

The effect of corporate geographic location on over-investment

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Abstract

This paper aims to shed light on the effect of a firm's geographic location on its over-investment by using different location variables based on a sample of 1936 Chinese listed firms spanning from 2007 to 2016. We find that remotely located firms have higher level of over-investment. Remotely located firms with more free cash flow face severer over-investment problem. In further research, we examine whether institutional investors can mitigate remote firms' over-investment. However, we find that institutional investors have no governance effect on remote firms' over-investment.

Key words: *geographic location; over-investment; Institutional investors; information asymmetry; agency problem*

1 Introduction

Previous studies show that firm characteristics impact over-investment, however, they neglect a very obvious characteristic of firms: location. In remote areas, it is harder for investors to oversee listed firms, which deteriorates agency problems. Severe agency problems in remote firms impact firm's behavior. We consider firm's location has significant impact on over-investment according to the previous studies. In this paper, we examine the impact of location on firm over-investment and the influence of free cash flow on the impact of location on firm over-investment.

Remotely located firms face severer information asymmetry and agency problems, which influences its cash holding decisions and financing capability (*Boubaker et al.*¹). Richardson(2006)² argues free cash flow and financing constraint are responsible for firm's over-investment. Xinquan Yang and Yumei Fu³ find firms located in non-center cities hold more cash and tend to invest more. These firms suffer high financing costs and financing constraint because big banks are usually unwilling to offer loans to them due to lack of information (Arena⁴). Without enough external funds, remote firms attempt to maintain internal funds. Cheaper internal funds may lead to over-investment (Myers and Majluf,⁵ 1984). Based on the above analysis, we find the routes that location influences over-investment: On one hand, remote firms face severer information asymmetry and agency problems. Managers or controlling shareholders are more likely to over-invest when regulation is limited by location. Free cash flow can intensify over-investment. On the other hand, financing

constraint caused by information disadvantage of remotely located firms pushes these firms to maintain more internal funds, they invest more because of low cost.

There are different ideas about the governance effect of institutional investors. Some argue that institutional investors have no positive effect on the corporate performance (Faccio and Lasfer,⁶ 2000). On the contrary, Shleifer and Vishny(1986)⁷ argue institutional investors have ability to oversee managers and are willing to do that. Whether institutional investors can mitigate remote firms' over-investment is another part of our study.

Xingquan yang and Yumei fu(2016) make a primary study on the impact of firm's location on the over-investment. Because their study does not focus on over-investment, they don't demonstrate sufficient theory, mechanism and explanation about the impact of firm's location on over-investment. Our study is motivated from their research but different from their work in the following aspects: First, we analyze the mechanism that location influences over-investment and find the influence routes. Second, we use two standards to distinguish remote areas and center areas. Last, we take the governance effect of institutional investors into consideration.

The rest part of this paper is structured as follows. Section 2 presents variables, data and models. Section 3 presents the main results. We conclude our results in section 4.

2 Variables, models and data

2.1 Variables and models

The dependent variable in our research is over-investment. We refer to Richardson(2006) to estimate over-investment. We directly use residual of model in Richardson(2006) as the estimate of over-investment which is labeled as *Overi* in the following regression results. Yanchao Wang(2009)⁸ uses the same measure of over-investment.

To examine the impact of firm's location on over-investment, we use the following model.

$$\begin{aligned} overi_{i,t} = & \alpha + \beta_1 Location_{i,t} + \beta_2 Lev_{i,t} + \beta_3 Board_{i,t} + \beta_4 State_{i,t} + \beta_5 Own_{i,t} + \beta_6 Roa_{i,t} + \beta_7 Size_{i,t} \\ & + \beta_8 Growth_{i,t} + Yeardummy + Industrydummy + \varepsilon \end{aligned} \quad (1)$$

In this model, *Overi* indicates over-investment, *Growth* is proxied by sales revenue growth, *Lev* indicates leverage which is calculated by total debt divided by total assets. *Cash* indicates cash holdings computed as cash plus short-term investment or financial assets to trade divided by lagged assets, *Age* indicates the number of years from firms IPO, *Size* is natural log value of book value of total assets, *Ret* is the market adjusted return as in Huili Zhang and Zhengfei Lu(2012)⁹, *Yeardummies* and *Industrydummies* are dummy variables to control year effect and industry effect. *Board* indicates the ratio of independent directors in the board, *Own* indicates the ownership concentration measured by the percentage of shares held by the greatest shareholders, *Roa* indicates the return of assets, *State* is the state owned firms dummy.

