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Does EVA performance evaluation improve the value of cash holdings? Evidence from China

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ABSTRACT

This paper investigates the influence of the economic value added (EVA) performance evaluation, issued in 2010 by the State-owned Assets Supervision and Administration Commission of the State Council, on the value of the cash holdings of central state-owned enterprises (CSOEs). We find that EVA performance evaluation has some influence on the overinvestment of CSOE cash holdings and significantly increases the value of CSOE cash holdings compared with the cash holdings of local state-owned enterprises. The greater value of CSOE cash holdings derives from underinvestment modification and overinvestment restraint. The value of cash holdings increases more for companies with better accounting performance. Thus, the EVA performance evaluation policy increases CSOE efficiency. This study contributes to the emerging literature related to cash holdings and the economic consequences of the EVA performance evaluation policy. It expands the literature related to investor protection in countries experiencing economic transition.

1. Introduction

Jensen and Meckling (1976) find that managers routinely waste their firm's cash for personal benefit. Furthermore, Jensen (1986) observes that managers hold on to excess cash for personal benefit. These arguments have been widely cited in the domestic and overseas literature. Due to the separation of ownership and control, managers often consume corporate cash to maximize their own benefits or act in a way that fails to maximize the benefits of stockholders. The agency costs resulting from the separation of ownership and

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control rights may be more serious in state-owned enterprises (SOEs) in China due to a lack of individual shareholders. The consumption of cash is likely to be an important component of agency costs.

Cash is very important to the management and operation of a corporation. Cash holdings provide money to meet the daily needs of a corporation and decrease financial risk. In addition, a firm's value rises when its cash is invested. Compared with other kinds of assets, cash is a form of profit and can be easily transformed into a personal benefit at a lower cost (Myers and Rajan, 1998). Given the separation of ownership and control, inside managers can affect the decisions made in relation to cash holdings via residual control. They hold more cash and accept projects that are harmful to shareholder interests, which decreases the value of the cash holdings and decreases their firm's market value to a point lower than book value (Jensen, 1986).

There are two factors that affect the value of cash holdings. The first is financial characteristics, including financing constraints, growth opportunities and investment opportunities. A firm's level of cash holdings affects its market value, which increases as cash holdings rise. The connection becomes stronger if a firm faces better growth opportunities (Saddour, 2006). In theory, a shareholder believes that $1 of a firm's cash holdings is equivalent to its book value. However, for a firm with better investment opportunities, a premium exists in its cash holdings (Pinkowitz and Williamson, 2007). The second factor is corporate governance. The effectiveness of a firm's corporate governance reflects the market value of its cash holdings, which in turn influence the firm's value. Firms with good corporate governance enjoy twice the cash market value of firms with poor corporate governance. The negative effect on operating performance resulting from holding large amounts of cash is suppressed in firms with good corporate governance (Pinkowitz et al., 2006; Dittmar and Jan, 2007).

Agency problems are common and agency costs decrease the value of cash holdings. Therefore, managers who restrain their self-interest may significantly increase the value of their firm's cash holdings. When discussing how manager's performance evaluations influence the value of their firm's cash holdings, it should be made clear that appropriate evaluation is the premise for encouraging managers to increase the service efficiency of their funds. Choosing a core performance evaluation index is the key point in a manager performance evaluation system. When a manager's income is positively related to the performance of his or her firm, economic value added (EVA) can operate as a performance evaluation index that encourages managers to make efficient investment decisions that raise the value of their firms (Rogerson, 1997). In addition, when EVA is included in a manager's compensation incentives, that manager will cut down financing decisions out of self-interest, which has little effect on any increase in firm value (Stern and Stewart, 2004). This paper considers whether an effective manager performance evaluation system decreases agency costs and improves the value of a firm's cash holdings.

Given China's unique institutional background, central SOEs (CSOEs) play an important role in economic growth and the development of a healthy securities market. Although CSOEs have undergone many reforms, many problems remain unsolved. For a long time, CSOEs failed to focus on their main businesses, electing instead to pursue large-scale projects and lowering the efficiency of their funds as a result. To correct this development pattern and protect small investors, the State-owned Assets Supervision and Administration Commission (SASAC) of the State Council issued its *Interim Measures for Business Performance Appraisals of Persons-in-Charge at Central Enterprises* in 2010. Since then, the performance of CSOE heads has been evaluated based on the EVA index.

