Product Market Competition, Government Control and Cash Flow Risk

Evidence of Chinese Corporations

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Abstract—The examination of a sample of Chinese A-share listed companies demonstrated that product market competition holds an external governance mechanism, which can reduce corporate cash flow risk. Considering different hierarchies of government control, this paper finds that compared with non-government controlled and local government controlled enterprises, product market competition creates a stronger governance effect on enterprises that controlled by the central government. Further examination about the quality of local governments reveals in circumstances with higher local government quality, the governance effect of product market competition is relatively heavier, and cash flow risks of sample enterprises show a more obvious reduction.

Keywords—product market competition; cash flow risk; government control; local government quality

I. INTRODUCTION

By taking into consideration the emerging market competition mechanism and special institutional environment, this paper focus on the unique influence of product market competition and government control on cash flow risk of Chinese enterprises. Specifically, we analyze the governance effect that product market competition exerts on corporate cash flow risks theoretically, and verify the analysis result through use of evidence from the Chinese market. Furthermore, we analyze and verify whether alterations in corporate cash flow risk, along with changes in the degree of product market competition are similar among enterprises under varying levels and hierarchies of government control; furthermore, whether government control creates a similar moderating effect on the relationship between the corporate cash flow risk and the degree of product market competition, taking into consideration different qualities of government management.

Cash flow risk can be used to depict the risk profile of an enterprise. Product market competition can impact inflows and outflows, occupancies and reserves, turnover and usage, as well as the intermediation of corporate cash flow through a pair of mechanisms. The first is to exert predatory effect to influence the competitive behavior of enterprises [1]. The second is to exert the governance effect to influence agent costs and agent efficiency that exists in processes related to corporate competition. Since the statement that "the agent problem is more serious in monopolized industries" proposed by Hicks, there has been a lot of discussion pertaining to "the governance effect on product market competition" [2]. Representative studies have found that product market competition can and does exert the governance effect as an external corporate governance mechanism [3]-[5]. Further studies focus on the complementary or substitutional relationship between the external governance mechanism produced by product market competition and the internal corporate governance mechanism [6]-[7]. However, research that directly utilizes corporate cash flows to study the governance effect on product market competition are relatively less: Jagannathan et al. found that enterprises in low competitive environments held greater cash flows and more easily developed inefficient investments [8]. Jagnnathan and Srinivasan used free cash flows to measure the severity of the agent problem and found that enterprises in a weak competitive market suffered more severe agent problems [9]; Alimov found that the corporate governance effect produced by product market competition could restrain the agent problem, so as to exert a positive influence on corporate cash holding values [10].

When discussing Chinese enterprises, the existence of government control exerts, to some extent, a dissimilation effect on the normal performance of the market competitive mechanism and the strategy choice of enterprises to reply this competitive environment. In China, governments intervene in enterprises through rights relating to control of property, administrative control, and cultural control, among others. La Porta and Shleifer divided the control rights of enterprises into two segments—government control and private control [11]. China's special national condition determines that the central government and local governments should be regarded as two different agent subjects with different motivations and methods to control the enterprises. At the same time, the quality of government management determines the whether a "supporting hand" or "grabbing hand" exist for government control of

enterprises. In this special kind of government control environment, interactions relating to the market competitive environment may present a different moderating effect than evidence from previous experiences on the governance effect of product market competition and its manifestation on corporate cash flow risk.

When taking into consideration the research status and the special demands of the particular production and operation environment Chinese enterprises operate in, we have arranged the following five sections to expand our research.

Section II describes the economic and institutional background. We use America as an example with which to compare to the degree of Chinese market development, and unique triple agent problems. In this section, we focus on what conditions have contributed to this special analysis, with results given in next sections.

Section III pertains to our theoretical analysis and research hypothesis. We divide this section to three parts: first, analysis of the influence mechanism and effects of the degree of product market competition on corporate cash flow risks; second, clarification on the differences between influence of product market competition on corporate cash flow risk controlled by different government hierarchies; third, the dissimilation caused by the different qualities of local governments.

Section IV describes our methodology. In this section, we selected all the A-share listed companies in China within the sample period 2011 to 2014, and used the data from the China Stock Market and Accounting Research (CSMAR) Database (and other complementary databases) for the purposes of an empirical test. In addition to this, we also clarify key variable's measures and reasons, as well as test models and steps.

Section V consists of empirical tests. On the basis of descriptive statistics, we use fixed effect models to test the first hypothesis in Section III, and create group regression to investigate the influence of different hierarchies of government control. Finally, we add interaction items to verify the moderation effect of local government quality.

Section VI makes three important conclusions: (1) In total, product market competition holds an external governance mechanism, and the governance effect it expresses can be reflected by cash flow risk, which demonstrates the reduction of corporate cash flow risk. (2) Compared with enterprises that are controlled privately or by local governments, product market competition exerts a heavier governance effect on enterprises that controlled by the central government. (3) In circumstances with a higher degree of local government quality, the governance effect on product market competition is more effective. The agent efficiency of sample enterprises (enterprises controlled by these local governments or privately which are located within the jurisdiction of these local governments) is relatively higher, and their cash flow risks show a more obvious reduction in regards to the enhancement of product market competition.

The significance and probable innovation of this paper is the following: to focus on the influence of the degree of product market competition on corporate cash flow risk, in order to attempt to extend this research on the influence of product market competition on corporate financial characteristics. We further explain the functional mechanism of the influence of the degree of product market competition on corporate cash flow risk from the perspective of the governance effect in order to provide a comparison object for the explanation of the predatory effect. Additionally, we adequately consider the specialization of the production and operation environment of Chinese enterprises and use the latest data from the Chinese market to offer supplementary experiential evidence that differs from previous research.

II. ECONOMIC AND INSTITUTIONAL BACKGROUND

When taking America as an example, many studies regarding product market competition and cash flow volatility have found that stronger product market competition brings about higher corporate cash flow volatility, as the operation of a monopoly is relatively stable and "the best of all monopoly profits is a quiet life" [2]. In China, however, this rule is not applicable mainly due to the degree of Chinese market development, and the triple agent problem which Chinese monopolies face.

According to the Chinese Market Economy Development Report (2010), China was not preliminarily up to the standard of a market economy until 2000. In relative terms, the market economy in America has been developed for more than 150 years and the index of economic freedom in America has been consistently ranked in top ten globally. Therefore, from the perspective of market development, China and America occupy different stages. Irvine Pontiff believe the main form of competition relating to product market competition can be narrowed down to vender-buyer competition [12]; they further point out that "all forms of competition increase idiosyncratic volatility, but the type of competition that is attributable to consumers demonstrating less loyalty to a given firm`s product could do so". This demonstrates that product market competition in America has progressed to the stage of product homogeneity, featuring the transition from monopoly competition to perfect competition (as shown in the right side of the dotted line in Fig.1). Meanwhile, they reference Raith for zero-sum game models and isomorphic cost-benefit functions in order to make assumptions about enterprises` behavior in competition [13].