We use three proxies as location variables: *Nonc*, *Noncp* and *Distance*. If firm's registered location is not in center cities, *Nonc* equals 1 and 0 otherwise. If firm's location is not in center

provinces, Noncp equals 1 and 0 otherwise. According to “blue book of urban competitiveness” and “the blue book of provincial competitiveness” in year 2015 published by Chinese Academy of Social Science, we choose top 20 cities as center cities and top 10 provinces including 3 municipalities as center provinces. Previous studies usually use cities to distinguish remote areas and center areas. However, we consider this standard ignores relation between cities. Some median cities or small cities also have strong economic power and high popularity because they are near center cities. Nevertheless, they are classified into remote areas. Cities in the same province have similar economic power, cultural development level and political development level. So, we also use province as another standard to distinguish remote areas. We gauge the distance of firm’s location from the nearest center city as a metric of its location using the model from Coval and Moskowitz (1999)¹⁰.

For further research, we try to test the impact of free cash flow and institutional investors. We design model(2) and model(3).

$$\begin{aligned} over_{i,t} = & \alpha + \beta_1 Location_{i,t} + \beta_2 Fcf_{i,t} + \beta_3 Location * Fcf_{i,t} + \beta_4 Lev_{i,t} + \beta_5 Board_{i,t} + \beta_6 State_{i,t} \\ & + \beta_7 Own_{i,t} + \beta_8 Roa_{i,t} + \beta_9 Size_{i,t} + \beta_{10} Growth_{i,t} + Yeardummy + Industrydummy + \varepsilon \end{aligned} \quad (2)$$

$$\begin{aligned} over_{i,t} = & \alpha + \beta_1 Location_{i,t} + \beta_2 Ins_{i,t} + \beta_3 Location * Ins_{i,t} + \beta_4 Fcf_{i,t} + \beta_5 Lev_{i,t} + \beta_6 Board_{i,t} + \beta_7 State_{i,t} \\ & + \beta_8 Own_{i,t} + \beta_9 Roa_{i,t} + \beta_{10} Size_{i,t} + \beta_{11} Growth_{i,t} + Yeardummy + Industrydummy + \varepsilon \end{aligned} \quad (3)$$

In model(2), Fcf indicates free cash flow computed as net cash flows from operating activities minus normal investment from model in Richardson(2006). In model(3), Ins indicates the percentage of shares held by institutional investors.

2.2 Data

The initial samples encompass all listed firms in Shanghai exchange and Shenzhen exchange during 2007-2016. Distance between firm’s location and the nearest city is manually calculated, other data are from CSMAR database and RESSET database. We remove following samples: (1) Financial listed firms; (2) Firms issuing H or B shares; (3) ST or ST* samples; (4) Abnormal samples, such as assets less than 0; (5) Samples with missing data in key indicators. All constant variables are winsorized at the 1% and 99% percentile level.

3 Results and robustness checks

3.1 Results

Table 1 shows the effect of location on over-investment. The t-Statistics is reported in parentheses. Significance at 1%, 5% and 10% is denoted with ***, ** and * respectively, the same below. The results show that the location variables are positively related to over-investment. It is obvious that firms located in non-center cities or non-center provinces have higher over-investment. The results also show that firms face more over-investment when they are far away from center cities. The findings provide evidence that remote firms face higher agency costs arising from additional hurdles in the regulation of managers and

Table 1 – The effect of location on over-investment

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Nonc	0.0015 (1.5395)			0.0015 (1.5618)		
Noncp		0.0025** (2.4876)			0.0024** (2.3821)	
Distance			0.0006** (2.5044)			0.0007** (2.5181)
State	-0.0004 (-0.3429)	-0.0008 (-0.7597)	-0.0004 (-0.3759)			
Own	-0.0025 (-0.7719)	-0.0023 (-0.7074)	-0.0023 (-0.7301)			
Lev	0.0180*** (5.8857)	0.0179*** (5.8741)	0.0178*** (5.8411)	0.0178*** (5.8525)	0.0176*** (5.8119)	0.0176*** (5.8037)
Board	0.0000 (0.7496)	0.0000 (0.7778)	0.0000 (0.7686)			
Roa	0.0681*** (7.1162)	0.0687*** (7.1811)	0.0686*** (7.1676)	0.0678*** (7.1175)	0.0686*** (7.1988)	0.0683*** (7.1730)
Size	0.0011** (2.0382)	0.0012** (2.1277)	0.0011** (2.0589)	0.0010* (1.8587)	0.0010* (1.8718)	0.0010* (1.8808)
Growth	0.0051*** (4.7320)	0.0050*** (4.6794)	0.0051*** (4.7247)	0.0051*** (4.7546)	0.0051*** (4.7220)	0.0051*** (4.7486)
Constant	-0.0339*** (-2.6118)	-0.0353*** (-2.7143)	-0.0343*** (-2.6466)	-0.0310*** (-2.4408)	-0.0317*** (-2.4921)	-0.0314*** (-2.4723)
Observations	13,614	13,614	13,614	13,614	13,614	13,614
Industry and Year	controlled	controlled	controlled	controlled	controlled	controlled
Adj.R ²	0.00864	0.00891	0.00892	0.00875	0.00899	0.00904
F value	4.953	5.082	5.084	5.451	5.573	5.597