The main change in this regulation was the use of EVA. EVA comprises 40% of the core index of return of assets. The key point in manager performance evaluations therefore changed from profit to value, forcing CSOEs to focus on value management rather than strategic management. In addition to total profits, capital efficiency is an important factor influencing EVA. In short, EVA value, which represents the value of a firm, grows as the firm's capital efficiency improves. The wise management of capital, achieved by decreasing the cost of occupied capital and improving the efficiency of used capital, is an important approach to improving firm value. Meanwhile, as mentioned in the *Notice on accomplishing the financial budget management and preparation of statement work at central enterprises* in 2013, CSOEs are required to stick to the rule that cash is king in budget management, highlighting the importance of capital management. This regulation asks CSOEs to put cash management first, detail their capital budgets and arrange their financial resources efficiently. In a macro-policy setting, we research cash holdings in CSOEs from an EVA perspective of value creation. The relationship between EVA and cash holdings in CSOEs is readily apparent. Furthermore, it would

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be helpful to explore the intention behind the policy and analyze the association between value creation and cash holdings in CSOEs.

The literature related to the value of cash holdings has focused mainly on financial characteristics, corporate governance and financial constraints. These aspects are representative of a firm's internal or external environment. Exploring the factors that influence the value of cash holdings from internal or external environment perspectives reveals their systematic nature and comparability. The sample in this study consists of listed companies that are controlled by CSOEs and matched with local SOEs (LSOEs). The SASAC chose EVA as its index to evaluate the performance of the heads of CSOEs. Combining our sample with this policy context, we research the influence of EVA on the value of CSOE cash holdings. We also try to reveal the intention behind the policy and determine whether it works according to the information we acquire.

This paper makes the following contributions. First, in terms of the EVA evaluation index, whether the heads of CSOEs change their previous management theory to create firm value remains unknown. Because cash has the highest liquidity in a firm, this paper pays attention to factors that affect cash value. It helps to clarify the connection between EVA and the value of cash holdings and provides a theoretical basis and tests for the effect of the policy.

Second, this paper tests the economic consequences of EVA evaluation carried out in CSOEs from a cash holdings perspective. It enriches the literature related to the value of cash holdings while connecting it with the EVA literature.

Third, this paper can be broadly classified as a study of corporate governance and the value of cash holdings. It analyzes how the EVA evaluation index influences the value of cash holdings in detail and therefore extends the literature in that field.

The following features may enhance the validity of our research beyond the contributions just mentioned. First, firms in China can be divided into several classes according to administrative level, such as enterprises of the central government, enterprises of provinces or ministries, enterprises of prefectures or departments and enterprises of counties or divisions. The higher the administrative level of a firm, the stronger its influence on the Chinese macro-economy. CSOEs are crucial participants and their operating efficiency plays an important role in this macro-economy. Second, investors in the Chinese stock market are widely considered to be poorly protected. According to the EVA evaluation index, corporate governance can ensure better investor protection. It not only improves the level of investor protection in the Chinese market, but also provides an empirical reference for other emerging markets.

The rest of this paper is arranged as follows. Section 2 contains the literature review. Section 3 reveals the institutional background, theoretical analysis and research hypotheses. Section 4 presents the research design, including the sample selection, model design and variable definitions. Section 5 describes the descriptive statistics. Section 6 reports the empirical test results. Section 7 offers a conclusion and presents the limitations of the paper.

2. Literature review

This paper focuses on cash, the value of cash holdings and EVA performance evaluation. In this section, we review the literature related to cash holdings and EVA performance evaluation.

2.1. Cash holdings and the value of holdings

Studies of cash holdings and their value have an important position in corporate finance. The scale of cash holdings and efficiency of cash use play important roles in a firm's value because cash is a firm's most essential liquid asset. Bates et al. (2009) classify the reasons why firms hold cash into three motives. The first is the transaction motive. John (1993) and Opler et al. (1999) find that cash holdings affect a firm's Tobin Q, R&D ratio, advertising expenditures, capital expenditures, scale, debt ratios, cash-to-cash cycles and cash flows. Kim et al. (1998) models a firm's investment decisions on its liquid assets and discovers that the optimal amount of liquidity is determined by a tradeoff between the low return of liquid assets and the benefit of decreasing the need for costly external financing. Opler et al. (1999) find that the firms with the best access to capital markets, such as large firms and firms with higher credit ratings, tend to hold lower ratios of cash

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to total non-cash assets. The research has also shown that firms that do well tend to hold more cash than predicted by the static tradeoff model, in which managers maximize shareholder wealth.