However, we believe that this assumption does not apply to the Chinese product competition market. Firstly, the Chinese product market is still in a stage of product heterogeneity and vender-vender competition (as shown on left side of the dotted line in Fig. 1). Secondly, though the economy appears to be slowing, the Chinese market is still a long way from saturation. Thus, zero-sum game models cannot depict the Chinese market's current situation, as it is more like "blue sea" relative to the competition status described by structuralism. Finally, in China, monopolies main profits are formed not by natural or

administration factors (by market monopoly enterprise), and are not obtained from scale effect from standardized and mass production. Instead, they utilize a quicker and flexible strategy, while predatory pricing and non-price monopolies increase risk more easily than non-exclusive competition in practice.

The other dimension relates to the triple agent problem. In a wealth of natural monopoly industries and administrative monopoly industries with Chinese characteristics (actually, natural monopoly and administrative monopoly industries are identical to large extent), enterprises play the role of state-owned enterprises, large ones and monopolist at the same time, which in turn creates multi-agent problems. The first level of the agency problem arises from the agent conflict between shareholders and managers, after the formation of the modern enterprise system. Although all enterprises must confront this problem, enterprises in China fall under different circumstances. It has been less than 20 years since China fully implemented shareholding reforms in 1997. Chinese enterprise governance's structure and mechanisms has not been sound, and the agent behavior of managers has not been constrained effectively. The second level of the agency problem comes from the agent conflict between large shareholders and small shareholders. Compared with the modern enterprise system, split-equity reform in China started even later (in 2005) and the construction of relevant systems and mechanisms is even less mature. Majority shareholders and minority shareholders have been belonged to disconnected interest groups for a long time. The third agency problem comes from the conflict of interests between government as the agent and the enterprise, which is the most serious agent problem that Chinese enterprises face. According to the indexes of economic freedom from The Heritage Foundation and The Frazer Institute, the main limitations to the marketization of China's economy are from government size, regulation, property rights and government corruption. In other words, barriers to free competition come from the government.
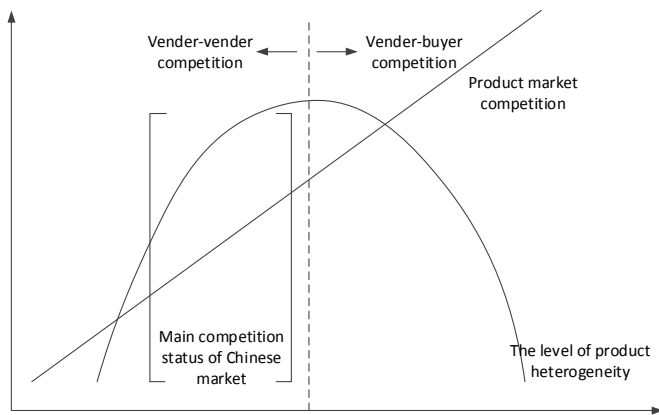

Fig. 1. The development stage of product market competition

Driven by political competition, Chinese local governments may employ means including administration, public finance,

culture and resource allocation, etc. to control enterprises, essentially making use of them to attain local governmental political objectives instead of increasing enterprises' values. This situation is particularly serious in state-owned enterprises which obtain monopoly profits, as well as politically connected enterprises. Government control and enterprise monopolization are even become endogenous in relation to reciprocal causation. As cash is the easiest form of assets for agents to occupy and attain their objective, it is probable that risk to cash operations may rapidly appear under the influence of this triple agent problems.

Therefore, we can conclude that, for Chinese enterprises, it is unreasonable to follow the example of the American experience in order to directly judge whether product market competition and cash flow risk have a positive relationship. Statistics from U. S. Fortune Magazine shows the average life of American SMEs is about 7 years and that of American large enterprises is about 40 years, while the same data relating to Chinese con-generic enterprises is 2.5 years and 7 to 8 years respectively. Once the scale effect of large enterprises and inherent differences between the products and services of SMEs have been factored out, enterprises which have high market power in China do not enjoy a quiet life [14]. One main reason resulting from this phenomenon is exposure of cash flow risk and cash flow drying up of these short-lived enterprises. The degree of development in the Chinese market and the special relationship between government and enterprises determines different effects regarding the direction and extent of product market competition on cash flow risk (compared with American enterprises). In regards to this issue, this paper analyses and tests the possibility of market competition mitigating the agency conflict between government and enterprises and decreasing cash flow risks accordingly.

III. Theoretical Analysis and Research Hypothesis

A. Analysis of the Influence Mechanism and Effects of the Degree of Product Market Competition on Corporate Cash Flow Risks

When the degree of product market competition is relatively high, enterprises in this competition environment are theoretically influenced by the governance mechanism that competition brings about, and managers' behavior is therefore influenced by synthetic action from supervisory, incentive and reputation mechanisms. This kind of combined influence should exert effects on both existing corporate projects and the determination of new project construction. When acting on existing projects, product market competition mainly exerts its external governance mechanism on the cash flow risk generated from corporate production and operation activities: (1) In terms of the matching strategy of cash utility and working efficiency management, managers, on the one hand, need to adopt a more proper cash term structure matching strategy. On the other, there is a need to create the largest enterprise value using the smallest amount of cash resources. The enhancement of agent efficiency

reflects on cash flow through the reasonable choice of cash matching strategy and boosting the advancement and retraction cycles of working capital to increase cash's working efficiency. (2) In terms of encroachment and accumulation of free cash flows, product market competition smoothes the unusual fluctuation of cash flow to a large extent by restraining managers who abuse cash resource, especially those who encroach on free cash flows. In the meantime, due to fierce competition, both monopoly rents and agent costs of enterprises could be reduced, thus the capacity and the motivation of enterprises to accumulate cash flows are also reduced, and the level of free cash flow itself is also relatively low. When acting on newly constructed projects, product market competition mainly impacts on cash flow risk generated from corporate finance and investment activities: (1) In terms of the quantity and efficiency of cash investments, due to fierce market competition, enterprises would do more cautious investment determinations, signifying the reduction of the number of investment items and the size of funds on one hand, and lessening the degree of real investments which deviate from target values on the other [15]. The direct result of these two phenomena is the reduction of inefficient investment, which is a significant reason resulting in unusual cash flow fluctuation. (2) On the demand side, the cost and availability of cash financing, by reason of investment determined financing, the fact that corporate managers give up inefficient investments which are high-cost and high-risk could, to some extent, decrease cash demands of enterprises. This therefore can decrease the costs of irrational financing. On the same note, this competition actually relieves the informational asymmetry in the product market [16]. Authorized economic operators could be get cash more easily from market investors. This kind of incentive mechanism could, in turn, promote enterprises to reduce their cash flow risks to gain confidence in the market.

In contrast, when the degree of product market competition is relatively low, its external governance mechanism is difficult to exert adequately, thus the governance effect on corporate cash flow risk is also hard to reflect fully. Thereby, this paper proposes the hypothesis i,

H1： Product market competition exerts a governance effect on micro-enterprises, thus reducing corporate cash flow risk.

