relevance of the Chinese-type of agency costs to firm investment decisions. The study has verified that agency problems associated with state-holding structure have led to overinvestment. The findings on debt-capital ratio have reflected the transitional nature of the Chinese corporate environment. On the one hand, the error-correction investment model has shown that the leverage effect associated with bankruptcy costs appears to have little impact on the investment decisions of SOEs. This is because the current institutions in China have retained certain features of a centrally planned economy. Most notably, the state remains the principal stakeholder of firms and the owner of banks. If the state does not change its controlling behaviour towards corporatized SOEs, the SOEs are less likely to be subject to financial disciplines once they fail to meet debt obligations. This deficiency is largely attributable to the fact that the legal system is incomplete and yet to be implemented forcefully. On the other hand, certain firm-specific factors, such as firm size and asset types that affect firms' leverage in market economies, also affect the investment decisions of Chinese firms.

The paper's findings carry a number of important policy implications for real sector and financial markets. China is currently pushing forward the adjustment of industry structure and the reform of enterprise ownership. But the overall reform process is shown to be limited by the absence of a number of substantive reforms in real and financial sectors. Property rights remain weak and the state continues to exercise arbitrary political and economic control over the real sector. These problems have contributed to industries' failure to capitalise on efficiency improvements. This calls for a more complete privatization of SOEs and a sound institutional infrastructure in place to clear the obstacles in the path towards market-based efficiency. But the viable strategy is unlikely to materialize without a more careful policy design on development of the stock market and commercialisation of banking system. Fostering the liberalization of stock markets is an important mission for China's ongoing economic reform, which should be targeted at a better regulated market

populated by a growing number of private firms and institutional investors, at the intermediary function of the stock market which give equal rights to shareholders, and at a corporate control market to create an environment that allows SOEs as well as state-owned financial institutions transform themselves into shareholding companies in the true sense. Banking system needs to provide full support for the role of banks and other financial intermediaries in channeling funds into productive investment, and for the delegating role that banks are due to assume in corporate monitoring as in Diamond's (1984). Broader reforms are also required to tackle the problems in the area of bankruptcy laws and creditor protections. Without the achievements in building up such a financial system, the positive contribution of stock market and banks to the ongoing reform in real sector may not be sustainable by itself. Overall, our findings suggest that the key guidance of policy designs should be encouragement of competition and institutional efficiency of financial markets and real sector. The problems facing these sectors are indicative of the complex nature of industrial reform, financial sector reform and ownership reform and the trade-offs the state must deal with in order to move the reform process forward.

Cautions need to be taken when interpreting the results obtained from the study, as the sample in the analysis is composed of listed firms, which are different from the majority of the firms that are not listed in the market in terms of investment decisions, financial decisions, as well as corporate structure and governance, although they may carry many similarities in these aspects. The underinvestment problem arising from asymmetric information and the overinvestment problem arising from agency costs are supposed to be far more or less severe in investment decisions of the unlisted firms. This requires that future studies on the financial effects on firm investment decisions focus on the comparative analysis of firm-level panel data comprised of both listed and unlisted firms, which enables us to gain more insights into investment dynamics in relation to the severity of informational asymmetries and agency costs associated with market imperfections in the transitional China.

Appendices

1. Tables 1-3 and Table 8

Table 1. GDP by industry sector: 1979-2004 (current price, 100 million Yuan)

	Total GDP	Primary industry		Secondary industry		Tertiary industry	
1979	4038.2	1258.9	31.2	1913.5	47.4	865.8	21.4
1980	4517.8	1359.4	30.1	2192.0	48.5	966.4	21.4
1981	4862.4	1545.6	31.8	2255.5	46.4	1061.3	21.8
1982	5294.7	1761.6	33.3	2383.0	45.0	1150.1	21.7
1983	5934.5	1960.8	33.0	2646.2	44.6	1327.5	22.4
1984	7171.0	2295.5	32.0	3105.7	43.3	1769.8	24.7
1985	8964.4	2541.6	28.4	3866.6	43.1	2556.2	28.5
1986	10202.2	2763.9	27.1	4492.7	44.0	2945.6	28.9
1987	11962.5	3204.3	26.8	5251.6	43.9	3506.6	29.3
1988	14928.3	3831.0	25.7	6587.2	44.1	4510.1	30.2
1989	16909.2	4228.0	25.0	7278.0	43.0	5403.2	32.0
1990	18547.9	5017.0	27.1	7717.4	41.6	5813.5	31.3
1991	21617.8	5288.6	24.5	9102.2	42.1	7227.0	33.4
1992	26638.1	5800.0	21.8	11699.5	43.9	9138.6	34.3
1993	34634.4	6882.1	19.9	16428.5	47.4	11323.8	32.7
1994	46759.4	9457.2	20.2	22372.2	47.9	14930.0	31.9
1995	58478.1	11993.0	20.5	28537.9	48.8	17947.2	30.7
1996	67884.6	13844.2	20.4	33612.9	49.5	20427.5	30.1
1997	74462.6	14211.2	19.1	37222.7	50.0	23028.7	30.9
1998	78345.2	14552.4	18.6	38619.3	49.3	25173.5	32.1
1999	82067.5	14472.0	17.6	40557.8	49.4	27037.7	33.0
2000	89468.1	14628.2	16.4	44935.3	50.2	29904.6	33.4
2001	97314.8	15411.8	15.8	48750.0	50.1	33153.0	34.1
2002	105172.3	16117.3	15.3	52980.2	50.4	36074.8	34.3
2003	117251.9	17092.1	14.6	61274.1	52.2	38885.7	33.2
2004	136515.0	20744.0	15.2	72387.0	53.0	43384.0	31.8

