

## **BANK CREDIT LINES AND OVERINVESTMENT: EVIDENCE FROM CHINA**

Qianwei Ying, Lingnan College, Sun Yat-Sen University, China

Danglun Luo, Lingnan College, Sun Yat-Sen University, China

Lifan Wu, California State University, Los Angeles USA

### **ABSTRACT**

*The paper investigates the relationship between bank credit lines and firms' overinvestment for Chinese listed companies from 2001 to 2008. We find significant impacts of bank credit lines on firm overinvestment activities. Further, we find that overinvestment is mainly made by State-owned firms, and not privately-owned firms. State-owned firms have easier access to bank credit lines with cheaper cost than private-owned firms, and therefore are more likely to overinvest. The results suggest that concentration of credit lines among State-owned firms likely leads to low resource allocation efficiency.*

**JEL:** G21, G31, G38

**KEYWORDS:** Credit lines; Overinvestment; State-owned firms

### **INTRODUCTION**

**B**ank credit lines have become a major source of funding for firms. Kashyap et al. (1993) reported that credit lines account for about 70% of U.S. small firms' financing. Sufi (2009) found that about 80% of bank lending to U.S. public firms is through credit lines. Jimenez et al. (2009) showed that bank credit lines account for 42% of Spanish firms' bank financing. Similarly, credit lines have recently become increasingly popular in China corporate finance. About 5% of listed firms obtained credit lines in 2001. This number increased to 24% by 2009. Bank credit lines exceeded 1.5 trillion RMB for listed firms in 2009. Our sample shows firm credit lines account for 26% of total liabilities in 2009. Given the importance of bank credit lines for corporate financing, this paper empirically investigates the role of credit lines for Chinese firms.

Credit lines themselves are not bank loans. But due to their funding speed and flexibility, users do not need to apply for the loan each time they need funding. Instead, they can easily and conveniently draw down unused lines of credit for their investment needs. However, this flexibility also provides opportunities to make undesirable investments. Jensen and Meckling (1976) showed that firms under financial distress may take advantage of bank lines of credit to pursue risky investments. Sufi (2009) pointed out that credit lines can make agency problems particularly severe, since banks can't perfectly observe how lines of credit are used and can't closely monitor borrower activities. Following these arguments, we examine how credit lines can lead to overinvestment for listed Chinese firms.

In addition, we examine Chinese firms because credit lines are mostly issued to State-owned firms in China. In contrast to the U.S. private shareholding structure and the pyramidal family ownership structure in East Asia, State ownership is the dominant ownership structure in China. The government is the single largest shareholder in State-owned firms. Having both controlling rights and cash flow rights, the State not only plays a key role in corporate governance, but also appoints key executive positions and the board of directors for State-owned firms. In this environment, with less investor protection and external corporate control, conflict of interests between controlling shareholders (the State) and minority shareholders (outside investors) inevitably exists. Therefore, our paper intends to explore the functions of State ownership under these circumstances and to provide new evidence to the finance literature.

The remainder of the paper is organized as follows. Section 2 provides a brief literature review. Section 3 describes data and develops testable hypotheses about the relation between lines of credit and

overinvestment. Section 4 presents empirical results, and concluding comments follow in Section 5.

## LITERATURE REVIEW

Firms face trade-offs in choosing between spot loans and credit lines. When a firm takes out a credit line, it pays the setup fee and gets the loan commitment. Researchers have long studied the role of credit lines in the bank loan market, and have developed several competing arguments about why firms choose credit lines instead of spot loans.

Campbell (1978), Hawkins (1982), Melnik and Plaut (1986), and Sofianos et al. (1990) argued that credit lines serve as options which firms can employ to hedge against future uncertainty in the loan market. The credit lines give borrowers the right to borrow up to a specified amount of money, in exchange for the upfront fee, during a fixed period at a fixed rate. When a firm suffers a deterioration of creditworthiness, it may have difficulty obtaining spot loans. Having an unused line of credit would help lock in new funding. However, the main implication of option models is that optional use of credit lines is either exercised all or nothing, never left partially exercised. This prediction is contradicted by empirical data. Many firms use credit lines, yet rarely reach the limit.