The second motive is the precautionary motive. According to Opler et al. (1999), firms are expected to hold more cash when they are short on cash flow or find it difficult to obtain external capital, as they incur higher costs if their financial conditions worsen. Almeida et al. (2004) find that financially constrained firms tend to invest in cash assets and that the opposite is true for unconstrained firms. Han and Qiu (2007) argue that the cash holdings of financially constrained firms are positively related to cash flow volatility, providing evidence for the precautionary motive for a firm's cash holdings. Acharya et al. (2012) conclude that the correlation between cash holdings and credit risk is robustly positive. This puzzling finding can be explained by the precautionary motive for saving cash.

The third motive is the agency motive. Jensen (1986) finds that in firms lacking investment opportunities, managers who are motivated by tunneling prefer to keep cash in their firms rather than pay dividends to investors. In terms of investor protection (Dittmar et al., 2003), evidence has shown that firms in countries where investor rights are poorly protected hold up to twice as much cash as those with good investor protection. In addition, when investor protection is poor, the factors that generally drive the need for cash holdings, such as investment opportunities and asymmetric information, become less important. Dittmar and Jan (2007) and Pinkowitz et al. (2006) find that serious agency problems devalue firms' cash holdings. Evidence from Dittmar and Jan (2007) and Harford et al. (2008) shows that managers who are motivated by tunneling are inclined to set up an equilibrium of excess cash holdings and are always good at consuming excess cash. Nikolov and Whited (2011) discover that the agency problem of perquisite consumption is better than firm size at explaining a cash holdings equilibrium and that the agency problem of firm size is better at explaining firm value. Liu and Mauer (2011) find that risk premiums are positively related to cash holdings but negatively related to the value of cash holdings.

Other scholars have researched cash holdings in different ways. Chen et al. (2012) find that cash holdings in the Chinese stock market decrease after the split-share reform. This appears to be more significant for firms with poorer corporate governance and stronger financial constraints. Based on questionnaires posted to CFOs in 29 countries, Lin et al. (2010) conclude that a line of credit is the key point influencing financial liquidity.

Scholars also make contributions to the value of cash holdings. Faulkender and Wang (2006) test abnormal stock returns in different fiscal years. They consider the marginal value of cash declines given more cash holdings, higher financial leverage and easier access to the capital market. Cash dividends also decrease the marginal value compared with stock repurchases. Some research has determined the average cash value in all firms to be \$0.94. In theory, shareholders estimate that \$1 in cash is equal to its book value. However, cash holdings in firms with better investment opportunities enjoy a premium (Pinkowitz and Williamson, 2007), meaning that \$1 in cash is worth more than its book value. The opposite is also true. Many researchers have focused on how corporate governance influences the value of cash holdings. Agency theory argues that cash value is lower in countries in which investor protection is poor, as controlling shareholders are more likely to benefit from cash assets. In response to this theory, Pinkowitz et al. (2006) believe that the relationship between cash holdings and firm value is weaker in countries with poorer investor protection. Firms with poor corporate governance hold less cash because managers tend to consume cash more quickly rather than keep it in case of financial crisis (Harford et al., 2008). Dittmar and Jan (2007) find that \$1 in cash in poorly governed firms ranges from only \$0.42 to \$0.88 in value. However, the amount rises to \$2 in well-governed firms. Moreover, when a firm's corporate governance is poor, it is easier for managers to waste cash on projects that do obvious damage to the firm's value.

Scholars in China have also devoted themselves to such research. Zhang and Wu (2006) conclude that the relation between cash and cash flow sensitivity is significantly positive in Chinese firms regardless of whether they face financial constraints. Under the economic conditions in China, better corporate governance lowers cash holdings (Xin and Xu, 2006). In terms of local government governance, firms positioned in areas in which the local government is properly governed hold less cash (Chen et al., 2011). In terms of agency problems, agency costs play a role in the following relationship (Jiang and Bi, 2006). When agency costs are high, excess cash holdings are negatively related to firm value. The relationship turns positive when agency costs decrease. In terms of the separation of control and ownership rights, Shen et al. (2008) find that state-owned controlling shareholders prefer high levels of cash holdings. The value of cash holdings in these firms is RMB0.769. When

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there is separation in the two rights or state-owned controlling shareholders change, the value rises to RMB1.206. The market value of cash holdings in Chinese listed firms is generally lower than the book value, which is more significant in listed SOEs.