Source: China Statistical Yearbook, State Statistical Bureau, 2005.

Table 2. Major index of stock market, 1990-2004 (100 million shares, 100 million Yuan)

	No. of companies	No. of share issues	No. of negotiable share issues	Market capitalization of total shares	Market capitalization of negotiable shares	Transaction turnover	Money raised
2004	1378	6684.64	2176.32	36946.26	11609.96	42316.60	625.303
2003	1278	6004.07	1884.03	42710.17	13169.56	32093.50	617.499
2002	1211	5467.04	1664.99	38522.36	12398.94	27998.00	727.721
2001	1140	4837.63	1463.56	43741.89	14348.82	38423.00	1066.620
2000	1061	3596.84	1220.87	48126.33	15896.43	60846.40	1523.600
1999	918	2914.89	947.59	26648.97	8163.80	32216.00	864.492
1998	819	2336.85	737.73	19438.29	5700.54	24129.90	797.237
1997	710	1766.97	560.10	17552.93	5196.75	32115.10	992.077
1996	499	1106.89	344.63	9798.10	2840.92	22017.50	352.212
1995	305	765.69	235.16	3467.55	936.64	4481.63	139.115
1994	278	636.64	183.06	3676.85	949.57	8960.50	197.461
1993	169	355.30	83.77	3473.30	782.82	3995.36	549.806
1992	50	69.47	21.80	1023.40	256.56	748.52	221.402
1991	13	5.06	2.31	104.14	43.31	40.09	17.8198
1990	7	0.03	0.01	12.31	3.07	0.01	18.4538

Source: China Securities Market Investment Yearbook, Guo Tai An Information Technology Company Ltd, 2005.

Table 3. Aggregate fixed asset investment by source of funds, 1981-2003 (100 million Yuan)

	Total	State budgetary appropriations		Domestic loans[1]		Foreign investment		Self-raised funds and others[2]	
		amount	%[3]	amount	%	amount	%	amount	%
1981	961.01	269.76	28.1	122.00	12.7	36.36	3.8	532.89	55.4
1982	1230.4	279.26	22.7	176.12	14.3	60.51	4.9	714.51	58.1
1983	1430.06	339.71	23.8	175.50	12.3	66.55	4.7	848.3	59.2
1984	1832.87	421	23.0	258.47	14.1	70.66	3.9	1082.74	59.0
1985	2543.19	407.8	16.0	510.27	20.1	91.48	3.6	1533.64	60.3
1986	3120.58	455.62	14.6	658.46	21.1	137.31	4.4	1869.19	59.9
1987	3791.7	496.64	13.1	871.98	23.0	181.97	4.8	2241.11	59.1
1988	4653.8	431.96	9.3	977.84	21.0	275.31	5.9	2968.69	63.8
1989	4410.39	366.05	8.3	762.98	17.3	291.08	6.6	2990.28	67.8
1990	4517.5	393.03	8.7	885.45	19.6	284.61	6.3	2954.41	65.4
1991	5594.49	380.43	6.8	1314.73	23.5	318.89	5.7	3580.44	64.0
1992	8080.1	347.46	4.3	2214.03	27.4	468.66	5.8	5049.95	62.5
1993	13072.3	483.67	3.7	3071.99	23.5	954.28	7.3	8562.36	65.5
1994	17827.12	529.57	3.0	3997.64	22.4	1768.95	9.9	11530.96	64.7
1995	20524.86	621.05	3.0	4198.73	20.5	2295.89	11.2	13409.19	65.3
1996	23358.57	625.88	2.7	4573.69	19.6	2746.60	11.8	15412.4	66.0
1997	25259.67	696.74	2.8	4782.55	18.9	2683.89	10.6	17096.49	67.7
1998	28716.92	1197.39	4.2	5542.89	19.3	2617.03	9.1	19359.61	67.4
1999	29754.65	1852.14	6.2	5725.93	19.2	2006.78	6.7	20169.8	67.8
2000	33110.1	2109.45	6.4	6727.27	20.3	1696.24	5.1	22577.14	68.2
2001	37986.98	2546.42	6.7	7239.79	19.1	1730.73	4.6	26470.04	69.6
2002	45046.92	3160.96	7.0	8859.07	19.7	2084.98	4.6	30941.91	68.7
2003	58616.29	2687.82	4.6	12044.36	20.5	2599.35	4.4	41284.76	70.5