Thakor and Udell (1987), Maksinovic (1990), Boot et al. (1987, 1991), Berkovitch and Greenbaum (1991), Duan and Yoon (1993) and Morgan (1994) documented credit lines as optimal solutions to asymmetric information between banks and corporate clients. According to this view, some firms may have difficulty getting spot loans or borrowing because their assets are illiquid, their firm is too small or they have little track record. This adverse selection problem is mitigated by credit lines which allow borrowers to signal their quality to banks. Credit lines provide more protection to the banks than spot loans because banks may have the option to cut the unused credit line portion in the event of a change in the firms' creditworthiness.

The third view focuses on firms' investment opportunities. Avery and Berger (1991) conducted a survey and showed that flexibility and speed of action in seizing investment opportunities are main reasons for the use of credit lines. Martin and Santomero (1997) further modeled these features in the demand for credit lines and investment opportunities. Recently Sufi (2009) empirically examined firms' profitability and flexibility of credit lines, and finds that banks only extend lines of credit to firms with high profitability and manage unused portions of lines of credit with covenants on profitability. He further suggests that lines of credit may play an instrumental role in firm investment policy and researchers may be able to examine how credit lines affect investment policy.

These arguments are not mutually exclusive and they all likely to contribute to development of the bank loan market. The empirical evidence on these explanations is mixed, and most focuses on the relationship between credit lines and firms' financing. For example, Ham and Melnik (1987), Berger and Udell (1995), Shockley and Thakor (1997), Dennis et al. (2000), Agarwal et al. (2004), Almeida et al. (2004), Faulkender and Wang (2006), and Jimenez et al. (2009) examined lines of credit as corporate liquidity and financing management. The purpose of this paper is to extend the current study of credit lines to examine the relationship between credit lines and overinvestment behavior.

## DATA AND METHODOLOGY

### Data

We collect our sample and credit lines information from the bank loan data set of RSSET Database. Our sample selection is based on the following criteria: (1) Listed Chinese firms from year 2000 to 2008; (2) Excluding banks and financial institutions; (3) Excluding firms with negative net worth; and (4) Excluding firms with a bankruptcy filing. Our final data consists of 11,811 firm years. All other variables are collected from the Center of China Economic Research (CCER) Database.

Table 1 presents descriptive statistics of all sample firms with lines of credit from year 2001 to year 2008. As more firms obtain lines of credit each year, the proportion of lines of credit firms also increases. For example, about 5% of listed firms received lines of credit in 2001, and the number increased to more than 24%, 372 firms, 2008. During the same period, the total amount of credit lines issued to listed firms went up more than 10 times, from 31.2 billion RMB in 2001 to 333 billion RMB in 2008.

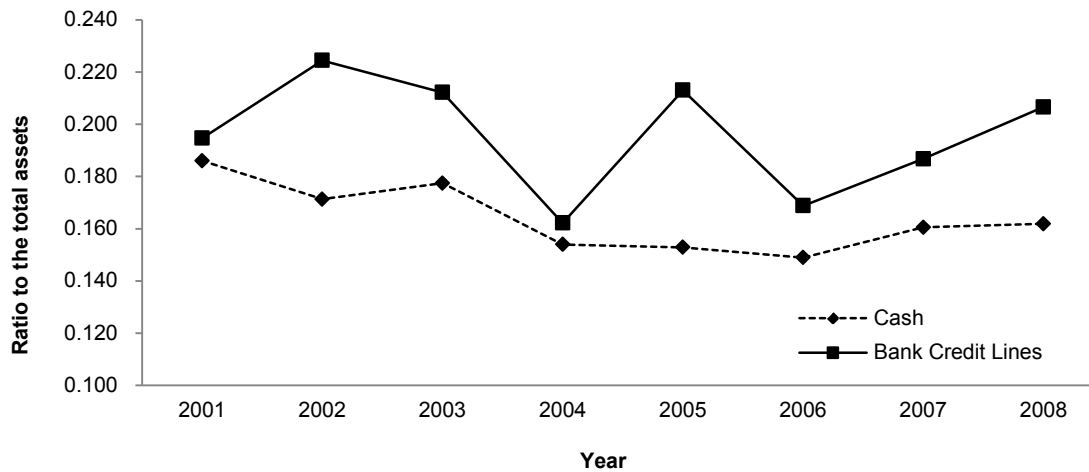
Table 1: Description of Credit Lines for Chinese Listed Firms

Year	Total Firms	Firms with Credit Lines	Ratio of Firms with Credit Lines to Total Firms
2001	1157	58	0.0501
2002	1215	133	0.1095
2003	1269	146	0.1151
2004	1349	146	0.1082
2005	1330	163	0.1226
2006	1383	179	0.1294
2007	1484	285	0.1920
2008	1537	372	0.2420

Table 1 shows descriptive statistics. Our sample selection is based on the following criteria: (1) Listed Chinese firms from year 2000 to year 2008; (2) Excluding banks and financial institutions; (3) Excluding firms with negative net worth; and (4) Excluding firms with bankruptcy filing. A total of 11,811 firm years are collected.