Table 2 – The impact of free cash flow and institutional investors on remotely located firms

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Nonc	0.0018* (1.9151)			-0.0005 (-0.4125)		
Fcf	0.0453*** (5.8668)	0.0570*** (9.0981)	0.0436*** (5.8173)	0.0607*** (11.3865)	0.0607*** (11.3763)	0.0608*** (11.3957)
Ins				0.0022 (0.5835)	0.0052* (1.6957)	0.0016 (0.4342)
Nonc*Fcf	0.0269*** (2.7017)					
Nonc*Ins				0.0113** (2.2260)		
noncp		0.0027*** (2.6180)			0.0008 (0.6126)	
Noncp*Fcf		0.0111 (1.0388)				
Noncp*Ins					0.0101* (1.8549)	
Distance			0.0008*** (2.9254)			-0.0000 (-0.0107)
Disatance*Fcf			0.0087*** (3.1762)			
Distance*Ins						0.0035** (2.5746)
State	-0.0012 (-1.1095)	-0.0016 (-1.4995)	-0.0012 (-1.1545)	-0.0012 (-1.1315)	-0.0017 (-1.5526)	-0.0012 (-1.1651)
Own	-0.0029 (-0.9008)	-0.0028 (-0.8777)	-0.0028 (-0.8756)	-0.0029 (-0.9221)	-0.0028 (-0.8640)	-0.0029 (-0.9024)
Lev	0.0171*** (5.6462)	0.0170*** (5.6110)	0.0169*** (5.5839)	0.0174*** (5.7233)	0.0172*** (5.6728)	0.0172*** (5.6829)
Board	0.0001 (1.2674)	0.0001 (1.3084)	0.0001 (1.2828)	0.0001 (1.3551)	0.0001 (1.3804)	0.0001 (1.3679)
Roa	0.0323*** (3.2263)	0.0334*** (3.3290)	0.0328*** (3.2747)	0.0284*** (2.8226)	0.0298*** (2.9607)	0.0290*** (2.8767)
Size	0.0014*** (2.5951)	0.0015*** (2.6986)	0.0014*** (2.6227)	0.0013** (2.3802)	0.0014** (2.4656)	0.0013** (2.3962)
Growth	0.0060*** (5.5710)	0.0059*** (5.5306)	0.0059*** (5.5464)	0.0059*** (5.5271)	0.0058*** (5.4231)	0.0059*** (5.5253)
Constant	-0.0417*** (-3.2270)	-0.0437*** (-3.3734)	-0.0421*** (-3.2580)	-0.0397*** (-3.0689)	-0.0412*** (-3.1779)	-0.0399*** (-3.0864)
Industry and Year	controlled	controlled	controlled	controlled	controlled	controlled
Observations	13,614	13,614	13,614	13,614	13,614	13,614
Adj.R ²	0.0183	0.0181	0.0187	0.0188	0.0190	0.0192
F	8.921	8.848	9.127	8.901	8.978	9.076

controlling shareholders. Firm size, growth opportunities, profitability and leverage have significantly positive effect on over-investment, the results are consistent with Xingquan Yang and Yumei Fu(2016).

We test the effect of location on the over-investment when taking free cash flow problem into consideration. Column (1), (2) and (3) in table2 are results of free cash flow conflicts. The results show the effect of location on the over-investment is deepened by free cash flow. Free cash flow significantly affects listed firms in non-center cities. More free cash flow supports managers or controlling shareholders to invest more.

Institutional investors play an important role in monitoring firm performance according to Hutchinson et al.(2015)¹¹. However, we find contrasting evidence in our study that institutional investors have an adverse effect on firm investment efficiency. Column (4), (5) and (6) in table2 show the test of governance effect of institutional investors. It is clear that higher institutional ownership is associated with greater over-investment. Firms located in remote areas don't benefit from institutional investors. This means institutional investors are not always active regulators. The characteristics of institutional investors are complex. Institutional investors may cause agency problems, because they are agents too and they don't aim to maximum shareholders' wealth (Black, 1992)¹².

3.2 Robustness checks

We do several robustness tests to check our results. First, we substitute ratio of sales income with TobinQ as the proxy of growth opportunities. Second, to remove the effect of estimate of over-investment, we use a new model according to Biddle et al. (2009)¹³ to estimate over-investment. Third, we remove samples from 2007 to 2009 to avoid the effect of financial crisis. Our main results hold in robustness checks. For the limit of pages, we do not report results of robustness checks.

4 Conclusions

We find that firms located in non-center cities or non-center provinces have greater over-investment. Over-investment increases when the distance between listed firms and nearest center city increases. Free cash flow can reinforce the impact of location on the over-investment. Institutional investors have no governance effect on the impact of location on over-investment, they even push over-investment into a higher level. Our results are robust to alternative model of estimating firm over-investment and to different ranges of samples. Further work could try to classify institutional investors into different kinds and test their impact on the effect of location on over-investment.

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