1. Domestic loans include all the loans raised domestically, including bank credits and non-banking financial institution credits.
2. Self-raised funds refer to funds received by construction enterprises from their higher responsible authorities, local governments, and raised within enterprises for the purpose of investment in fixed assets during the reference period. Others refer to bonds raised by enterprise (companies) or financial institutions through issuing various bonds for the purpose of investment in capital construction and innovation, the bonds include key enterprise bonds and key construction program bonds issued by the banks on behalf of the state specialized investment companies; it also include the funds received during the reference period which are not included in the above-mentioned sources.
3. The percentage out of total fixed asset investment.

Source: China Statistical Yearbook, State Statistical Bureau, 2004.

Table 8 (a) – Table 8 (c) show the transition probabilities for each classification in the sample period.

Table 8 (a). Transition rate of size classification (%)

	Small firms	Medium firms	Large firms
Small firms	67.76	19.63	12.62
Medium firms	3.26	75.73	20.90
Large firms	0.69	3.52	95.78

Table 8 (b). Transition rate of ownership classification (%)

	Non-SOEs	Non-SOEs	SOEs	SOEs
Non-SOEs	97.38	1.37	0.17	1.08
Non-SOEs	5.30	85.25	0.95	8.50
SOEs	1.37	3.98	87.04	7.61
SOEs	4.85	17.79	25.20	52.16

Table 8 (c). Transition rate of industry classification (%)

	Primary industry	Primary industry	Tertiary industry
Primary industry	100.00	0.00	0.00
Secondary industry	0.00	100.00	0.00
Tertiary industry	0.00	0.00	100.00

The tables above illustrate firm dynamics in terms of size, industry and ownership. The percentage in the column reflects the percentage changes in each classification. 19.63 percent and 12.62 percent of small firms grow into medium and large firms respectively, while 3.26 percent and 20.90 percent of medium firms turn into small firms and large firms respectively, with 67.76 percent of small firms and 75.73 percent of medium firms remain at the same level, indicating that SME business environment is in general highly dynamic. But large firms demonstrate a relatively strong tendency to stay among its own category, with only 4.22 percent of firms becoming SMEs. State-ownership is also changing over time, and it's shown that, on average, 5 percent of non-SOEs change into SOE status, while SOEs have a more than 20 percent of chance of turning into non-state-owned, to reflect the effect of the state-ownership reform which is currently undergoing in the Chinese stock markets. There is no evidence that any single firm changes its industry types over the sample period.

2. Construction of the variables

The data used in this study consists of the company accounts from China Stock Market & Accounting Research Database (CSMAR), which is developed by the Centre for China Financial Research (CCFR) of the University of Hong Kong and Guo Tai An Information Technology Company. Main variables in the models are sales, cash flow, total debts, flows of investment, and capital stock.

Output (*Y*): annual turnover is used as a proxy for output.

Cash flow (*CF*): cash flows are obtained directly from cash flow statements.

Total debts (*TD*): Total debt is comprised of both short-term and long-term debts.

Investment (*I*): Investment represents new fixed tangible assets.

Capital stock (*K*): a perpetual inventory method based on reported investment figures is used, with the net book value of fixed assets in the first observation within the sample period as the starting value.

$$K_{i,t} = (1-\delta)K_{i,t-1} + \frac{I_{i,t}}{P^I_{i,t}}$$

where $K_{i,t}$: capital stock by industry at *t*

$I_{i,t}$: investment by industry at *t*

$P^I_{i,t}$: price indices for fixed assets by industry at *t*

Y and *CF* have been deflated by an ex-factory price index of industrial products (1995 price), and TD has been deflated by retail price index (1995 price), while *I* and *K* have been deflated by the price index of investment in fixed assets (1995 price). The three index are supplied by the National Statistics Bureau of China. All variables are expressed as ￥1RMB.

After computing the main variables used in the investment model, we have excluded observations, which appeared to contain substantial outliers. Specifically, observations which satisfied the following criteria were discarded

if $\frac{I_{i,t}}{K_{i,t}} > 1$;

if real sales increase or decrease by a factor of 3; if $|dy| > \log(3)$

If $\frac{\Delta Y_{i,t}}{K_{i,t}}$, $\frac{CF_{i,t}}{K_{i,t}}$, or $\frac{TD_{i,t}}{K_{i,t}}$ fall in the first or the last percentile of the empirical distribution, the observations were treated as outliers and excluded.

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