In addition, lines of credit have become increasingly important in corporate financing management. Figure 1 describes the proportion of credit lines of firms relative to their total assets. It typically accounts more than 20% of total assets for most of our sample years, which exceeds the firms' cash position. Clearly lines of credit play an important role in firms' liquidity management.

Figure 1: Ratio of Credit Lines to Total Assets



The figure shows the ratio of credit lines to total assets for Chinese listed firms for the period of 2001 to 2008. The ratio of cash to total assets is also reported as the comparison.

To measure the credit line variable, we follow the Agarwal et al (2004) and Sufi (2009) methods. Specifically, we use two measurements: a dummy variable to indicate whether a firm obtains lines of credit (1= yes, and 0=no), and a ratio of lines of credit to the firm's total assets to measure the level of credit lines.

We measure overinvestment similarly to Richardson (2006). Overinvestment is defined as excess investment above a normal level. Underinvestment occurs if actual investment less than the normal level. We measure underinvestment as negative overinvestment in our analysis. We follow Richardson method (2006) to construct the overinvestment variable:

$$Inv_{it} = \alpha + \beta_1 OPP_{it-1} + \beta_2 Leverage_{it-1} + \beta_3 Cash_{it-1} + \beta_4 Age_{it-1} + \beta_5 Size_{it-1} + \beta_6 Inv_{it-1} + \sum YearIndicator + \sum IndustryIndicator + \varepsilon_{it} \quad (1)$$

where  $Inv_{it}$  represents the investment expenditures of firm  $i$  at current year  $t$ , measured by the ratio of capital expenditures to total assets.  $OPP_{it-1}$  are the previous year investment opportunities. Investment opportunities are measured by Tobin's Q (1969),  $Tobin_{it-1}$ . Alternatively we measure investment opportunities by the growth rate of operating income,  $Growth_{it-1}$ .  $Leverage_{it-1}$  is the previous year total debt ratio.  $Cash_{it-1}$  is the previous year ratio of cash and cash equivalent to total assets.  $Age_{it-1}$  is age of the firm.  $Size_{it-1}$  is the firm size, measured by the logarithm of its total assets.  $Inv_{it-1}$  is the lagged investment. Year Indicator and Industry Indicator are dummy variables. The error terms of Equation(1) is our estimate of the overinvestment. Table 2 provides statistical description for these variables.

### Hypotheses and Methods

Firms with credit lines have more ability to overinvest than firms without them. Since credit lines usually are cheaper than spot loans, they can act as alternative low cost loans. According to Sufi (2009), banks are likely to provide credit lines to financially healthy firms. Therefore, firms with credit lines usually have more free cash flow and liquidity than firms without. With more flexibility and lower cost of loans, firms with credit lines have more freedom to invest. Richardson (2006) pointed out that free cash flow can lead to overinvestment. We argue that lines of credit can also lead to overinvestment.

Since credit lines give firms an option to freely borrow from a bank in any amount up to a specified limit at a specified price, firms are more likely use these options to explore favorable investment projects. Avery and Berger (1991) found that speed of action and pursuit of investment opportunities are primary reasons for credit line use. Duan and Yoon (1993) showed that low credit line interest rates cause firm overinvestment. Martin and Santomero (1997) further explored the relationship between investment opportunities and demand for lines of credit. Based upon these arguments, our first hypothesis is,

*H1: Credit lines provide incentive to overinvestment.*

State-owned firms are government controlled and their investment decisions are frequently influenced by government policies. Local government officials are interested in regional economic growth and GDP targets which are linked to promotion and benefits. Such performance pressure and incentives push government officials to take advantage of recourses in State-owned firms to achieve their political goals. Sometimes negative NPV investments are undertaken because of government official interference, as long as the project temporarily brings employment and growth to their area. Local branches of State-owned banks usually maintain close relationships with local government officials to gain the government support. Thus, State-owned firms can access lines of credits easily, and make more investments.

