Macroeconomic Uncertainty, Earnings Management, and Investment Opportunities

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ABSTRACT

The earning management level of a firm can impact the investment opportunities of it. Across to our investigation, the higher level of earning management, the more investment opportunities a firm will get. And when the level of economic uncertainty rises, the positive effect of earning management to investment opportunities will be weaken. The unlimited controlling party of the firms plays a big role on causing these effects.

Keywords: Earnings management, investment opportunities, Tobin's q, macroeconomic uncertainty

1. INTRODUCTION

Bruns and Merchant (1990) discussed the morality about earnings management [1]. Based on Keating and Zimmerman (1999) earnings management will change the investment opportunity incentives [2]. Kaplan, McElroy, Ravenscroft and Shrader (2007) discussed the consequences of earnings management [3]. Belski, Beams, and Brozovsky (2008) examines ethics about managed earnings [4]. In this paper, We test whether investment Aopportunities of high and low earnings management firms are significantly different, and, if so, what the effects of earnings management levels are on the amount of investment opportunities. Previous study of Roychowdhury (2006) argue that earnings management is determined by five indicators [5]. We therefore use these five indicators as measurements of earnings management. Evidence that macroeconomic uncertainty limited earnings management and the real investment opportunities is indicated by Boyle, Guthrie (2003) Baum at el. (2006), and Bloom at al. (2007) [6-8]. And we make another test on whether investment opportunity to earnings management differs by the ultimate control party.

We use one measure that reflect economic conditions (macroeconomic uncertainty) and five measures that reflect earnings management (CFO, COGS, change in inventory, discretionary expenses and production costs). Following Bolton, Hui and Neng (2011), we use q to measure investment opportunities [9]. It is likely that the macroeconomic uncertainty affects earnings management, so macroeconomic uncertainty is regressed on earnings management variables, and the residuals from these regressions are used as the earnings management proxies in our tests.

Our study provides five sets of test based on q theory of investment, first developed by Tobin in 1969 [10]. In the first test, we center on two assumptions. Firstly, we assume that high earnings management firms tend to get more investment opportunities, and low level of earnings management firms tend to get less investment opportunities. The second assumption is that during the period that the level of macroeconomic uncertainty decreases, the positive effect of earning management to investment opportunities will be strengthen.

Given the literature of Roychowdhury (2006), liao, Bibo, and Hao (2014), we follow them to consider the variables of market-to-book ratio, debt, accounts, stock, size and leverage [5, 11]. In our first test above, we regulate our control variables and then assume that all control variables are equal. Here, to eliminate the possibility that the result between earnings management and Tobin's q is influenced by our control variables, we make our second test to our control variables by psmatch2 to complete and perfect our test above. Pamatch2 is a matching method that creates a new observation sample. Because we pair low earnings management firms with high earnings management firms based on these control variables, and then keep the paired samples and get rid of the samples unqualified. In our new sample, there is no dramatic difference among these variables. Next, we use the new sample to make cluster robust standard deviation and robust standard deviation adjustment and get new regressions. And if the coefficients in our new regression is still significant after we reject the unqualified firms, the result in our above test can be used; while if the result is not significant, then the control variables do have influence on the q rather than earnings management itself and hence the result above cannot be used.

In our regressions, there is a possibility that sample selection bias can result in bias estimates and statistical inferences. Hence, our third test tries to use the Heckman two-stage model to amend the estimation bias resulting from this deviation. In the first stage, we create a Probit model with our full sample to find some given

characteristics in firms which show high earnings management level. And in our second stage, we calculate the Inverse Mills Ratio for each sample variable based on the Probit model in stage one. We can get a value for each sample to correct the sample selection bias by using the Inverse Mills Ratio. And we could get the regression parameter by adding the inverse mills ratio into our original regressions. Finally, we just need to observe the significance of the independent variable- Inverse Mills Ratio-in our regression of stage two. If the independent variable is insignificant, then there is no sample selection bias in our beginning regression; therefore, we could use the original coefficients to get the result. While if the variable of Inverse Mills Ratio is significant, then there is sample selection bias in our regression; hence, we should use the coefficients in our second-stage regressions to get the statistical inference.

Following liao, Liu and Wang(2014), we split firms into state-owned -enterprises and non- state-owned -enterprises to test our first two propositions [11]. The split-share structure was a legacy of China's initial share issue privatization (SIP), in which state-owned enterprises(SOEs) went public to issue monitory tradable shares to institutional and individual investors. Therefore, our fifth test is made to check whether the changes of investment opportunities are influenced by the ultimate control party rather than earnings management itself. If the coefficients for SOEs or non-SOEs are consistent with our first test, then the result of the first result can be used for the corresponding ultimate control party. If the coefficients are not consistent with our first test, then the conclusion cannot be got for the corresponding ultimate control party.