As mentioned previously, scholars have mostly focused on corporate governance and the legal environment and have discussed whether the two influence the value of cash holdings. Little attention has been paid to performance evaluation. The regulation of the EVA performance evaluation, issued by the SASAC in 2010, is exogenous across firms in China. The EVA evaluation reflects a distinctly different idea compared with past evaluations. The regulation enforced by the SASAC provides an excellent opportunity to determine whether the EVA evaluation affects the management theory of the heads of CSOEs and the value of cash holdings. Based on its results, this study should enrich the literature related to what influences the value of cash holdings.

2.2. EVA performance evaluation

Stern Stewart introduced the EVA performance evaluation more than 20 years ago.[1] The company believes that EVA is more persuasive than other performance indicators in terms of driving stock prices, creating wealth and interpreting changes in shareholder wealth (Stewart, 1994). The empirical findings of the correlation between EVA and accounting performance have been diverse. Chen and Dodd (1997), Lehn and Makhija (1997) and Kleiman (1999) find that EVA supports value creation capabilities. Machuga et al. (2002) find that EVA can more accurately forecast future profits than Earning Per Share (EPS). Lovata and Costigan (2002) find that defensive companies with low levels of insider ownership and institutional investors with large cash holdings are more inclined to use the EVA performance evaluation system. However, Biddle et al. (1997) find no evidence to support EVA.

Conclusions as to whether EVA can improve corporate value and whether stock prices have more relevance have been diverse. However, this does not affect our analysis of the effect of EVA on the value of cash holdings. An EVA calculation must consider all of the costs involved, including the cost of equity capital. Therefore, an EVA performance evaluation affects an enterprise's entire asset structure, and the enterprise must adjust its cash holdings accordingly. The literature has not yet linked these two phases.

The SASAC deemed EVA an effective performance evaluation mechanism that is able to improve business efficiency and protect shareholder interests and is within the scope of SOEs to enforce. In this paper, we focus on whether the EVA performance evaluation changes the philosophy of the heads of CSOEs in a way that increases the value of their cash holdings. The literature thus far has not provided a clear answer to this point. Therefore, this paper attempts to analyze the relationship between EVA performance evaluation and the corporate value of cash holdings, link the fragmented literature related to EVA and the value of cash holdings and test the effect of the EVA performance evaluation in practice.

3. Institutional background, theoretical analysis and hypotheses

We begin by considering the executive pay reform process of Chinese companies. Employee pay was under strict control before China's reform and opening-up policies were launched in 1978. Factory director wages were also subject to the rigid wage system. Wages were bonded to some non-financial indexes, including enterprise location, industry, political rank (central or local), director's administrative level, firm size, job type and personal qualifications (Yueh, 2004). The State Council approved the "annual salary system," combining the basic and risky salaries of the Shanghai Hero Pan Company in 1992, thereby beginning the substantive reform of the executive pay system. Although SOEs had undertaken many non-financial goals, their operating performance was generally measured by financial indexes (Yueh, 2004).

Although China holds a theoretically positive attitude toward the value of managers, it regulates managers in practice, bonding their salaries with those of employees. Around 2004, the State Council and SASAC issued

[1] Before the document is issued, the salary decisions made inside the companies probably make implicit use of value-making indexes to evaluate the executives based on accounting performance. The release of the document may make these implicit value-making indexes explicit.

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their *Interim Measures for Business Performance Appraisals of Persons-in-Charge at Central Enterprises* and *Interim Measures for Compensation of Persons-in-Charge at Central Enterprises* and subsequently put them into practice. They determine that the salaries of heads of CSOEs comprise basic and performance salaries in addition to long-term incentive units and raise a specific measure to bond the regulation of their salaries with business performance. The *Interim Measures for Business Performance Appraisals of Persons-in-Charge at Central Enterprises* entered into effect on January 1, 2007 and encourages enterprises to use the EVA index to appraise their annual business performance. Enterprises using the EVA index and attaining EVA growth are rewarded. According to the *Interim Measures for Business Performance Appraisals of Persons-in-Charge at Central Enterprises*, the SASAC can only encourage enterprises to use the EVA index. The enterprises are free to decide whether to use it based on the systems they have in place. Considering the spillover effect of the *Interim Measures for Business Performance Appraisals of Persons-in-Charge at Central Enterprises*, other enterprises may imitate the CSOEs and use EVA as an appraisal index.[2] This document may only expose the implicit evaluation of the executives' value creation. The Shandong Department of Finance published the EVAs of all of the SOEs and community-owned enterprises and some private enterprises for three years beginning in 2006 to maximally decrease the profit manipulation of executives and accounting distortion performance and coordinate the SASAC and enterprises to comprehensively evaluate executive performance. In 2010, the SASAC issued *Order No. 22*, requiring CSOEs to appraise executive performance using a combination of accounting profit and EVA. EVA has a weight of around 40%.