B. Difference of Influence of Product Market Competition on Corporate Cash Flow Risk Controlled by Different Government Hierarchies

"Government Control" is a special production and operation environment faced by Chinese enterprises [17]. According to Ultimate Ownership Theory proposed by La Porta and Shleifer, the properties of corporate control rights can basically be divided into two correspondent parts—government control and private control [11]. Since Chinese tax reforms started in 1994, local governments and the central government have developed to different areas of interest. Following this, the "State-owned Corporate Assets Supervision and Administration Interim

Regulations" issued in 2003 has actually made local governments and the central government into two agent subjects with different hierarchies. Within the authorized range, these two governmental hierarchies could possess "ownership interest" from the enterprises they control, which leads to the conclusion that in terms of motivation and methods to control enterprises, there is an obvious distinction between local governments and the central government. With this institutional background, this paper compares enterprises controlled privately, by local governments and by the central government, and analyzes the difference among them.

For enterprises not controlled by the government, if there is no government intervention, the governance effect of product market competition on their cash flow risks should be the same as a rational estimation. That is to say, product market competition could lessen corporate cash flow risks by enhancing agent efficiency and reducing agent costs. However, with the current developmental degree of the Chinese market, government is still a kind of "visible hand" which allocates resources. The statement "focus on the key that market plays a decisive role in the allocation of resources to deepen economic reforms" proposed by "CPC Central Committee decision on deepening reform of an overall number of major issues" in 2013 has also been reflected from one side; even for non-government controlled enterprises, their production and operation environment can also be affected by government allocation of resources and other management behaviors. There is still some resistance in the formation of a competitive market.

For local government controlled enterprises, there is considerable evidence that when considering local achievements, political futures, and social functions, Chinese local governments may employ a kind of "Paternalism" and disturb the governance effect of product market competition by "paternal love." This is done by offering resource support to enterprises they control, and implementing policy support and regional barriers to prevent these enterprises participating in market competition, and thereby following rules of competition. In the meantime, because of some administrative functions of local government that these enterprises should undertake, the comparability, disclosure and authenticity of their information can be discounted, which also disturbs the information effect of market competition to some extent. In fact, local governments are more akin to agents who usually make the enterprises they control override competition rules [18]. Due to the relatively large rent-seeking space, the cash flow of local government controlled enterprises is used to satisfy inefficient management from agents to a large extent, while it is difficult for competition to exert its governance effect regarding this kind of risk.

In regards to the central government, there is no pressure of contending among local governments, and it fundamentally considers the entirety of the national economy. The central government has no strong incentive to increase fiscal revenues or realize other governmental goals via the enterprises it controlling. On the other hand, enterprises controlled by central

ministries are almost all related to industries pertaining to the national economy and people`s livelihood; in these industries, enterprises are supervised strictly by the central government, possess little monopoly and rent-seeking space, and enjoy thorough protection from laws and competition rules. Managers of these enterprises are restrained by both governance mechanisms from product market competition and laws and regulations to guarantee orderly competition. Thereby, central government controlled enterprises are actually the "test field" of Chinese market reform. The response that these enterprises answer to competition environment is much more similar to rational expectations. Product market competition could exert a more obvious governance effect on cash flow risks of central government controlled enterprises. Thus, this paper proposes the hypothesis ii,

H2: Compared with non-government controlled enterprises and local government controlled enterprises, central government controlled enterprises are more sensitive to the governance effect of product market competition, and their cash flow risks is also more sensitive to the degree of product market competition.

C. Dissimilation Caused by the Different Qualities of Local Governments

From the previous analysis, it could be stated that the reason why product market competition has difficulty in exerting valid external governance mechanisms is closely related to local market environment and the quality of local governments. Local governments intervene in enterprises' production and operation decision in the market through levying, supervising, and permit approvals. Especially in emerging markets, local governments often control the environmental resources, human resources, and financial resources which can impact markedly on resource allocation of enterprises under their jurisdiction [11, 19-20]. This makes the enterprises' response to the market endogenous to the quality of government management.

If the quality of a local government is relatively high, the government can exert its "supporting hand" to a larger extent [21]-[22]. High quality of government could be presented as better property right protections, efficient execution of laws, high-class public service, and a higher degree of marketization. Thus, high quality of local government, on the one hand, could standardize information disclosure, reduce the information asymmetry in the product market, reduce transaction costs and agent costs and give full play to the market allocation of resources function and efficiency. On the other hand, it could provide enterprises a full market competition mechanism, sharply lower opportunistic behavior by applying public administration to enforce market contracts, and protect the governance mechanism of product market competition, allowing this to exert its due effect. If the quality of local government is relatively low, the government exerts its "grabbing hand" to a larger extent [23]. The methods of government management are mainly administrative intervention, which greatly undermines the function of market mechanisms. At the same time, lower

quality governments have stronger motivation to encroach upon corporate resources to realize their political goals [24]. When these governments play the actual agent role, the phenomenon of corruption aggravates the risk of encroachment on corporate cash flows, which signifies that the governance mechanism of competition not only is unable to adequately exert itself, but also be destroyed by local governments as agents. Thereby, this paper proposes the hypothesis iii,

H3： In circumstances with higher quality local governments, the governance effect of product market competition is relatively heavier, and cash flow risks of sample enterprises (enterprises controlled by these local governments or privately whose location is in the jurisdiction of these local governments) show a more obvious reduction with the enhancement of product market competition.

IV. METHODOLOGY

A. Sample Selection and Data Sources

This paper's research sample is every A-share listed company in China within the sample period 2011 to 2014. To protect the validity of data, this paper does the sample selection using the following principles: removal of companies in the finance industry or complex; removal of ST or *ST listed companies; the choice of annual data as the object of study; removal of companies whose characteristic variables contains missing data. Division of industries according to the "Listed Companies Industry Classification Guidelines" issued by the China Securities Regulatory Commission in 2012.

This follows the principle of picking two digits codes for manufacturing industry and one digit for others, and removing the industries that contain less than 15 companies. According to these, there are 6,851 observations in the sample period belonging to 18 industries. In addition, this paper applies a 1% Winsorization to avoid the influence of extremum of some companies in some years. The data "Company Registry Province" is obtained from the Wind Database. The data of "Quality of Government" is obtained from the "Chinese Provincial Business Operating Environment Index 2013 Report". Other data is collected from the China Stock Market and Accounting Research (CSMAR) Database. This paper uses Stata12 to do the statistical analysis.

B. Variables

1) Cash flow risk

At present, though the method based on VaR and CFaR [25] has been fully developed, this paper does not choose this kind of method with the consideration of following two reasons. First, this method could be seriously influenced by the factors relating to corporate characteristics. For example, the key variable "Expected Cash Flow" is closely related to business management strategy, strategy expectations, and choice of cash flow management policy. As for Chinese enterprises, using reported data to measure these kinds of subjective variables

might bring about deviations. Second, this paper primarily focuses on "the abnormal fluctuations" of cash flow risks produced by the uncertainty of corporate productions and operations. The theoretical analysis of this paper is based on running fluctuations of corporate cash flow, while VaR and CFaR methods are more suitable to measure the exposure risk of cash flow, which does not match the foothold of theoretical analysis exactly. Thereby, this paper chooses the method used by Chen and Wang to use the standard deviation of the net cash flow from operating activities in three consecutive years to measure corporate cash flow risk, and divide total assets to eliminate the influence of size deviation [26].