We carry out analyses by a sample of Chinese firms over 16 years. We find that q to earnings management are lower during periods with high level of macroeconomic uncertainty. We find that firms with high earnings management levels get more investment opportunities, and firms with low earnings management level get less investment opportunities. And during periods with high macroeconomic uncertainty, the positive effect of earnings management on investment opportunity reduces; during the low macroeconomic uncertainty periods, the positive effect of earnings management on investment opportunities increases.

We also find that after testing the control variables, sample selection bias, the coefficients of earnings management are still positive and statistically significant and there is not much difference between the coefficients. However, q to earnings management is more sensitive for non-SOEs than for SOEs, with the same trend above.

This section introduce the paper. Section II illustrates sample, variables and descriptive statistics. Section III discusses regressions and empirical findings. Section IV conclude this paper.

2. SAMPLES VARIABLES AND SUMMARY STATISTICS

2.1. Sample and Firm-Level Variables

Table 1 reports summary statistics for the primary variables used in this study. For each variable, we show the observation numbers, pooled average, standard deviation, minimum, 50th percentiles and maximum values. Earnings management 1 to 5 are quarterly indicator variables from (2006). Tobin's q is measured as the log of market value of equity, minus the book value equity, plus the book value of assets, all scaled by the book value of assets. Market-to-book ratio is market value of equity divided by book value of equity. Debt is long or short term liabilities. Accounts is accounts receivable scaled by lagged assets. Stock is inventory scaled by lagged assets. Size is logarithm of the market value of equity at the beginning of the quarter. Leverage is total labilities scaled by lagged assets. Macroeconomic uncertainty is conditional variance of quarterly real GDP. SOE is equal to one if ultimate controlling party of the firm is state, and zero otherwise.

We select our sample from all of the China listed firms in the WIND database during the years 2001 through 2016, which is the sample period that China has joined WTO and started to make changes. We exclude financial firms, utility firms and stocks using 'ST' as their initial name. We exclude organizations without positive book values of equity, and organizations with less than $10 million book value of assets. We winsorize each of the accounting variables at the top and bottom 1% to reduce the effect of outliers.

Firm-level variables:

Earnings management. Based on Healy and Wahlen (1999), "Earnings management occurs when managers use judgement in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting practices." [12]. Following Roychowdhury's steps [5], we build 5 indicators (earnings management 1 to 5) to measure earnings management as following:

Earnings Management 1. EM1 is measured as normal operating cash flow scaled by total assets of previous period. We run the following regression and control firm fixed effect and quarter fixed effect to estimate the model of normal cash flow from operations:

$$\frac{CFO_t}{A_{t-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{A_{t-1}}\right) + \beta_1 \left(\frac{S_t}{A_{t-1}}\right) + \beta_2 \left(\frac{\Delta S_t}{A_{t-1}}\right) + \varepsilon_t \quad (1)$$

Where A_t is the total assets at the end of period t, S_t is the sales during period t and $\Delta S_t = S_t - S_{t-1}$.

Table 1 Summary Statistics

Variable	N	Mean	SD	Min	p50	Max
Earnings Management1	100000	0.047	0.046	0.000	0.033	0.211
Earnings Management2	100000	0.045	0.051	0.000	0.027	0.252
Earnings Management3	97000	0.028	0.030	0.000	0.018	0.143
Earnings Management4	100000	0.023	0.028	0.000	0.016	0.184
Earnings Management5	96000	0.045	0.058	0.000	0.027	0.435
q	120000	2.225	1.988	0.215	1.628	11.370
Market-to-Book	120000	0.879	0.818	0.088	0.614	4.648
Debt	93000	1.818	5.480	0.000	0.275	42.100
Accounts	110000	0.090	0.074	0.001	0.071	0.368
Stock	110000	0.167	0.154	0.000	0.129	0.778
SIZE	120000	21.770	1.264	19.210	21.610	25.700
Leverage	120000	0.448	0.217	0.045	0.447	1.013
Macroeconomic uncertainty	120000	0.835	0.400	0.384	0.650	1.963
SOEs	110000	0.465	0.499	0.000	0.000	1.000

Earnings management 2. We first change CFO into COGS and exclude the $\beta_2 \left(\frac{\Delta S_t}{A_{t-1}} \right)$ term in regression (1), then run the new regression to estimate EM2.

Earnings management 3. We change CFO in equation (1) into change in inventory ΔINV_t to estimate EM3.