Managers of State-owned firms have a stronger incentive to overinvest than private-owned firms. Their salaries are capped because of the State-owned nature. Therefore, pursuing expansion and investments is rational to obtain more implicit benefits. Based on these reasons, our second hypothesis is:

*H2: The State-owned firms are more likely to overinvestment than private-owned firms.*

Table 2: Statistical Description of Variables

Variable	Mean	Minimum	25% Percentile	50% Percentile	75% Percentile	Maximum	Standard Deviation
<i>LOC</i>	0.025	0.000	0.000	0.000	0.000	1.881	0.101
<i>Excess</i>	0.000	-0.343	-0.029	-0.011	0.016	0.662	0.054
<i>Invst</i>	0.064	0.000	0.015	0.043	0.089	0.749	0.067
<i>FCF</i>	0.021	-0.934	-0.030	0.052	0.128	0.372	0.198
<i>HHI5</i>	0.230	0.020	0.104	0.184	0.317	1.151	0.177
<i>Magstk</i>	0.015	0.000	0.000	0.000	0.000	0.502	0.073
<i>Tobin</i>	1.265	0.487	0.867	1.069	1.438	4.312	0.653
<i>Growth</i>	0.135	-1.220	-0.008	0.138	0.290	1.492	0.364
<i>Leverage</i>	0.481	0.079	0.349	0.486	0.616	0.922	0.186
<i>Cash</i>	0.159	0.004	0.074	0.129	0.213	0.562	0.118
<i>Age</i>	9.235	0.000	6.000	9.000	12.000	27.000	4.149
<i>Size</i>	21.236	19.124	20.556	21.130	21.829	24.171	0.989

The table reports summary statistics of variables. *LOC* is the ratio of credit lines to the total assets; *Excess* is the overinvestment variable using Richardson (2006)'s measurement; *Invst* is the investment expenditures measured by the ratio of capital expenditures to total assets; *FCF* is the free cash flow; *HHI5* is the level of ownership concentration measured by the squared ratio of the first five largest shareholdings to the total outstanding shares; *Magstk* is the ratio of managers' stock holding to total outstanding shares; *Tobin* is the ratio of firm's market value to its replacement costs. *Growth* is the growth rate of operating income; *Leverage* is the total debt ratio; *Cash* is the ratio of cash to the total assets; *Age* is the firm age. *Size* is the firm size measured by the logarithm of its total assets.

To test our hypothesis, we first set up the following regression model to examine effects of credit lines on the overinvestment:

$$Excess_{it} = \alpha + \beta_1 Creditline_{it} + \beta_2 FCF_{it} + \beta_3 HHI5_{it} + \beta_4 Magstk_{it} + \beta_5 SOE_{it} + \varepsilon_{it} \quad (2)$$

where, *Excess<sub>it</sub>* is the overinvestment variable;  $\alpha$  is a constant term; *Creditline* is the lines of credit; *FCF<sub>it</sub>* is the free cash flow; *HHI5* is the level of ownership concentration measured by the squared ratio of the first five largest shareholdings to the total outstanding shares; *Magstk* is the ratio of the managers' stock holding; *SOE* is the ownership dummy variable (=1 if State-owned firm; and 0 otherwise); and  $\varepsilon_{it}$  is an error term.

To control for factors, other than the level of credit lines, which can jointly affect firm's overinvestment, we include in Equation (2) a set of control variables that are likely correlated with a firm's credit lines. Richardson (2006) found that overinvestment activities are more concentrated in firms with large free cash flows. Therefore, we incorporate free cash flow as a control variable. In addition, we include corporate governance factors such as the ownership concentration, and managerial shareholding. Finally we include an ownership dummy variable to examine the overinvestment behavior of the State-owned and the private owned firms. In order to make more reliable statistical inference on Equation (2), we follow Peterson (2009)'s suggestion to use robust standard errors clustered at the firm level. To investigate the impact of credit lines on overinvestment under different ownership structure, we add an ownership dummy variable jointly with bank credit lines,  $SOE_{it} \times Creditline_{it}$ , to Equation (2), and yield,

$$Excess_{it} = \alpha + \beta_1 Creditline_{it} + \beta_2 FCF_{it} + \beta_3 HHI5_{it} + \beta_4 Magstk_{it} + \beta_5 SOE_{it} + \beta_6 SOE_{it} \times Creditline_{it} + \varepsilon_{it} \quad (3)$$