Throughout the reform of the Chinese enterprise and "annual salary system," salary contracts have generally been based on accounting profit assessments. Although accounting performance is more easily manipulated for managers' interests,[3] we do not deny that such manipulation can act as an incentive for executives to work harder. As managers decide salaries, their interests complement those of shareholders. Determining how to encourage executives to improve short-term accounting performance without encouraging a loss in enterprise value is one of the most important tasks for managers. A series of indexes can measure the enterprise value including stock prices, return on equity and EVA. Nevertheless, the systemic risk of the stock market is beyond the control of executives (Sloan, 1993; Garvey et al., 2002). As a result, performance indexes, which are bonded with the systemic risk of the stock market, go against executive incentives. Compared with stock market indexes, the EVA index is under executive control, which reflects the effort level of the executives. Compared with accounting indexes, the EVA index is less likely to be manipulated and is able to reflect executives' efforts to ensure the long-term growth of their enterprises. When it is unsafe to observe CEOs' performance, EVA may offer a better option by partly observing the controllable output (changes in stockholder wealth) of their observable effort (CEOs' effort) (Jensen and Murphy, 1990).

EVA is a corporate finance, decision and compensation incentive system registered and carried out by Stern Stewart. At its core, it is an evaluation methodology based on net operating profit and the total cost of capital-making profit. It is calculated as follows: EVA = Net profit after tax − Total capital cost = Net profit after tax − Capital × Cost of capital. According to the new conception of value creation, an enterprise's value creation must be evaluated via EVA (Stewart, 1994). EVA truly reflects whether an enterprise is creating or losing value in a certain period, considering all of the capital costs including equity capital. Occupation of funds is a factor that influences EVA. The higher the amount of occupied of funds, the lower the EVA, ceteris paribus. Meanwhile, the cash that enterprises hold comprises a large proportion of occupied funds. Therefore, cash holdings and the efficiency of their investment are important factors influencing EVA. This paper focuses on cash holding value.

[2] EVA has also undergone great improvement in China. Baosteel and Tsingtao Beer successfully introduced EVA at the end of 2002 and took it as an opportunity to re-engineer their organizational construction and management processes and establish EVA salary and financial management systems. The government implemented an annual salary policy in Tsingtao Beer in 1999. However, the annual salary system based on accounting numbers unfairly ignored the costs of capital. Combining EVA and accounting numbers increased the transparency of the company, its investment efficiency and the value of its human resources (2002, http://business.sohu.com). Other famous enterprises that have adopted EVA include China Construction Bank, Li-Ning, China Construction and FAW Group.

[3] Before the document is issued, the salary decisions made inside the companies probably make implicit use of value-making indexes to evaluate the executives based on accounting performance. The release of the document may make these implicit value-making indexes explicit.

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Three kinds of motivations account for cash holding performance: transaction motivation (Miller and Orr, 1966; Mulligan, 1997), precautionary motivation (Opler et al., 1999; Riddick and Whited, 2009; Bates et al., 2009) and agency cost motivation (Jensen, 1986; Dittmar and Jan, 2007). The earnings from cash holdings maintain currency for daily operations, decrease the chance of a financial dilemma and ensure that an investment policy is not affected by a lack of money. However, cash holdings involve certain managerial and opportunity costs. Too high a cash holding may influence executives' investment behavior and create agency costs (Jensen and Meckling, 1976). As such, the earnings and costs of cash holdings must be balanced.

According to the principal-agent model presented by Jensen and Meckling (1976), executives allocate enterprise resources out of personal interest due to information asymmetry and limited rationality, including cash. When an enterprise's performance harms stockholder interests, the motivation of its executives' cash holding behavior assimilates the theory of free cash flow. According to this theory, massive cash holdings complement executives' interests. The separation of the two rights pushes executives to use their residual control rights to hold cash. It allows executives to fulfill self-serving behavior such as perquisite consumption and adding subsidies. Meanwhile, massive cash holdings result in blind investment, which focuses on expansion rather than stockholder interests.