Earnings management 4. We change CFO into production costs and then add $\beta_3 \left(\frac{\Delta S_{t-1}}{A_{t-1}} \right)$ term in equation (1) to estimate EM4.

Earnings management 5. We change CFO into discretionary expenses and exclude the $\beta_2 \left(\frac{\Delta S_t}{A_{t-1}} \right)$ term in equation (1) to estimate EM5.

Tobin's q(q). According to Baker, Stein, and Wurgler (2003), Tobin's q is measured as the log of market value of equity, minus the book value equity, plus the book value of assets, all scaled by the book value of assets.

(log([MV of equity – BV of equity + BV of assets]/BV of assets)). We define tobin's q as the average amount of each quarter [13].

Market-to-book Ratio. Market to book ratio is measured as market value of equity divided by book value of equity.

Debt. Debt is measured by long-term-liabilities divided by short-term-liabilities. We define long term liabilities as liabilities more than two years (eight quarters), otherwise short term liabilities.

ACCOUNTS: Accounts is measured as accounts receivable scaled by total assets of the previous quarter.

STOCK. Stock is measured as inventory scaled by total assets of the previous quarter.

SIZE. Size is measured as the logarithm of the market value of equity at the beginning of the quarter.

Leverage (LEV). Leverage is measured as total labilities scaled by total assets of the previous quarter.

State-Owned-Enterprise (SOE). we classify a firm as SOE if the ultimate controlling party of the firm is the state, non-SOE otherwise and we measure SOE using a dummy variable that is equal to one if the firm is SOE, and zero otherwise. We obtain data on annual financial reports where listed Chinese firms disclose their ultimate controlling parties.

2.2. Measuring Economic Conditions

Macroeconomic uncertainty (MU). According to Driver & Moreton (1991), Talavera et al. (2012), we use the conditional variance of quarterly real GDP as an index to measure macroeconomic uncertainty [14, 15].

3. MACROECONOMIC UNCERTAINTY, EARNINGS MANAGEMENT, AND INVESTMENT OPPORTUNITIES

3.1. Regression Framework

This section presents our empirical framework linking investment opportunities, earning management, control variables and macroeconomic uncertainty together. We start with considering a representative, quarterly regression of investment opportunity q on earnings management and control variables:

$$tobinq_{i,t} = \beta_1 EM_{i,t} + \sum_{j=1}^{n} \beta_j Controls_{j,i,t} + \varepsilon_{i,t} \quad (2)$$

Table 2 Investment opportunities with low and high earnings management activities

Variable	Low earnings management	High earnings management	Mean Difference
Tobinq(EM1)	2.131	2.283	-0.151***
Tobinq(EM2)	2.056	2.573	-0.517***
Tobinq(EM3)	1.818	2.647	-0.829***
Tobinq(EM4)	2.217	2.308	-0.091***
Tobinq(EM5)	2.168	2.27	-0.102***

Since equation (2) is estimated on a quarter basis, we acquire time series of quarterly β_1 coefficient. Next, to understand how macroeconomic uncertainty (MU) influence investment opportunities (q) to earnings management(EM), we use the regression of the quarterly β_1 coefficient on measures of macroeconomic uncertainty (MU) :

$$\beta_1 = \alpha_i + \beta_2 MU_t + \varepsilon_t \qquad (3)$$

The β_2 coefficient in equation (3) not only presents the marginal impact of MU on the EM coefficient, but also shows whether MU influence the cross-section of q. Petersen(2009) argues that the standard errors of the coefficients as a result of the first pass regression will be biased downward, if a persistent firm effect exists in the data (investment and q are both persistent)[16]. And Petersen (2009) indicates that standard errors clustered on firm and quarter are unbiased in this regression[16]. Hence, we substitute equation (3) into equation (2) and add quarter and firm fixed effects; finally, we get equation (4):

$$tobinq_{i,t} = \alpha_i + \beta_1 EM_{i,t} + \beta_2 EM_{i,t} * MU_t$$
$$+ \sum_{j=1}^{n} \beta_j Controls_{j,i,t} + \varepsilon_{i,t} \qquad (4)$$

The interactions in equation (4) estimates the marginal impacts of MU on the EM coefficient, just as the slop coefficient in equation(3). In equation (4) the β_1 and β_2 coefficients test our hypothesis that investment opportunities (q) to earnings management is higher when there is less macroeconomic uncertainty. As mentioned above, earning management level should be higher with low macroeconomic uncertainty, so our framework predicts that β_1 should be positive and β_2 should be negative.