In addition, we divide our whole sample into the State-owned firms and private firms to examine bank credit lines' impacts on the overinvestment controlling free cash flow and other constraints. Specifically

we add a joint variable of the free cash flow with credit lines,  $FCF \times Creditline$ , to Equation (2), which yields,

$$Excess_{it} = \alpha + \beta_1 Creditline_{it} + \beta_2 FCF_{it} + \beta_3 HHI5_{it} + \beta_4 Magstk_{it} + \beta_5 FCF_{it} \times Creditline_{it} + \varepsilon_{it} \quad (4)$$

## RESULTS

We divide all firms into two groups, depending on whether they receive credit lines, to compare their variable characteristics. Table 3 provides the summary statistics for these two groups in first differences. All variables are statistically significant. We find that firms with bank lines of credit show significantly more overinvestment than firms without them (t-value = 2.759). Similarly we find firms with lines of credit have more investment expenditures, larger size, and more free cash flow available.

Table 3: T- Tests for Group Differences

	With Credit Lines	Without Credit Lines	T-value
<i>Excess</i>	0.004	-0.001	2.759***
<i>Invte</i>	0.068	0.063	2.657***
<i>Size</i>	21.443	21.206	8.658***
<i>FCF</i>	0.053	0.016	6.590***
<i>Leverage</i>	0.511	0.477	6.710***
<i>HHI5</i>	0.245	0.227	3.674***
<i>Magstk</i>	0.029	0.013	7.284***

The table reports the T-test results on the differences between the group of firms with credit lines and those without credit lines. *Excess* is the overinvestment variable using Richardson (2006) measurement; *Invte* is the investment expenditures measured by the ratio of capital expenditures to total assets; *FCF* is the free cash flow; *HHI5* is the level of ownership concentration measured by the squared ratio of the first five largest shareholdings to the total outstanding shares; *Magstk* is the ratio of managers' stock holding. \*\*\* denotes significance at the 1% level.

Table 4 shows the impact of credit lines on overinvestment. Model (1)-(3) of Table 4 use the credit lines variable *Creditdum* to compare overinvestment behavior of firms with credit lines to firms without them. *Creditdum* is 1 if a firm gets lines of credit and 0 otherwise. Model (1) presents a significantly (at the 10% level) positive relationship between the access to credit lines and the overinvestment after controlling the free cash flow influence. Model (3) adds a joint variable,  $SOE \times Creditdum$ , to analyze the difference in overinvestment behavior between State-owned and private-owned firms. We find that within the credit lines group, State-owned firms tend to overinvest more than the private-owned firms.

Model (4)-(6) of Table 4 further investigate the impacts of the level of credit lines on overinvestment among firms with credit lines. We use the quantitative variable LOC, ratio of credit lines to the total assets, to measure the amount of credit lines. We find no significant impact credit line level on overinvestment. Given that only a small number of firms (less than 25% of listed firms) received credit lines, it appears that obtaining credit lines itself has strong influence on the firms' overinvestment behavior, while the level of credit line has relatively weak influence.

Table 5 divides firms within credit lines group into state-owned and private-owned firms to examine overinvestment behavior. Results from Model (1) and (2) indicate that only State-owned firms overinvest (t value = 0.005. No indication of overinvestment is found for private-owned firms. The results are consistent with our hypotheses that State-owned firms are more likely to overinvest than private-owned firms. Model (3) and (4) show the combined effects of bank credit lines and free cash flow on overinvestment. Both State and private-owned firms overinvest when free cash flows are high. From the joint effect variable,  $FCF \times Creditdum$ , we find that credit lines accelerate free cash flow for State-owned firms, indicating State-owned firms have stronger incentives to overinvest than private firms.