Against China's institutional background, the CSOE as an institutional outcome both exhibits the characteristics of an enterprise and differs from enterprises in many ways. CSOEs do not have a clear property rights system, which results in the circumstance of "undeserved owners." Jensen and Meckling (1976) believe that the relationship between stockholders and managers is essentially a contract. By signing contracts, principals authorize agents to perform certain responsibilities on behalf of the principals themselves and bestow certain decision-making powers upon those agents. The loss of company value associated with this principal-agent relationship is known as an agency cost. In CSOEs, where property rights and principals are uncertain, a serious agency problem may arise between principals and agents that may incur agency costs. Meanwhile, CSOE executives enforce a compensation regulation (Chen et al., 2005) that weakens the incentive institution effect, forcing executives to add income from residual controls in compensation. In this circumstance, CSOE executives prefer to expand their enterprises to fulfill more self-serving behavior such as perquisite consumption, which raises their enterprises' agency costs and influences their value. In more microcosmic terms, it lowers the efficiency of cash use, wastes money on projects and investments that damage the company's value and lowers the company's cash-holding value. As CSOEs are at the highest level of China's enterprise administration system, their agency problems are self-evident. This paper seeks to determine whether the agency problems of executives affect their behavior and the value of their cash holdings. It also considers whether EVA evaluation can change the behavior of executives and enhance their companies' cash-holding value.

Designing a set of reasonable incentive measures to decrease the loss of enterprise value resulting from agency costs is an important part of principal-agent theory. Therefore, alleviating the agency problems between CSOE owners and executives is a way of enhancing CSOEs' value-making capacity, investment efficiency and cash-holding value. Establishing effective regulation and incentive institutions against such a background and synchronizing the interests of owners and executives are the keys to solving these problems. An appropriate evaluation of executive performance is the premise of an effective incentive. When the indexes of performance evaluation have been confirmed, executive behavior reaches a benchmark and executives perform in a way that maximizes their own interests. Therefore, favorable performance evaluation indexes alleviate agency problems and guide executives to make decisions and organize their enterprises' manufacturing and operating performance on behalf of stockholder interests.

EVA evaluation began in 2010. The EVA index was added on the basis of accounting performance evaluation and had a greater weight. EVA is adjusted on the basis of accounting performance and equals the economic profit less the capital costs, including the equity capital cost. Therefore, the added EVA evaluation affects executives as much as capital costs do. Capital costs comprise the occupied capital and weighted average cost of capital. Executives have three approaches to enhancing EVA. First, they can efficiently operate their existing businesses and capital and increase their operating income. Second, they can be more prudent in terms of investment, which becomes efficient only when the return on investment exceeds the cost of capital. Third, they can increase the operating efficiency of capital and add the current turnover of capital. Executives increase both EVA and accounting profit when they increase their operating income. Decreasing the occupied

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capital also influences EVA. Cash holdings comprise the greater part of the occupied capital. Therefore, cash holdings and investments are the key points to increasing EVA.

Even more crucial is that the EVA evaluation policy implemented by the SASAC also transmits a signal to the heads of CSOEs, which means that the SASAC focuses on evaluating both the value-making abilities and accounting performance of enterprises. The SASAC hopes to enhance the value-making abilities of enterprises by enhancing the performance evaluation model and protecting stockholder interests to a greater degree. The heads of CSOEs can observe the SASAC's intention and may adjust their enterprises' operations and management based on their charges. Of course, they must balance their own gains and losses, which can take the forms of personal salaries, control powers and chances of promotion.

China advanced a series of macroscopic regulations to prevent the polarization of employee income and demonstrate the principal of fairness. In practice, the government regulates executive income and some employee income (Chen et al., 2005). The main measure of this regulation is to bond executive and employee income and set a directional line for employee income. For example, in 2002, the SASAC issued the rule that executive salaries cannot exceed 12 times the salaries of employees, followed by the provinces. In 2004 and 2009, the SASAC and Ministry of Human Resources and Social Security issued and implemented their *Interim Measures for Business Performance Appraisals of Persons-in-Charge at Central Enterprises* and *Guiding Opinions on Further Regulating the Salary Management of Persons-in-Charge at Central Enterprises*, which clearly state that SOE executive salaries must comprise a basic annual salary, a performance salary and income from mid-/long-term incentives. The basic annual salary is bonded with the average salary of employees at central enterprises. These regulations have been broken to differing degrees over the growth of China's economy and the growth of SOE profits. Tremendously overpriced salaries have occasionally appeared and serve as the best examples of these breakthroughs. Therefore, salaries remain one of the most important ways of incentivizing executives. Although executives can achieve control power to maximize their self-interest through perquisite consumption, the compensation incentive remains a relatively important incentive measure and executives do not waive higher salaries in exchange for personal control power.