The 5 earnings management indicators are all scaled by lagged total assets, but macroeconomic uncertainty is measured contemporaneously with investment opportunities q. It should be noted that equation (4) does not test whether the level of investment opportunities differs over time with MU. In equation (4), the quarter fixed effects effectively demean observations by the quarterly average, making q, earning management variables orthogonal to MU. This is the reason that we do not use MU itself in our regression; there is no explanatory power for quarterly time-series variables in regressions with quarterly fixed effects. Since we include quarterly fixed effects, the average levels of q and earnings managements within a given quarter related to other quarters have no influence on our coefficients.

3.2. Empirical Findings

3.2.1. Investment opportunities under low and high earnings management

Table 2 reports estimation of investment opportunities (q) with low and high earnings management activities separately.

We use earnings management variable to split the sample into two groups, one is low earnings management group, and the other is high earnings management. Then we compare the investment opportunities between those two groups. And the result in Table 2 demonstrates that the investment opportunities of low earnings management firms are significantly lower than the high earnings management firms. And the results is robust when we use other earnings management measures (EM2 to EM5).

3.3.2. Investment opportunities

Table 3 reports estimation of equation 4 where q is the dependent variable. In the equation 2, which does not include the interaction terms, the earnings management coefficient is positive and significant. The earnings management 1 coefficient is 5.131 (t-statistic=1.083). Because the earnings management 1 variable have standard deviations (SD) of 0.046, the regression illustrates that a 1-SD increase in earnings management 1 results in a 0.236 increase in q. Since q has a mean value of 2.225, this means a 10.61% increase. The coefficient of earnings management 2 is 6.391(t=1.008), with a SD of 0.051, showing that a 1-SD increase in EM2 leads to a 0.326 increase in q, which is about a 14.65% increase. The coefficient of earnings management 3 is 11.84 (t=1.974), with a SD of 0.030, showing that a 1-SD increase in EM3 leads to a 0.355 increase in q, which is about a 15.96% increase. The coefficient of earnings management 4 is 9.366 (t=1.855), with a SD of 0.028, showing that a 1-SD increase in EM4 leads to a 0.262 increase in q, which is about a 11.79% increase. The coefficient of earnings management 5 is 4.359 (t=0.844), with a SD of 0.058, showing that a 1-SD increase in EM5 leads to a 0.253 increase in q, which is about a 11.36% increase. Earnings management 3 has the largest coefficient(11.84) among those five independent variables, while earnings

management 5 has the lowest coefficient (4.359); however, all of them have significant influence on investment opportunity q.

Regressions 1-5 have interactions with macroeconomic uncertainty variable. The regressions show that investment opportunities q to earning management increases with the decease of macroeconomic uncertainty. All of the interactions in all regressions are statistically significant, showing that these effects are robust. The results suggest that firms with high level of earnings management activities tends to get more investment opportunities; and during the period that the level of macroeconomic uncertainty rises, the positive effect of earning management to investment opportunities will be weaken.

To observe the marginal impact of macroeconomic uncertainty, compare the overall coefficients using the minimum and maximum values of macroeconomic uncertainty (shown in Table 1). Considering equation (3) in the first regression, the overall earnings management 1 coefficient is 5.131-2.915x 0.384=4.012 during low macroeconomic uncertainty period and 5.131-2.915x 1.963=-0.591, or 115% lower, during high macroeconomic uncertainty period. And the overall coefficients for earnings management indicators 2,3,4 and 5 are 6.391-3.592x0.384=5.012, 11.84-3.710x0.384=10.415, 9.366-7.194x0.384=6.604, 4.359-3.020x0.384=3.200 during low macroeconomic uncertain period and 6.391-3.592x1.963=-0.660, 11.84-3.710x1.963=4.5573, 9.366-7.194x1.963=-4.756, 4.359-3.020x1.963=-1.569 during high macroeconomic uncertainty period respectively, indicating 113%, 56%, 172%, 149% lower respectively. Those results show that the macroeconomic uncertainty has significant marginal impact on investment opportunities(q) both economically and statistically.

3.2.3. Investment opportunities considering control variables

Table 4 reports estimation of equation 4 where q is the dependent variable while characteristic variables are controlled. Firstly, we use those characteristics of market-to-book, debt, accounts, size and leverage to pair low earnings management firms with high earnings management firms, and then exclude the firms cannot pair. There is a possibility that it is those characteristics that influence q rather than earnings management itself because firms with high earnings management and firms with low earnings management are significantly different in those characteristics.

Then, for those paired high and low earnings management firms, we take some measures to control those characteristics to test this possibility. And we find that the five earnings management coefficients are still positive and significant in equation (2), which does not include the interaction term. This result shows that earnings management still has significant influence on investment opportunity q after we controlled those characteristic variables.