2) Product market competition of an enterprise

It is still an unresolved econometric problem to find a universal and operable index to reflect the degree of product market competition. Typical research usually is based on the industry-wide Herfindahl index (HHI) and the number of competitors inside an industry, which measure the degree of product market competition [27]. However, Tan et al. proposed that it would cause deviation if the range of index calculation is confined to listed companies [28]. In terms of the Chinese market, what is more meaningful is the statement proposed by Nickell that operating profit ratio could be regarded as corporate "monopoly rents," and the higher monopoly rent is, the stronger the degree of product market monopoly is, vice versa [29]. Thereby, this paper refers to the method used by Chen and Wang to use the absolute value of the margin between corporate operating profit ratio and industrial operating profits of the industry this enterprise is in as the index to measure the degree of product market competition. The less the absolute value is, the more similar the enterprise is with their competitors in the industry, and the higher the competition it faced [26]. In terms of technical processing, this paper uses the reciprocal of the index to construct a direct indicator and logarithm of the index to avoid the difficulty of observing regression coefficient caused by the magnitude difference between this variable and others.

3) Governance effect

There are two principles employed to conduct the quantitative research regarding the corporate governance effect in available literature: first, one must measure the effect of the corporate agent problem via the corporate performance and enterprise value [30]; second, measure the efficiency losses and cost expenditure resulting from the agent problem directly [31]. In this paper, the purpose of constructing a mediating variable of governance effect is to investigate the influence of product market competition on corporate cash flow risk by changing the management agent behavior. Thus, this paper uses the second method to measure the management agent behavior directly. This paper uses management expense ratios to measure agent costs caused by consumer service and improper expenditure. There is a positive correlation between management expense ratios and agent costs. Furthermore, this paper uses asset turnover ratios to measure agent efficiency as influenced by inefficient management, bad investments and lazy behavior of managers. There is also a positive correlation between asset turnover ratio and agent efficiency.

4) Government control

The method employed to reflect the variable of which government hierarchy controls enterprises is represented by the "Ultimate Ownership Theory" proposed by Xia and Fang [18]. Referring to this principle, and combining the necessity of addressing this issue the paper focuses on with the availability of data, this paper also adopts the nature of the corporate actual controller as the standard to judge whether and which government hierarchy a company is controlled by. This paper regards companies whose actual controllers are private enterprises, overseas-funded enterprises, foreign governments, or private citizens as non-government controlled enterprises; it also regards companies whose actual controllers are local government-owned enterprises, local governments, local developments and institutions, or local self-governmental organization as local government controlled enterprises; and regards companies whose actual controllers are central government-owned enterprises, the central government, whether or not a company developed directly under central authority, or institutions organized by the central authority as central government controlled enterprises. Table. reports detail regarding this information.

5) Quality of local government

The quality of government is a concept that is relatively hard to quantify. For now, among the research to measure of the quality of Chinese local governments, one representative study is the "Government Quality Index" prepared by World Bank, while this index was only prepared until 2006 [24]. Additionally, Xia and Fang chose various indicators from the "Chinese Market Index—the Regional Market Relative Progress Report" to construct a composite index, while this index was also just prepared until 2010 [18]. For that reason, this paper refers to a principle contained in previous research, and chooses the dimension of government administration, the legal environment of business, and infrastructure in "Provincial Chinese Business Operating Environment Index Report" (referred to as the "Report" below) prepared by Wang et al. to measure the quality of local governments synthetically (specific sub-indexes are shown in Table. II) [32]. In terms of data processing, considering the "Report" only contains the annual data of 2006, 2008, 2010, and 2012, this paper uses the mean value of adjacent two years sets to substitute the missing data points. Considering the probable endogeneity brought by short panel data for 4 years, this paper replays the quality of local government in this year by the data of previous 2 years (lagged 2 periods). The method to construct the composite index adopts the arithmetic mean referring to the method used by Francis and Olsson and the "Report" itself [33].

6) Control variables

To guarantee the accuracy of estimation of the key variables, this paper chooses the following control variables to control the influence of other factors on cash flow risk: to control the

probability of financial crisis and cash flow risk by adding the variable of company size; to control the borrowing power and the probability of financial distress by adding the capital structure variable ; to control influence of the normal change of cash flow on the cash flow fluctuation by adding the variable of cash flow; to control the influence of asset structure and financing policy on the risk of mismatch of capital term structure by adding the long term debt ration variable; to control the factor of financial constraint by adding the dividend payout ratio variable; to control the influence of investment opportunities and investment behavior on the demand and occupation of cash flow by adding the variables of growth and investment spending; to control the tendency to accumulate cash and the capacity of resolving the cash flow risk by adding the variables of cash holdings, cash turnover ratio and liquidity substitutes; to control the influence of the agent problem caused by governance structure on cash flow fluctuations by adding the variables of ownership concentration. Methods to measure control variables refers to the common ones used in previous research. The symbols and definitions of all variables are listed in Table. III.

TABLE I. DISTRIBUTION OF ACTUAL CONTROLLER

Nature of Actual Controller	Sample Size	Ratio to Total Sample
Non-government controlled	3403	49.67%
Local government controlled	2288	33.40%
Central government controlled	1160	16.93%
Total	6851	100%

Data Source: sorted out by authors.

TABLE II. CONSTRUCTION OF THE INDEX OF LOCAL GOVERNMENT QUALITY

Nvestigation Dimensions	Sub-Index
Government administration	Open, just and fair
	Government efficiency
	Reduction of unnecessary intervention
	Probity government
Legal environment of business	Judicial justice and efficiency
	Safeguard of the legitimate rights and interests of operators
Infrastructure	Power supply
	Rail transport
	Other infrastructure

Data Source: sorted out by authors according to "Provincial Chinese Business Operating Environment Index 2013 Report"

C. Model

Referring to the method used by Opler, Pinkowitz et al. to study cash holding levels [34], following the model used by Chen and Wang to interpret corporate cash flow risk, and according to the necessity of the key issue [26], this paper constructs the following models to test the influence of product market competition on corporate cash flow risk and the mediating effect of agent costs and agent efficiency in the influencing process to examine the governance effect of product market competition. The method and steps to text mediating effect refer to the research of Wen et al. [35].