Table 4: Test Results of Credit Lines on Overinvestment

	Whole Sample			Sample with Credit Lines		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Creditdum</i>	0.003*	0.003*	-0.002			
	(1.79)	(1.79)	(-0.69)			
<i>LOC</i>				0.008	0.011	0.024
				(0.88)	(1.21)	(1.45)
<i>FCF</i>	0.038***	0.038***	0.039***	0.069***	0.077***	0.077***
	(10.23)	(9.47)	(9.49)	(6.33)	(6.02)	(6.01)
<i>SOE</i>		-0.001	-0.002		0.005	0.008
		(-0.78)	(-1.48)		(1.43)	(1.58)
<i>HHIS</i>		-0.005	-0.005		-0.006	-0.006
		(-1.48)	(-1.44)		(-0.64)	(-0.63)
<i>Magstk</i>		0.020**	0.023**		0.014	0.012
		(2.16)	(2.37)		(0.86)	(0.70)
<i>SOE × Creditdum</i>			0.008**			
			(2.13)			
<i>SOE × LOC</i>						-0.018
						(-0.86)
<i>Constant</i>	-0.001**	0.000	0.001	-0.001	-0.005	-0.007
	(-2.15)	(0.10)	(0.61)	(-0.63)	(-1.20)	(-1.45)
N	9498	8866	8866	1408	1271	1271
R <sup>2</sup>	0.020	0.020	0.021	0.039	0.047	0.047
F	55.762	22.637	19.573	21.509	8.840	7.386

The table reports results for the regression:  $Excess_{it} = \alpha + \beta_1 Creditline_{it} + \beta_2 FCF_{it} + \beta_3 HHIS_{it} + \beta_4 Magstk_{it} + \beta_5 SOE_{it} + \beta_6 SOE_{it} \times Creditline_{it} + \varepsilon_{it}$ . *Excess* is the overinvestment variable. *Creditline* is the credit lines variable, either a dummy variable indicating whether the firm has access to lines of credit (*Creditdum*) or the ratio of lines of credit to firm's total assets (*LOC*). *FCF* is the free cash flow; *HHIS* is the level of ownership concentration; *Magstk* is the ratio of managers' stock holding; *SOE* is the ownership dummy variable (=1 if state-owned; and 0 otherwise). Columns (1)-(3) show results for the full sample of listed firms. Columns (4)-(6) show results for the sample of firms with credit lines. The t-values are in the parentheses. \*\*\*, \*\* and \* indicate significance at the 1, 5 and 10 percent levels respectively.

Our previous analysis of the impact of credit lines is based upon the assumption that obtaining credit lines is exogenously given. However, approval of credit lines is not a random event. As Sufi (2009) and Jimenez et al. (2009) pointed out, firms' ability to obtain credit lines is related to their own characteristics, such as profitability, growth potential, cash flow, debt ratio and firm size. To control for endogeneity, we use Heckman's (1979) two-step method, Treatment Effects Model, to re-estimate the results.

We first use the following Probit model to predict the access ability to credit lines,

$$Creditdum_{it} = \alpha + \beta_1 Invt_{it-1} + \beta_2 ROA_{it-1} + \beta_3 Tobin_{it-1} + \beta_4 Cflow_{it-1} + \beta_5 Size_{it-1} + \beta_6 Age_{it-1} + \beta_7 Leverage_{it-1} + \beta_8 Tang_{it-1} + \varepsilon_{it} \tag{5}$$

From Equation (5), we get the Inverse Mills Ratio, and then take it as an extra control variable to add to Equation (2) and (3). The results are consistent with our previous estimates.

Our estimate of overinvestment also depends on the measurement of investment opportunity. The Tobin's Q measurement may be subject to some estimation error in Equation (1). Therefore, we replace Tobin's Q with the growth rate of operating income to re-estimate the overinvestment in Equation (1), while at the same time we take into account for the endogenous selection bias. We do not find any significant change in the results after the replacement.

Table 5: Results of Credit lines on Overinvestment for the State-owned and Private-owned firms

	(1)	(2)	(3)	(4)
	State-owned	Private-owned	State-owned	Private-owned
<i>Creditdum</i>	0.005** (2.58)	-0.002 (-0.54)	0.003 (1.60)	-0.003 (-1.10)
<i>FCF</i>	0.049*** (8.96)	0.023*** (4.30)	0.046*** (8.04)	0.021*** (3.87)
<i>HHI5</i>	-0.008* (-1.78)	-0.000 (-0.03)	-0.008* (-1.76)	-0.001 (-0.09)
<i>Magstk</i>	-0.042 (-0.91)	0.030*** (2.98)	-0.046 (-1.01)	0.028*** (2.77)
<i>FCF × Creditdum</i>			0.042** (2.47)	0.034* (1.75)
<i>Constant</i>	-0.001 (-0.76)	-0.000 (-0.15)	-0.001 (-0.69)	-0.000 (-0.08)
N	6290	2576	6290	2576
R <sup>2</sup>	0.026	0.016	0.027	0.017
F	22.477	8.735	19.387	7.902