Regressions 1 to 5 include an interaction with macroeconomic uncertainty. The five coefficients of earnings management are all positive and statistically significant, after excluding the influence of control variables on investment opportunities (q). Therefore, when there is a lot of macroeconomic uncertainty, investment opportunities without the influence of control variables become less affected by earnings management. This result is the same as reported in Table 3.

To evaluate the economic significance of the effects, consider the five regressions in Table 4, which include the earnings management activities without the influence of control variables but the macroeconomic uncertainty interactions. Assume that the macroeconomic uncertainty takes its mean value of 0.835 from Table 1. For example, In the first regression, the overall earnings management 1 coefficient is 5.014 without the influence of macroeconomic uncertainty and 5.014-2.693x 0.835=2.765, or 45% lower with the influence of macroeconomic uncertainty.

3.3.4. Investment opportunities considering sample selection bias

The findings in Table 5 show that earnings management has a positive effect on q but q to earnings management decreases with macroeconomic uncertainty. We posit that these results are caused by sample selection bias based on Heckman two-stage model. Applying that to our case, there may be some given characteristics in firms which show high earnings management level. However, firms presented as high earnings management enterprises are not the real high earnings management one but have those given characteristics in our linear regression. If this is the case, then the high and low earnings management firms groups are selected with bias and the result may be wrong. We test for this effect to check the significantly different dimensions which sample selection bias and we find that firms with some given characteristics are preferred to carry out earnings management activities.

Therefore, we run the regression in Table 5 after following Heckman's two-stage model to control the problem caused by sample selection bias. In Table 5, the value of invmills are all statistically significant except the one in the fourth regression, showing that there are selection bias in regressions (1),(2),(3),(5). While these regressions' earnings management coefficients are still positive and significant, indicating that earnings management still has significant influence on investment opportunity q even though there is sample selection bias in our regression. For regression (4), the value of invmills is not significant (0.560), showing that there is not sufficient evidence that sample selection bias is here or its influence on q to earnings management.

Regressions 1 to 5 include an interaction with macroeconomic uncertainty. All the multiplication terms of Earnings management and Macroeconomic Uncertainty are negative and significant; therefore, when there is more

macroeconomic uncertainty, investment opportunities becomes less influenced by earnings management when eliminating the effect of sample selection bias. This result is the same as reported in Table 3. After those measures to control the problem caused by sample selection bias, we could get that the influence of earnings management on q and the influence of macroeconomic uncertainty on q to earnings management are not caused by sample selection bias.

The results in Table 5 are consistent with the framework developed in the introduction part, which predicts that there are more investment opportunities with more earnings management activities during low macroeconomic uncertainty period after we correct the sample selection bias. The effects of macroeconomic uncertainty is statistical significant and economic significant.

3.3.5. By ultimate control

Table 6 reports the estimation of equation 4 for SOEs where investment opportunity q is the dependent variable. Considering the equation 2 first, which does not include interaction terms, the situations are different among these 5 regressions. In the first regression, the earnings management 1 coefficient is positive but insignificant, suggesting that higher q for SOEs is not significantly related to high earnings management activities and lower q for SOEs is not significantly related to low earnings management activities. And for regressions (2) to (5), earnings management coefficients are positive and significant at 10% level, suggesting that higher q for SOEs is related to high earnings management activities at 10% level of significance and lower q for SOEs is related to low earnings management activities at 10% level of significance. This is not consistent with Table 3.

Regressions 1 to 5 consider the influence of macroeconomic uncertainty. The regressions do not show that for SOEs, investment opportunities q to earnings management increases with the decease of macroeconomic uncertainty. These effects are not robust because interactions in the first, fourth and fifth regressions are negative and insignificant, and interactions in the second and third regressions are positive and insignificant. In the fourth regression, there is 10% level of significance that the overall earnings management 4 coefficient is 3.409 and 3.409-1.273=2.136 or 37% lower with macroeconomic uncertainty; earnings management 5 coefficient is 1.759 and 1.759-0.711=1.408, or 40% lower during the period with high level of macroeconomic uncertainty. Hence, there is not sufficient evidence that level of earnings management influence the investment opportunities (q) for SOEs and macroeconomic uncertainty will influence these effect of earnings management on investment opportunity for SOEs.