The incentive of political promotion is as meaningful as monetized salary incentives and personal control power. The heads of CSOEs are located near or directly within China's political center and have greater potential for political promotion. Many heads of CSOEs have been directly promoted as provincial officials. For example, Finance Minister Xie Louwei served as the president of CIC and the Governor of Fujian Province used to be the CEO of Sinopec. CSOEs have become incubators for economic officials and political promotion may be more of an incentive for the heads of CSOEs than making money or achieving personal profit. The SASAC is the evaluation and regulation institution of the heads of CSOEs. Its evaluation of these heads can decide their promotion to a great degree. Therefore, the heads of CSOEs have reasons to improve the operating ideas of their enterprises and maximize value according to the wishes of the SASAC. As such, creating value has become a central effort of the heads of CSOEs in the daily operating process.

CSOE executives are in the optimal position of choosing what should be evaluated and created to maximize their own interests. The SASAC introduced the *Interim Measures for Business Performance Appraisals of Persons-in-Charge at Central Enterprises* in 2010, with the objective of choosing reasonable performance evaluation indexes to solve the agency problem between CSOE stockholders and executives. The SASAC formerly used return on equity as the main performance evaluation index before EVA. Indexes based on accounting performance may push enterprises to go after net profit and ignore the costs of equity capital. As a result, the value of an enterprise's stockholders suffers as the enterprise expands. CSOEs generally enjoy loose funding policies and endure lower cost of debt capital. Therefore, executives can easily ignore the costs of capital when making operating decisions. EVA comprehensively accounts for the total capital costs and eliminates the disadvantage of classic accounting computation, which occupies the money of stockholders for free. As rational "economic men," CSOE executives have a greater motive to think about the costs of equity and debt capital and spend more money on projects that may truly increase the value of their enterprises after the evaluation policy has been taken into account.

According to the premise of the separation of ownership and control rights, inside executives use residual control power to affect cash-holding decisions and encourage investments that damage stockholder value through abnormally high cash holdings (Jensen, 1986) and to maximize their personal control power. It is relatively easy for SOEs to gain the credit support of banks and equity capital from the capital market, which

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may increase cash holdings. Increased cash holdings have two effects on investment, overinvestment and underinvestment, both of which decrease a company's value and cash holdings.

The heads of CSOEs may use cash holdings more prudently and consider the costs of capital after an EVA evaluation. Furthermore, overinvestment and underinvestment may be curbed to a certain level. Therefore, we present our first hypothesis as follows:

H1(a). The SASAC's EVA evaluation policy lowers the overinvestment of CSOEs.

H1(b). The SASAC's EVA evaluation policy lowers the underinvestment of CSOEs.

The corporate value of cash holdings often decreases due to underinvestment and overinvestment (Jensen, 1986). If overinvestment or underinvestment improves after an EVA performance evaluation, then the value of the CSOE's cash holdings is enhanced due to the efforts of the head of the CSOE to actively or passively improve its business philosophy.

There are two ways to improve EVA. The first is to lower capital productivity. The second is to decrease the weighted cost of capital calculated from the costs of debt and equity. The more cash held by an enterprise, the larger the enterprise's occupied capital. Cash returns and even negative cash returns are almost zero. The cost of capital remains the same under the weighted condition. The more cash held by an enterprise, the more the occupied capital is wasted. The higher the cost of capital, the lower the EVA.

However, cash holdings also have a transaction motivation (Miller and Orr, 1966; Mulligan, 1997) and precautionary motivation (Opler et al., 1999; Riddick and Whited, 2009; Bates et al., 2009). Miller and Orr (1966) support the cash transaction motivation. Mulligan (1997) argues that an enterprise stores less cash due to the cost savings motivation of economic scale. Precautionary motivation supporters believe that when companies enter the capital market, they hold more cash to cope with unexpected situations (Opler et al., 1999; Riddick and Whited, 2009). If enterprises face risks such as a higher risk of cash flows, they will retain a large amount of cash to deal with these risks. Therefore, a certain amount of cash held by a company is accompanied by more investment opportunities (Mikkelson and Partch, 2003).

Under the pressure of the EVA performance evaluation, management seeks to decrease the cost of capital and maintain normal business operations. Therefore, its ultimate goal is to control cash within a reasonable scope to improve the value of the enterprise and its personal interests. Cash holding management can also increase the value of cash holdings to some extent.

Because EVA performance evaluation is only enforced within CSOEs, the effect of a CSOE's operating philosophy and management style may be stronger than that of an LSOE. Therefore, the CSOEs' performance evaluation mode has a stronger effect on cash holdings than that of general SOEs. In summary, we make the following hypotheses.

H2(a). The value of a CSOE's cash holdings increases following an EVA performance evaluation.