$$
\begin{aligned}
Cvar_{it} = {} & c + \beta Comp_{it} + \alpha_1 Size_{it} + \alpha_2 Lev_{it} \\
& + \alpha_3 Zcash_{it} + \alpha_4 Cf_{it} + \alpha_5 TobinQ_{it} + \alpha_6 Invest_{it} \\
& + \alpha_7 Ldebt_{it} + \alpha_8 Vel_{it} + \alpha_9 Sub_{it} + \alpha_{10} Div_{it} \\
& + \alpha_{11} Herfindahl_{it} + \lambda Year + \theta Ind + \varepsilon_{it}
\end{aligned} \tag{1}
$$

$$
\begin{aligned}
Ag_{it} = {} & c + \eta Comp_{it} + \alpha_1 Size_{it} + \alpha_2 Lev_{it} + \alpha_3 Zcash_{it} \\
& + \alpha_4 Cf_{it} + \alpha_5 TobinQ_{it} + \alpha_6 Invest_{it} + \alpha_7 Ldebt_{it} \\
& + \alpha_8 Vel_{it} + \alpha_9 Sub_{it} + \alpha_{10} Div_{it} \\
& + \alpha_{11} Herfindahl_{it} + \lambda Year + \theta Ind + \varepsilon_{it}
\end{aligned} \tag{2}
$$

$$
\begin{aligned}
Cvar_{it} = {} & c + \beta`Comp_{it} + \mu Ag_{it} + \alpha_1 Size_{it} + \alpha_2 Lev_{it} \\
& + \alpha_3 Zcash_{it} + \alpha_4 Cf_{it} + \alpha_5 TobinQ_{it} + \alpha_6 Invest_{it} \\
& + \alpha_7 Ldebt_{it} + \alpha_8 Vel_{it} + \alpha_9 Sub_{it} + \alpha_{10} Div_{it} \\
& + \alpha_{11} Herfindahl_{it} + \lambda Year + \theta Ind + \varepsilon_{it}
\end{aligned} \tag{3}
$$

Exerting grouping regression, this paper tests the moderating effect of hierarchies of government controlling on (1) to (3).

Following that, the paper constructs the following models to test the moderating effect of quality of local government on the governance effect of product market competition on enterprises controlled by privates and local governments.

$$
\begin{aligned}
Cvar_{it} = {} & c + \beta_1 Comp_{it} + \beta_2 Comp_{it} \times ProQuality_{it} \\
& + \alpha_1 Size_{it} + \alpha_2 Lev_{it} + \alpha_3 Zcash_{it} + \alpha_4 Cf_{it} \\
& + \alpha_5 TobinQ_{it} + \alpha_6 Invest_{it} + \alpha_7 Ldebt_{it} \\
& + \alpha_8 Vel_{it} + \alpha_9 Sub_{it} + \alpha_{10} Div_{it} \\
& + \alpha_{11} Herfindahl_{it} + \lambda Year + \theta Ind + \varepsilon_{it}
\end{aligned} \tag{4}
$$

$$
\begin{aligned}
Ag_{it} = {} & c + \eta_1 Comp_{it} + \eta_2 Comp_{it} \times ProQuality_{it} \\
& + \alpha_1 Size_{it} + \alpha_2 Lev_{it} + \alpha_3 Zcash_{it} + \alpha_4 Cf_{it} \\
& + \alpha_5 TobinQ_{it} + \alpha_6 Invest_{it} + \alpha_7 Ldebt_{it} \\
& + \alpha_8 Vel_{it} + \alpha_9 Sub_{it} + \alpha_{10} Div_{it} \\
& + \alpha_{11} Herfindahl_{it} + \lambda Year + \theta Ind + \varepsilon_{it}
\end{aligned} \tag{5}
$$

$$
\begin{aligned}
Cvar_{it} = {} & c + \beta`_1 Comp_{it} + \beta`_2 Comp_{it} \times ProQuality_{it} \\
& + \mu Ag_{it} + \alpha_1 Size_{it} + \alpha_2 Lev_{it} + \alpha_3 Zcash_{it} \\
& + \alpha_4 Cf_{it} + \alpha_5 TobinQ_{it} + \alpha_6 Invest_{it} + \alpha_7 Ldebt_{it} \\
& + \alpha_8 Vel_{it} + \alpha_9 Sub_{it} + \alpha_{10} Div_{it} \\
& + \alpha_{11} Herfindahl_{it} + \lambda Year + \theta Ind + \varepsilon_{it}
\end{aligned} \tag{6}
$$

The meanings of variables in the models above have been listed in Table.III The variables of Year and Ind are used to control the influence of time and industry respectively. Additionally, i represents company i, t represents year t. c is the constant term, and ε is the residual term.

The steps to test mediating effect are shown in Fig. 2.

V. EMPIRICAL RESULTS

Table. V lists the results of descriptive statistics of the stratified sample. This paper divides the entire sample into the group weak product market competition (containing 3,089 firm-year observations) and the group strong product market competition (containing 3,762 firm-year observations) by the means of product market competition (*Comp*). The stratified

sample descriptive statistics of the variables of cash flow risk (*Cvar*), agent costs (*AgCost*) and agent efficiency (*AgEff*) show that in the group with weak product market competition, the cash flow risk's value is significantly higher than in the group with strong product market competition. At the same time, the value of agent costs is significantly higher, while the value of agent efficiency is significantly lower (all these results are significant at least at the level of 1%). These results indicate initially that in the comparatively lower degree product market competition environment, corporate cash low risks and the agent costs are relatively high and the agent efficiency is relatively low. The influence of product market competition on the corporate agent problem and the governance effect on corporate cash flow risk are awaiting further testing.
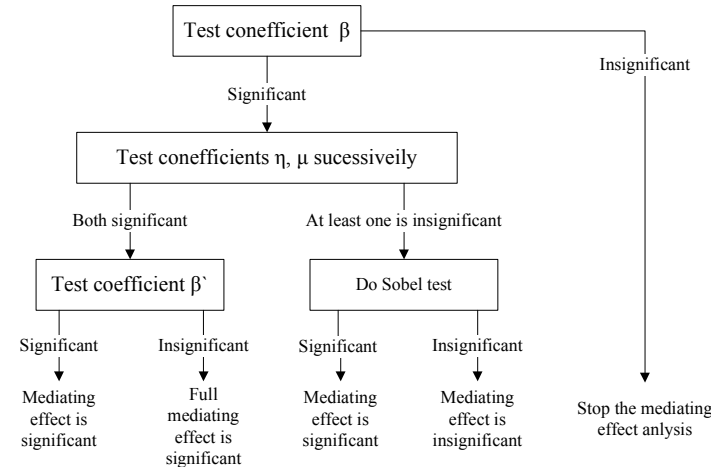
Data Source: sorted out by authors according to "Comparison of Moderator and Mediator and Their Applications" published by Wen et al.

Fig. 2. The steps of mediating effect test

A. Tests of H1

Firstly, this paper examines the influence of product market competition on corporate cash flow risk. Before this, this paper performed a Hausamn test on the panel data, and the results reject random the effect model, thus this paper uses the fixed effect model to do empirical tests and explanations. In addition, to overcome the "rough" part of the explained variable, this paper uses moving average smoothing filters to smooth the variable of cash flow risk according to time series by the method of non-weighted moving average of data before and after the examined firm-year. Furthermore, this paper tests the multicollinearity through a VIF test, the results of which show that the average VIF of the models is 1.63 while the max VIF is 2.66. This is less than the upper limit 10 of multicollinearity, thus there is no multicollinearity in these models.

Table. VI column (1) shows that corporate cash flow risk (*Cvar*) is negatively correlated to product market competition (*Comp*) significantly (-0.0008, 1%). That is to say, the stronger the product market competition of the enterprise is, the higher the cash flow risk of this enterprise is. This result initially certifies the negative relationship between product market competition and cash flow risk. Consequently, following this, this paper tests whether this kind of relationship could be regarded as the governance effect of product market competition or not.