Table 7 reports the estimation of equation 4 for non-SOEs where investment opportunity q is the dependent variable. In the equation 2, which do not include the interaction terms, all earnings management variables are positive and

significant, consistent with the findings in Table 3. In the first regression, the earnings management 1 coefficient is positive and significant, suggesting that higher management firms are more likely to get a higher q for non-SOEs. The overall EM 1, 2, 3, 4, 5 coefficients are 5.450 (t=1.109), 8.335 (t=1.124), 16.18 (t=2.190), 10.73(t=2.042), 4.947(t=0.971) respectively. It is obvious that earnings management 3 has the largest coefficient of 16.18 among those five variables, indicating that level of earnings management 3 has largest influence on q among those five variables for non-SOEs.

Regressions 1 to 5 consider the influence of macroeconomic uncertainty. The regressions show that investment opportunities q to earnings management increases with the decease of macroeconomic uncertainty for non-SOEs. These effects are robust since all of the interactions in all regressions are positive and significant at 1% level. The overall coefficients of earnings management 1,2,3,4 ,5 and macroeconomic uncertainty are -3.568, -5.101, -5.856, -8.795, -3.664 separately. The results indicate that non-SOEs with high level of earnings management activities tends to get more investment opportunities; and during the period that the level of macroeconomic uncertainty rises, the positive effect of earnings management to investment opportunities for non-SOEs will be reduced.

4. CONCLUSION

The results in this paper suggest that earnings management has significant and independent effects on the investment opportunity. And macroeconomic uncertainty has effect on both earnings management and investment opportunities. Our findings base on some previous studies and we discuss them in the introduction part. In the rest sections, we move forward to combined the knowledge from previous studies together to get the result of our new findings. This paper use regression to completes the five sets of tests.

First, we develop regressions to test the relationship between earnings management and q. we classify earnings management into two groups which are high and low earnings management groups. We find that firms with high earnings management activities tend to get more opportunities and firms with low earnings management tent to get low opportunities. For the robustness, we test the situation with control variables, sample selection bias and ultimate controlling party. We get the same trend with the origin test and therefore the result is robust.

Among these five sets of tests considering various situations, macroeconomic uncertainty has a negative effect on investment opportunities to earnings management. The higher the macroeconomic uncertainty level, the less the positive effect earnings management have on investment opportunities. All of those findings are consistent with previous studies or derived based on previous studies mentioned in the introduction part.

Table 3 Investment opportunities

	(1)	(2)	(3)	(4)	(5)
Market-to-Book	-0.814***	-0.812***	-0.784***	-0.812***	-0.801***
	(0.0533)	(0.0534)	(0.0511)	(0.0541)	(0.0532)
Debt	0.00617***	0.00795***	0.00631***	0.00644***	0.00672***
	(0.00170)	(0.00172)	(0.00164)	(0.00176)	(0.00174)
Accounts	0.301	0.165	0.195	0.271	0.231
	(0.206)	(0.211)	(0.203)	(0.214)	(0.212)
Stock	-0.187*	-0.0900	0.0346	-0.113	-0.0881
	(0.0960)	(0.0943)	(0.0919)	(0.0949)	(0.0949)
Size	-0.203***	-0.216***	-0.189***	-0.218***	-0.205***
	(0.0257)	(0.0253)	(0.0239)	(0.0267)	(0.0262)
Leverage	-0.659***	-0.591***	-0.740***	-0.574***	-0.583***
Earnings Management1	5.131***				
	(1.083)				
EM1MU	-2.915**				
	(1.257)				
	(0.154)	(0.161)	(0.143)	(0.164)	(0.156)
Earnings Management2		6.391***			
		(1.008)			
EM2MU		-3.592***			
		(1.124)			
Earnings Management3			11.84***		
			(1.974)		
EM3MU			-3.710*		
			(2.144)		
Earnings Management4				9.366***	
				(1.855)	
EM4MU				-7.194***	
				(2.128)	
Earnings Management5					4.359***
					(0.844)
EM5MU					-3.020***
					(0.954)
intercept	7.273***	7.497***	6.818***	7.594***	7.291***
	(0.541)	(0.535)	(0.501)	(0.560)	(0.549)
Firm fixed effects	yes	yes	yes	yes	yes
Quarter fixed effects	yes	yes	yes	yes	yes
observations	82285	82295	78477	81574	77783
R^2 (within)	0.358	0.364	0.377	0.357	0.359

This table reports the results from our investment regressions. The dependent variable is q. see table 1 for variable definitions. All regressions include firm and fixed quarter effects. R^2 statistics reflect within firm variables. Standard errors are clustered on both firm and quarter fixed effects. Robust t-statistics are reported in the parentheses. *Significant at 10%;**significant at 5%;***significant at 1%.