The table reports results for following regression:  $Excess_{it} = \alpha + \beta_1 Creditdum_{it} + \beta_2 FCF_{it} + \beta_3 HHI5_{it} + \beta_4 Magstk_{it} + \beta_5 FCF_{it} \times Creditdum_{it} + \varepsilon_{it}$ . *Excess* is the overinvestment; *Creditdum* is a dummy variable indicating whether the firm has access to lines of credit; *FCF* is the free cash flow; *HHI5* is the level of ownership concentration; *Magstk* is the ratio of managers' stock holding. Columns (1) and (3) show results for the State-owned firms. Columns (2) and (4) show the results for the private-owned firms. The t-values are in the parentheses. \*\*\*, \*\* and \* indicate significance at the 1, 5 and 10 percent levels respectively.

## CONCLUDING COMMENTS

Existing financial research suggests that credit lines provide speed and flexibility for firms in pursuit of investment opportunities, and such flexibility can also lead to overinvestment. We conduct an empirical analysis on the role of credit lines in the overinvestment behavior of Chinese firms during the period between 2001 and 2008. We utilize Richardson's (2006) method to estimate overinvestment and set up two hypotheses: Credit lines provide incentives to overinvest and State-owned firms are more likely to overinvest than private firms.

We find evidence that bank credit lines, similarly to free cash flows, are vulnerable to abuse by managers of firms in China and therefore, they can cause agency problems. These findings are consistent with Sufi's (2009) arguments. However, we find such overinvestment behavior is limited to State-owned firms with credit lines. We find no evidence of overinvestment activities for private-owned firms. We attribute this fact to differential abilities for obtaining bank credit lines. Private-owned firms have a disadvantage in competing for bank credit lines comparing to State-owned firms, and therefore, they use approved credit lines more carefully. On the other hand, all major Chinese banks are owned or controlled by the government. They have a preference to provide credit lines to State-owned firms. With cheaper costs and easier access to credit lines, State-owned firms have a stronger incentive to overinvest.

The results found in this paper show that excess liquidity and bank credit resources concentrated in State-owned enterprises lead to distortions in the efficiency of capital allocation and investment. Future reforms in the banking system and easier access to bank credit resources for private-owned firms are necessary in China. Although the focus in this paper is the linkage between credit lines and overinvestment, we do not rule out the possibility that bank credit lines can also increase investment efficiency by reducing financing constraints or facilitating cash management. This can even occur for State-owned enterprises in some cases. Thus, identifying the trade-off between the positive and negative effects of bank credit lines and examining the relationship between bank credit lines and investment



efficiency in different situations is an interesting topic for further investigation.

## REFERENCE

- Agarwal S., S. Chomsisengphet and J. Driscoll (2004) "Loan Commitments and Private Firms," FEDS Working Paper No. 2004-27.
- Almeida H., M. Campello and M. Weisbach (2004) "The Cash Flow Sensitivity of Cash," *The Journal of Finance*, Vol. 59 p. 1777-1804.
- Avery R. B. and A. N. Berger (1991) "Loan Commitments and Bank Risk Exposure," *Journal of Banking and Finance*, Vol. 15(1) p. 173-192.
- Berger A. and G. Udell (1995) "Relationship Lending and Lines of Credit in Small Firm Finance," *Journal of Business*, Vol. 68 p. 351-381.
- Berkovitch E. and S. Greenbaum (1991) "The Loan Commitment as An Optimal Financing Contract," *Journal of Financial and Quantitative Analysis*, Vol. 26 p. 83-95.
- Boot A., A. V. Thakor and G. F. Udell (1987) "Competition, Risk Neutrality, and Loan Commitments," *Journal of Banking and Finance*, Vol. 11 (September) p. 449-471.
- Boot A., A. V. Thakor and G. F. Udell (1991) "Credible Commitments, Contract Enforcement Problems and Banks: Intermediation as Credibility Assurance," *Journal of Banking and Finance*, Vol. 15 (June) p. 605-632.
- Campbell T. S. (1978) "A Model of the Market for Lines of Credit," *Journal of Finance*, Vol. 33 (March) p. 231-244.
- Dennis S., D. Nandy and I. G. Sharpe (2000) "The Determinants of Contract Terms in Bank Revolving Credit Agreements," *Journal of Financial and Quantitative Analysis*, Vol. 35 p. 87-110.
- Duan J. C. and S. H. Yoon (1993) "Loan Commitments, Investment Decisions and The Signaling Equilibrium," *Journal of Banking and Finance*, Vol. 17 (4) p. 645-661.
- Faulkender M. and R. Wang (2006) "Corporate Financial Policy and The Value of Cash," *Journal of Finance*, Vol. 61 p. 1957-1990.
- Ham J. C. and A. Melnik (1987) "Loan Demand: An Empirical Analysis Using Micro Data," *Review of Economics and Statistics*, Vol. 69 (November) p. 704-709.
- Hawkins G. D. (1982) "An Analysis of Revolving Credit Agreements," *Journal of Financial Economics*, Vol. 10 (March) p. 59-81.
- Jensen M. And W. Meckling (1976) "Theory of The Firm: Managerial Behavior, Agency Costs, and Capital Structure," *Journal of Financial Economics*, Vol. 3 p. 305-360.
- Jimenez G., J. Lopez and J. Saurina (2009) "Empirical Analysis of Corporate Credit Lines," *Review of Financial Studies*, Vol. 22 p. 5069-5098.
- Kashyap A. K, J. C. Stein and D. W. Wilcox (1993) "Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance," *American Economic Review*, Vol. 83 (March) p. 78-98.
- Maksinovic V. (1990) "Product Market Imperfections and Loan Commitments," *Journal of Finance*, Vol.