Table. VI column (2) and (4) test the mediating effect of corporate agent costs. The results show that there is a significant negative relationship between corporate agent costs (*AgCost*) and product market competition (*Comp*) (-0.0070, 1%). Furthermore, the test results of the cash flow risk estimation model containing agent costs show that the correlation coefficient between product market competition (*Comp*) and corporate cash flow risk (*Cvar*) is -0.0007 and significant at the level of 5%, and that the correlation coefficient between agent costs (*AgCost*) and cash flow risk (*Cvar*) is 0.0056 and therefore insignificant. Thereby, expanding upon this, this paper performs the Sobel-Goodman test on the mediating effect of corporate agent costs (*AgCost*). The results show that the mediating effect of agent costs is at least significant at the 5% level, and the contribution to the influence of product market competition on corporate cash flow risk is 14.21%. The economic meaning is that the stronger the product market competition is, the lower the agent costs are, thus the corporate cash flow risk becomes accordingly lower. Table.VI column (3) and (5) test the mediating effect of corporate agent efficiency. The results show that there is a significant positive relationship between corporate agent efficiency (*AgEff*) and product market competition (*Comp*) (0.0146, 1%). That is to say, the stronger product market competition is, the lower the agent efficiency is due to the reduction of inefficient management caused by lazy managers and their value-destroyed behaviors.

By apply in the variable of agent efficiency to the cash flow risk estimation model, the test results show that the correlation coefficient between product market competition (*Comp*) and corporate cash flow risk (*Cvar*) is -0.0009 and significant at the level of 1%, and that the correlation coefficient between agent efficiency (*AgEff*) and cash flow risk (*Cvar*) is 0.0066 and significant at the level of 1% as well. It is clear that corporate agent efficiency creates a significant mediating effect on the influence of product market competition on corporate cash flow risk. The subsequent Sobel-Goodman test reveals that its contribution to mediating effect is -27.68%. The economic meaning of the negative sign is that the stronger product market competition is, the higher the agent efficiency is, and thus the corporate cash flow risk is lower accordingly. The reason for this may be that if product market competition is relatively strong, managers of enterprises in this market would be synthetically influenced by supervisory, incentive, and reputation mechanisms, which brings about changes in agent costs and agent efficiency. This governance effect reflects on corporate cash flow, behaving as the reduction of abnormal fluctuations of cash flow, the reasonable strategy of cash utilization and matching, the enhancement of turnover efficiency, the reduction of investment scale and the

enhancement of investment efficiency, the reduction of the demand and costs of finance, as well as the enhancement of funds availability. All these changes integrate with the reduction of cash flow risk. The empirical results verify the H1: The stronger product market competition is, the stronger its governance effect on micro-enterprises is, and thus the lower corporate cash flow risk is.

B. Tests of H2

Table. reports the group regression results of the non-government controlled group, the local government controlled group and the central government controlled group. The empirical results show that there is no significant influence of product market competition on the enterprises controlled by non-governmental organization and local governments. In regards to these enterprises, the governance effect that should be exerted by the reduction (-0.0089, 1%; -0.0032, 1%) of agent costs (*AgCost*) and the enhancement (0.0158, 1%; 0.0134, 1%) of agent efficiency (*AgEff*) produced by product market competition cannot be present in regards to corporate cash flow risk. The reason for these results is possibly that the production and management environment of non-government controlled enterprises are influenced by the quality of government resource allocation and other management behaviors to a large extent/ At the same time, the local government controlled enterprises are intervened in by the "paternalism" of local governments to a larger extent. Both of these factors are due to the invalid governance effect of product market competition.

In regards to central government controlled enterprises, the corporate cash flow risk (*Cvar*) has a significant negative coefficient on their product market competition (*Comp*) (-0.0013, 5%). The agent costs (*AgCost*) of central government controlled enterprises are negatively related to their product market competition (*Comp*) (-0.0083, 5%). Subsequently, while adding the variable of agent costs to the cash flow risk estimation model, it could be found that the coefficient of product market competition (*Comp*) is -0.0011, and therefore insignificant, and that the coefficient of agent costs (*AgCost*) is significantly positive (0.0269, 10%). The agent efficiency is positively related to their product market competition (*Comp*) (0.0190, 1%). When Adding the variable of agent efficiency to cash flow risk estimating model, it could be found that the coefficient of product market competition (*Comp*) is significantly negative (-0.0015) at the level of 5% and the coefficient of agent efficiency (*AgEff*) is significant positive (0.0097) at the level of 1%, which means that the mediating effect is significant. The economic meaning of the empirical results is that the deeper the extent that central government controlled enterprises participates in product market competition, the lower their cash flow risks are. This is mainly due to the governance effect of the product market in enhancing corporate agent efficiency. These regression results verify that compared with non-government-controlled enterprises and local government controlled enterprises, central government controlled enterprises are more sensitive to the governance effect

of product market competition, and their cash flow risks are also more sensitive to the degree of product market competition, which supports H2

C. Tests of H3

Table. VIII reports the regression results of the model added by the interaction item of product market competition and the quality of local government (*Comp×ProQuality*). Table. column (1) shows that with the consideration given for the influence of local governmental quality, for non-government controlled enterprises and local government controlled enterprises, the regression coefficient of their cash flow risks (*Cvar*) to product market competition (*Comp*) is -0.0114 and significant at the level of 5%, and the coefficient of the interaction item (*Comp×ProQuality*) is 0.0033 and significant at the level of 10%. The economic meaning is that the quality of local government actually disturbs the influence of product market competition on cash flow risks during the sample firm-years, and the higher quality the local governments is, the more obvious the reduction of corporate cash flow risk due to product market competition is.

The mediating effect tests in columns (2) and (3) show that although in the preliminary tests the corporate agent costs (*AgCost*) and agent efficiency (*AffEff*) are neither influenced by product market competition significantly and the moderating effect of the quality of local governments is also insignificant, in the further tests simultaneously containing the variables of product market competition, agent costs, and interaction item in the estimated cash flow risk model, the corporate cash flow risk (*Cvar*) is significantly negatively related to product market competition (*Comp*) (-0.0114, 5%), the coefficient of the interaction item (*Comp×ProQuality*) is significantly positive (0.0034, 5%), and the figure related to agent costs (*AgCost*) is insignificant. According to the steps of mediating effect test, the Sobel-Goodman test rejects the mediating effect of agent costs as well. Adding the corporate agent efficiency to the estimated model of cash flow risk, the test results show that the corporate cash flow risk (*Cvar*) is negatively related to product market competition (*Comp*) significantly (-0.0116, 5%), the coefficient of the interaction item (*Comp×ProQuality*) is positive significantly (0.0034, 5%), and the figure relating to agent efficiency (*AgEff*) is also positive significantly (0.0050, 1%). The result of Sobel-Goodman test further manifests that the mediating effect of agent efficiency is significant at least at the level of 5%.