Table 4 Investment opportunities considering control variables

	(1)	(2)	(3)	(4)	(5)
Market-to-Book	-0.888***	-0.862***	-0.970***	-0.873***	-0.825***
	(0.0617)	(0.0656)	(0.0661)	(0.0595)	(0.0613)
Debt	0.0101***	0.00705**	0.00163	0.00201	0.00649**
	(0.00261)	(0.00277)	(0.00222)	(0.00259)	(0.00297)
Accounts	0.386	0.449*	0.298	0.232	-0.00934
	(0.259)	(0.270)	(0.301)	(0.245)	(0.274)
Stock	-0.319***	-0.0862	-0.182	-0.181	-0.250*
	(0.115)	(0.127)	(0.133)	(0.136)	(0.139)
Size	-0.243***	-0.203***	-0.233***	-0.199***	-0.231***
	(0.0339)	(0.0274)	(0.0288)	(0.0281)	(0.0316)
Leverage	-0.290	-1.138***	-0.539***	-0.803***	-0.433*
	(0.210)	(0.178)	(0.208)	(0.171)	(0.224)
Earnings Management1	5.014***				
	(1.137)				
EM1MU	-2.693**				
	(1.303)				
Earnings Management2		4.849***			
		(1.012)			
EM2MU		-2.381**			
		(1.128)			
Earnings Management3			12.86***		
			(2.237)		
EM3MU			-3.039		
			(2.432)		
Earnings Management4				7.035***	
				(1.734)	
EM4MU				-4.110**	
				(1.914)	
Earnings Management5					3.480***
					(0.811)
EM5MU					-2.288**
					(0.893)
firm fixed effects	yes	yes	yes	yes	yes
Quarter fixed effects	yes	yes	yes	yes	yes
observations	31412	30230	28536	30953	29193
R^2 (within)	0.345	0.368	0.378	0.366	0.349

This table reports the results from our investment regressions. The dependent variable is q excluding the influence of control variables. Earnings management 1 to 5 are quarterly indicator variables excluding the influence of control variables. All control variables described in Table 1 are included in our regressions. All regressions include firm and fixed quarter effects. R^2 statistics reflect within firm variables. Standard errors are clustered on both firm and quarter fixed effects. Robust t-statistics are reported in the parentheses. *Significant at 10%;**significant at 5%;***significant at 1%.

Table 5 Investment opportunities considering sample selection bias

	(1)	(2)	(3)	(4)	(5)
Market-to-Book	-0.769***	-0.797***	-0.747***	-0.810***	-0.812***
	(0.0504)	(0.0513)	(0.0481)	(0.0509)	(0.0557)
debt	0.0137***	0.0132***	0.00837***	0.00475**	0.0168***
	(0.00248)	(0.00247)	(0.00199)	(0.00200)	(0.00548)
Accounts	0.0879	-0.262	0.0775	0.898	-0.736
	(0.204)	(0.256)	(0.215)	(0.559)	(0.555)
Stock	-0.909***	0.0340	0.249*	-0.164	0.0325
	(0.183)	(0.103)	(0.139)	(0.120)	(0.111)
Size	-0.0978**	-0.203***	-0.167***	-0.165***	-0.198***
	(0.0392)	(0.0244)	(0.0262)	(0.0349)	(0.0255)
Leverage	-1.568***	-0.676***	-0.919***	-0.551***	-0.748***
	(0.302)	(0.154)	(0.175)	(0.150)	(0.174)
invmills	-1.474***	-0.326***	-0.350**	0.560	-0.616**
Earnings Management1	4.820***				
	(1.055)				
EM1MU	-2.722**				
	(1.186)				
	(0.341)	(0.103)	(0.167)	(0.470)	(0.305)
Earnings Management2		5.988***			
		(0.965)			
EM2MU		-3.241***			
		(1.054)			
Earnings Management3			11.58***		
			(1.901)		
EM3MU			-3.575*		
			(2.042)		
Earnings Management4				8.398***	
				(1.747)	
EM4MU				-5.951***	
				(1.946)	
Earnings Management5					4.211***
					(0.800)
EM5MU					-2.892***
					(0.881)
firm fixed effects	yes	yes	yes	yes	yes
Quarter fixed effects	yes	yes	yes	yes	yes
observations	79744	79752	76303	79055	75629
R^2 (within)	0.360	0.364	0.377	0.356	0.359

This table reports the results from our investment regressions. The dependent variable is q after eliminating the influence of sample selection bias. Earnings management 1 to 5 are quarterly indicator variables after eliminating the influence of sample selection bias. All control variables described in Table 1 are included in our regressions. All regressions include firm and fixed quarter effects. R^2 statistics reflect within firm variables. Standard errors are clustered on both firm and quarter fixed effects. Robust t-statistics are reported in the parentheses. *Significant at 10%;**significant at 5%;***significant at 1%.