45 (December) p. 1641-1655.

Martin J. S. and A. M. Santomero (1997) "Investment Opportunities and Corporate Demand for Lines of Credit," *Journal of Banking and Finance*, Vol. 21 (October) p. 1331-1350.

Melnik, A. and S. Plaut (1986) "Loan Commitment Contracts, Terms of Lending, and Credit Allocation," *Journal of Finance*, Vol. 41 (June) p. 425-435.

Morgan D. P. (1994) "Bank Credit Commitments, Credit Rationing, and Monetary Policy," *Journal of Money, Credit and Banking*, Vol. 26 (February) p. 87-101.

Petersen M. A. (2009) "Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches," *Review of Financial Studies*, Vol. 22 p. 435-480.

Richardson S. (2006) "Over-Investment of Free Cash Flow," *Review of Accounting Studies*, Vol. 11 p. 159-189.

Shockley R. L. and A. V. Thakor (1997) "Bank Loan Commitment Contracts: Data, Theory, and Tests," *Journal of Money, Credit and Banking*, Vol. 29 (November) p. 517-534.

Sofianos G., P. Wachtel and A. Melnik (1990) "Loan Commitments and Monetary Policy," *Journal of Banking and Finance*, Vol. 14 (October) p. 677-689.

Sufi A. (2009) "Bank Lines of Credit in Corporate Finance: An Empirical Analysis," *Review of Financial Studies*, Vol. 22 p. 1057-1088.

Thakor A.V. and G. F. Udell (1987) "An Economic Rationale for The Pricing Structure of Bank Loan Commitment," *Journal of Banking and Finance*, Vol. 11(2) p. 271-289.

Tobin J. (1969) "A General Equilibrium Approach to Monetary Theory," *Journal of Money, Credit and Banking*, Vol. 1 p. 15-29.

## ACKNOWLEDGEMENT

The authors are grateful for the financial support from National Natural Science Foundation (No. 70902024 and No. 71003108), and Guangdong Soft Science Foundation (No.2011B070400008, No.2011B070300024).

## BIOGRAPHY

Qianwei Ying is Assistant Professor, Lingnan College, Sun Yat-sen University, 135 Xingang Xi Road, Guangzhou, China, 510275. He can be reached at: [yingqianwei@gmail.com](mailto:yingqianwei@gmail.com).

Danglun Luo is Associate Professor, Lingnan College, Sun Yat-sen University, 135 Xingang Xi Road, Guangzhou, China, 510275. He can be reached at: [luodl@mail.sysu.edu.cn](mailto:luodl@mail.sysu.edu.cn).

Lifan Wu is Professor of Finance at California State University, Los Angeles. His research appears in journals such as *Journal of Business Finance and Accounting*, *Global Finance Journal*, *Applied Financial Economics*, *International Journal of Finance*, *Asia-Pacific Financial Market*, and *Journal of Financial and Quantitative Analysis*. He can be reached at: [lwu7@castatela.edu](mailto:lwu7@castatela.edu).