It can be concluded from the empirical results that the reduction of cash flow risks during the sample firm-years due to product market competition stems from the competitive enhancement of their agent efficiency, while gaps in the quality of local governments disturbs the manifestation of this governance effect. In areas where the quality of local government is relatively high, the product market competition exerts more obvious governance effect on corporate cash flow risk via the enhancement of agent efficiency. This is because the

high quality of local governments means governments would exert their management function as a "supporting hand" to a larger extent, and guarantee the full development of the governance effect of product market competition through high quality public governance, which is reflected accordingly, as that the governance effect on reduction of cash flow risk is more significant. The empirical conclusions partially support H3: the higher quality the local governments is, the more obvious the enhancement of agent efficiency of the enterprises controlled by these local governments or by private interests or individuals whose location is in the jurisdiction of these local governments due to product market competition is, and the reduction of cash flow risks of these kinds of enterprises is more sensitive to the increasing degree of product market competition. However, there is no evidence to support that agent costs have the same mediating effect as agent efficiency in this influence mechanism.

D. Robustness Test

There is no authoritative model to estimate corporate cash flow risk for now and the model this paper constructs refers to classical research on cash holdings and complements with other references [34]. For this reason, in the robustness test, this paper roundly adds the financial characteristic variables of company size, growth, investment demand, the strategy of cash holding, state of operation, financing scale, and financial standing, and does the P-to-retain test on these control variables to retain the variables whose coefficient is unequal to 0 at the significant level of 0.05, and then performs model regression for another time. Chosen control variables contain: company scale, dividend payout ratio, Tobin Q, investment spending, capital structure, cash holdings, working capital, financial asset ratio, financing scale, and the proportion of the top ten shareholders. Test results remain robust.

Moreover, because the data this paper used is a short panel of only four years, there could be an endogenous problem. Thus, in the robustness rest, this paper uses data which lagged one year behind the explanatory variables, mediating variables and moderating variables, with the exception of the quality of local government, in which it has been lagged when constructing this variable, to eliminate the possibility of the endogenous problem. Test results remain robust. Limited by space, this paper does not report the results of robustness tests.

VI. Conclusion

Based on the governance effect of enterprises, this paper attempts to analyze the unique influence of product market competition on the cash flow risk of Chinese enterprises. The tests of panel data's fixed effects are modeled to sample companies in order to find out, in total, whether product market competition holds an external governance mechanism, and if the governance effect it expresses can be reflected by cash flow risk, which can be demonstrated by the reduction of corporate cash flow risk. While considering the different hierarchies of government control, this paper finds that compared with the enterprises that are controlled by private interests and local governments, product market competition exerts a heavier governance effect on the enterprises that are controlled by the central government. Further examination of the sample of enterprises that controlled privately and by local governments, with the additional consideration of local government quality, reveals that in circumstance with higher local government quality, the governance effect of product market competition is more effective. The agent efficiency of sample enterprises (enterprises controlled by these local governments or privately whose location is in the jurisdiction of these local governments) is relatively higher, and their cash flow risks show a more obvious reduction with an enhancement of product market competition. However, there is no evidence that could support that agent costs have the same mediating effect as agent efficiency in this influence mechanism.

The further research, after the empirical test of the final effect of the special market-institution environment in this paper, could be focused on the quantitative of the different behaviors of government intervention and corporate competition. We think the game theory may be an effective tool to do the strategies prediction, which might find out the reason why emerging market like China has a unique market response and the direction that can lead to the best relationship among market, government and enterprises.

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Appendix:

<div align="center">TABLE I. VARIABLES LIST</div>

Variable Nature	Variable Names	Variable Meaning	Measurement Methods
Explained variable	Cvar	Cash flow risk	St. Dev. (Net cash flow from operating activities from t-2 to t) / Total assets
Explanatory variable	Comp	Product market competition	ln [1/ | Enterprises operating margin – Industry operating margin |]
Mediating variables	AgCost	Agent costs	Management costs / Operating income
	AgEff	Agent efficiency	Operating income / Total assets
Moderating variables	Control	Government control	Refers to variable definitions in the corresponding part
	ProQuality	Quality of local government	
Control variables	Size	Company size	Ln (Total assets)
	Lev	Capital structure	Total liabilities / Total assets
	Zcash	Cash holdings	(Money funds + Trading financial assets) / Total assets
	Cf	Cash flow	Net cash flow from operating activities / Total assets
	TobinQ	Growth	Market value / Total assets
	Invest	Investment Spending	(Cash payment for construction of fixed assets, intangible assets and other long-term assets - Cash withdrawn from disposal of construction of fixed assets, intangible assets and other long-term assets) / Total assets
	Ldebt	Long term debt ratio	Long-term liabilities / Total assets
	Vel	Cash turnover ratio	Operating income / Average balance of cash and cash equivalents
	Sub	Liquidity Substitutes	(Current assets - Current liabilities - Money funds - Trading financial assets) / Total assets
	Div	Dividend payout ratio	Dividend dummy (take 1 if companies paid dividends this year, or take 0)
	Herfindahl	Ownership concentration	Quadratic sum of the proportion of the holding of the former 5 major shareholders

Data Source: sorted out by authors.

<div align="center">TABLE II.   DESCRIPTIVE STATISTICS OF UNIVARIATES</div>

Variables	N	Mean	Sd	Min	P50	Max
Cvar	6581	0.0473	0.0405	0.0026	0.0357	0.2261
Comp	6581	2.2123	1.7346	-0.6561	2.4078	6.6149
AgCost	6581	0.0951	0.0869	0.0092	0.0742	0.6090
AgEff	6581	0.7266	0.5122	0.0645	0.6065	2.9022
ProQuality	6581	3.2374	0.1284	2.9057	3.2457	3.6314

Note: the means and medians of univariates are tests of t-test and Wilcoxon test each, and the results are at least significant at the level of 10%.

<div align="center">TABLE III.   DESCRIPTIVE STATISTICS OF STRATIFIED SAMPLES</div>

Variables	Group with Low Product Market Competition		Group with High Product Market Competition		Comparison of Mean Value
	N	Mean_1	N	Mean_2	
Cvar	3089	0.0492	3762	0.0458	mean_1>mean_2***
AgCost	3089	0.1097	3762	0.0830	mean_1>mean_2***
AgEff	3089	0.6084	3762	0.8236	mean_1<mean_2***

Note: means of stratified samples are tested by non-homogeneous variance t-test. ***p<0.01, **p<0.05, *p<0.10.