Table 6 Investment opportunities for SOEs (state-owned enterprises)

	(1)	(2)	(3)	(4)	(5)
Market-to-Book	-0.601***	-0.601***	-0.586***	-0.600***	-0.597***
	(0.0407)	(0.0407)	(0.0400)	(0.0415)	(0.0416)
debt	0.00121	0.00197	0.00100	0.00114	0.00113
	(0.00152)	(0.00156)	(0.00146)	(0.00161)	(0.00158)
Accounts	0.429**	0.268	0.359*	0.351	0.301
	(0.208)	(0.218)	(0.213)	(0.215)	(0.222)
Stock	0.154	0.205**	0.282***	0.198*	0.204*
	(0.105)	(0.105)	(0.104)	(0.106)	(0.107)
Size	-0.0932***	-0.0947***	-0.0864***	-0.101***	-0.0976***
	(0.0214)	(0.0212)	(0.0207)	(0.0214)	(0.0217)
Leverage	-0.944***	-0.911***	-0.956***	-0.888***	-0.900***
	(0.148)	(0.149)	(0.146)	(0.149)	(0.151)
Earnings Management1	2.008				
	(1.228)				
EM1MU	-0.370				
	(1.315)				
Earnings Management2		1.711*			
		(1.025)			
EM2MU		0.340			
		(1.117)			
Earnings Management3			3.796*		
			(2.109)		
EM3MU			1.420		
			(2.191)		
Earnings Management4				3.409*	
				(1.987)	
EM4MU				-1.273	
				(2.057)	
Earnings Management5					1.759*
					(0.915)
EM5MU					-0.711
					(0.956)
Firm effects	yes	yes	yes	yes	yes
Quarter fixed effects	yes	yes	yes	yes	yes
observations	39565	39566	38215	38935	37618
R^2 (within)	0.387	0.390	0.400	0.386	0.388

This table reports the results from our investment regressions. The dependent variable is q. see Table 1 for variable definitions. All variables are SOE. All regressions include firm and fixed quarter effects. R^2 statistics reflect within firm variables. Standard errors are clustered on both firm and quarter fixed effects. Robust t-statistics are reported in the parentheses. *Significant at 10%;**significant at 5%;***significant at 1%.

Table 7 Investment opportunities for non-SOEs (not state-owned enterprises)

	(1)	(2)	(3)	(4)	(5)
Market-to-Book	-1.195***	-1.173***	-1.138***	-1.188***	-1.169***
	(0.0866)	(0.0860)	(0.0823)	(0.0866)	(0.0853)
debt	0.0111***	0.0133***	0.0118***	0.0112***	0.0114***
	(0.00344)	(0.00341)	(0.00339)	(0.00343)	(0.00339)
Accounts	0.0359	0.000224	-0.0966	0.0267	0.0880
	(0.299)	(0.292)	(0.286)	(0.303)	(0.302)
Stock	-0.106	0.0139	0.150	-0.0133	0.0227
	(0.143)	(0.141)	(0.140)	(0.143)	(0.144)
Size	-0.282***	-0.301***	-0.261***	-0.299***	-0.288***
	(0.0376)	(0.0368)	(0.0358)	(0.0382)	(0.0381)
Leverage	-0.195	-0.142	-0.407**	-0.123	-0.161
	(0.209)	(0.208)	(0.199)	(0.211)	(0.213)
Earnings Management1	5.450***				
	(1.109)				
EM1MU	-3.568***				
	(1.257)				
Earnings Management2		8.335***			
		(1.124)			
EM2MU		-5.101***			
		(1.292)			
Earnings Management3			16.18***		
			(2.190)		
EM3MU			-5.856**		
			(2.415)		
Earnings Management4				10.73***	
				(2.042)	
EM4MU				-8.795***	
				(2.306)	
Earnings Management5					4.947***
					(0.971)
EM5MU					-3.664***
					(1.084)
Firm effects	yes	yes	yes	yes	yes
Quarter fixed effects	yes	yes	yes	yes	yes
observations	40179	40186	38088	40120	38011
R^2 (within)	0.350	0.361	0.380	0.351	0.353

This table reports the results from our investment regressions. The dependent variable is q. see Table 1 for variable definitions. All variables are Non-SOE. All regressions include firm and fixed quarter effects. R^2 statistics reflect within firm variables. Standard errors are clustered on both firm and quarter fixed effects. Robust t-statistics are reported in the parentheses. *Significant at 10%;**significant at 5%;***significant at 1%.

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