TABLE IV.   TESTS OF H1

Explanatory Variable	(1) Cvar	(2) AgCost	(3) AgEff	(4) Cvar	(5) Cvar
Comp	-0.0008*** (0.0003)	-0.0070*** (0.0008)	0.0146*** (0.0027)	-0.0007** (0.0003)	-0.0009*** (0.0003)
AgCost				0.0056 (0.0057)	
AgEff					0.0066*** (0.0016)
Size	-0.0070*** (0.0010)	-0.0313*** (0.0027)	-0.0170* (0.0094)	-0.0068*** (0.0010)	-0.0069*** (0.0010)
Lev	0.0181*** (0.0043)	-0.0019 (0.0111)	0.2204*** (0.0394)	0.0181*** (0.0043)	0.0166*** (0.0043)
Zcash	0.0071* (0.0039)	-0.0496*** (0.0100)	0.2703*** (0.0354)	0.0074* (0.0039)	0.0053 (0.0039)
Cf	0.0064* (0.0039)	-0.0810*** (0.0010)	0.2325*** (0.0353)	0.0069* (0.0039)	0.0049 (0.0039)
TobinQ	0.0004 (0.0003)	0.0010 (0.0008)	0.0120*** (0.0029)	0.0004 (0.0003)	0.0004 (0.0003)
Invest	0.0071 (0.0065)	-0.0522*** (0.0167)	0.1578*** (0.0592)	0.0074 (0.0065)	0.0061 (0.0065)
Ldebt	-0.0049* (0.0028)	0.0331*** (0.0073)	-0.2571*** (0.0258)	-0.0051* (0.0028)	-0.0032 (0.0028)
Vel	-0.0001* (0.0001)	-0.0017*** (0.0001)	0.0103*** (0.0005)	-0.0001 (0.0001)	-0.0002*** (0.0001)
Sub	0.0133*** (0.0039)	-0.0724*** (0.0101)	0.3575*** (0.0358)	0.0137*** (0.0039)	0.0109*** (0.0039)
Div	4.55e-06 (0.0007)	-0.0033* (0.0018)	0.0283*** (0.0064)	2.29e-5 (0.0007)	-0.0002 (0.0007)
Herfindahl	0.0100 (0.0073)	-0.0083 (0.0188)	0.2768*** (0.0665)	0.0101 (0.0073)	0.0082 (0.0073)
Constant	0.1997*** (0.0243)	0.8389*** (0.0628)	0.9208*** (0.2222)	0.1950*** (0.0248)	0.1995*** (0.0259)
R-squared	0.0424	0.1411	0.1951	0.0426	0.0459
F	13.0000***	7.7000***	19.3300***	12.9900***	12.9800***
Observations	6851	6851	6851	6851	6851

Note: standard error listed in parentheses; ***p<0.01, **p<0.05, *p<0.10.

TABLE V.   TESTS OF H2

Explanatory Variable	(1) Cvar	(2) AgCost	(3) AgEff	(4) Cvar	(5) Cvar
Group of non-government controlled enterprises					
Comp	-0.0004 (0.0004)	-0.0089*** (0.0013)	0.0158*** (0.0037)	-0.0006 (0.0004)	-0.0006 (0.0004)
AgCost				-0.0150** (0.0075)	
AgEff					0.0073*** (0.0026)
Constant	0.1859*** (0.0352)	0.7692*** (0.1027)	1.0426*** (0.2967)	0.1974*** (0.0356)	0.1783*** (0.0352)
R-squared	0.0467	0.1592	0.2414	0.0485	0.0503
F	12.2700***	6.1600***	17.3300***	12.2600***	12.1000***
Observations	3403	3403	3403	3403	3403
Group of local government controlled enterprises					
Comp	-0.0005 (0.0005)	-0.0032*** (0.0010)	0.0134*** (0.0048)	-0.0004 (0.0005)	-0.0005 (0.0005)
AgCost				0.0231* (0.0123)	
AgEff					0.0017 (0.0026)
Constant	0.2911*** (0.0459)	0.7329*** (0.0932)	1.5188*** (0.4365)	0.2741*** (0.0467)	0.2885*** (0.0461)
R-squared	0.0885	0.1356	0.2601	0.0906	0.0888
F	13.2700***	9.8900***	20.2000***	13.2900***	13.2100***
Observations	2288	2288	2288	2288	2288
Group of central government controlled enterprises					
Comp	-0.0013** (0.0006)	-0.0083*** (0.0014)	0.0190*** (0.0063)	-0.0011 (0.0007)	-0.0015** (0.0006)
AgCost				0.0269* (0.0159)	
AgEff					0.0097*** (0.0036)
Constant	0.1689*** (0.0628)	0.8165*** (0.1401)	0.3834 (0.6148)	0.1469** (0.0641)	0.1652*** (0.0626)
R-squared	0.0851	0.1747	0.2805	0.0884	0.0933
F	12.6100***	10.2400***	21.9300***	12.6400***	12.7300***
Observations	1160	1160	1160	1160	1160

Note: standard error listed in parentheses; ***p<0.01, **p<0.05, *p<0.10. Limited by space, this paper does not report the results of regression coefficient and significance of control variables.

TABLE VI.   TESTS OF H3

Explanatory Variable	(1) Cvar	(2) AgCost	(3) AgEff	(4) Cvar	(5) Cvar
Comp	-0.0114** (0.0057)	-0.0019 (0.0152)	0.0433 (0.0512)	-0.0114** (0.0057)	-0.0116** (0.0057)
Comp× ProQuality	0.0033* (0.0018)	-0.0014 (0.0047)	-0.0091 (0.0158)	0.0034* (0.0018)	0.0034* (0.0018)
AgCost				0.0026 (0.0061)	
AgEff					0.0050*** (0.0018)
Size	-0.0076*** (0.0011)	-0.0321*** (0.0030)	-0.0278*** (0.0103)	-0.0075*** (0.0012)	-0.0074*** (0.0011)
Lev	0.0211*** (0.0047)	-0.0138 (0.0124)	0.2488*** (0.0418)	0.0211*** (0.0047)	0.0198*** (0.0047)
Zcash	0.0058 (0.0041)	-0.0563*** (0.0110)	0.3077*** (0.0372)	0.0059 (0.0042)	0.0042 (0.0042)
Cf	0.0069 (0.0042)	-0.0912*** (0.0113)	0.2682*** (0.0380)	0.0071* (0.0043)	0.0056 (0.0043)
TobinQ	0.0007** (0.0003)	0.0021** (0.0009)	0.0125*** (0.0031)	0.0007** (0.0003)	0.0006* (0.0003)
Invest	0.0103 (0.0070)	-0.0473** (0.0188)	0.1862*** (0.0632)	0.0104 (0.0070)	0.0093 (0.0070)
Ldebt	-0.0054* (0.0030)	0.0365*** (0.0081)	-0.2446*** (0.0272)	-0.0055* (0.0030)	-0.0042 (0.0031)
Vel	-0.0001 (0.0001)	-0.0017*** (0.0002)	0.0099*** (0.0005)	-0.0001 (0.0001)	-0.0001** (0.0001)
Sub	0.0163*** (0.0042)	-0.0744*** (0.0113)	0.3529*** (0.0380)	0.0165*** (0.0043)	0.0145*** (0.0043)
Div	-0.0002 (0.0008)	-0.0045** (0.0020)	0.0250*** (0.0069)	-0.0002 (0.0008)	-0.0003 (0.0008)
Herfindahl	0.0109 (0.0081)	0.0016 (0.0216)	0.2769*** (0.0726)	0.0109 (0.0081)	0.0095 (0.0081)
Constant	0.2144*** (0.0258)	0.8163*** (0.0687)	0.9514*** (0.2315)	0.2123*** (0.0262)	0.2097*** (0.0258)
R-squared	0.0513	0.1431	0.1987	0.0513	0.0532
F	12.6300***	7.0300***	18.1700***	12.6000***	12.5400***
Observations	5691	5691	5691	5691	5691

Note: standard error listed in parentheses; ***p<0.01, **p<0.05, *p<0.10.