H2(b). Compared with those of a non-CSOE, the value of CSOE's cash holdings increases following an EVA performance evaluation.

4. Research design

4.1. Research sample

As this paper focuses on the association between EVA evaluation performance and the value of CSOE cash holdings, we choose A-share listed companies under the control of central enterprises as our research sample. Considering that the share reform process may affect the value of a company, we use data from the 2006–2011 period. When the SASAC of the State Council was first established in 2003, it managed 196 enterprises. Through recombination, this number decreased to 117 by the end of November 2011. According to the list of state-controlled stock codes, the sample comprises 1128 companies. After excluding companies with missing data and ST and *ST companies, the number of companies decreases to 987. To investigate the effect of the EVA appraisal system, we compare CSOEs with general SOEs. Therefore, non-CSOEs are also included in the

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analysis. We use the difference-in-difference method to test the implementation of the EVA performance evaluation policy. To avoid the disparity inherent in CSOEs and LSOEs, we adhere to the principle of same year, same industry and similar total assets and find 987 matching samples for the 987 companies. The final sample is 1974. Considering the influence of outliers, we winsorize the continuous variables at the 0.01 level. We obtain company financial data from the WIND advisory financial and CCER databases.

4.2. Model design

The regression model and variable design used in this paper mainly follow those used by Pinkowitz and Williamson (2007). To test our first hypothesis, we design the following model:

$$\text{Overinvest} = \alpha_1 + \beta_1 \text{central} + \beta_2 \text{imp} + \beta_3 \text{imp} * \text{central} + \text{other variables} + \varepsilon \quad \text{(Model(1))}$$

Our model relating factors to the value of cash holdings relies on a study by Pinkowitz et al. (2006). To test H2, we include the dummy variable imp of the EVA evaluation year in our model and modify the design as follows:

$$V = \alpha_1 + \beta_1 \text{cash} + \beta_2 \text{imp} + \beta_3 \text{imp} * \text{cash} + \text{other variables} + \varepsilon \quad \text{(Model(2))}$$

$$V = \alpha_1 + \beta_1 \text{cash} + \beta_2 \text{imp} + \beta_2 \text{central} + \beta_2 \text{imp} * \text{cash} + \beta_2 \text{central} * \text{cash} + \beta_2 \text{imp} * \text{central} + \beta_3 \text{imp} * \text{central} * \text{cash} + \text{other variables} + \varepsilon \quad \text{(Model(3))}$$

4.3. Variable definitions

Corporate market value is treated as dependent variable V. Due to the past split-share structure of the Chinese capital market, it consists of the market value of circulating shares, the value of non-tradable shares and the value of corporate debt. As the value of corporate debt lacks market data, we use the book value of liabilities instead. Due to the share reform of CSOEs and other reasons, the value of non-tradable shares does not have a corresponding market price and the transfer price of non-tradable shares is generally based on net assets. Therefore, following Xia and Fang (2005), we use the product of non-tradable shares and net assets per share as the value of non-tradable shares.

Following Faulkender and Wang (2006), we define cash holdings as cash and tradable financial assets. Before International Accounting Standards (IAS) were introduced to China, similar tradable financial assets were reflected in short-term investment items. After IAS were introduced, they were reflected in tradable financial asset items. As the sample period in this paper begins in 2006, we add the two together, along with monetary funds. The result can be considered a proxy variable for cash holdings.

We calculate the EVA for each company according to the *Temporary regulations of performance evaluation on the central state enterprise legal person*, which were revised and implemented by the SASAC. EVA is equal to the net operating profit after tax less the capital costs. The formula is written as follows: EVA = the net operating profit after tax − the capital costs = the net operating profit after tax-adjusted capital * average cost of capital rate. The net operating profit after tax is calculated as follows: net profit + (interest expense + research and development expenses adjustments − non-recurring income adjustments * 50%) * (1–25%). The adjusted capital is calculated as follows: average owner's equity + average liabilities − average interest-free liabilities-average construction-in-process. The average cost of capital rate, which should be 5.5% in principle, can be adjusted slightly in accordance with the circumstances. It should stay the same three years after confirmation.[4] Following the regulation, we adjust the net operating profit after tax and the capital, with a cost-of-capital rate of 5.5% required in principle. We then calculate EVA manually. To control for the influence of enterprise scale on EVA, we use the rate equal to EVA divided by the capital used as a variable of EVA.

As we account for the effect of the EVA performance evaluation on the value of cash holdings and excessive investment, we calculate the excess investment variable. The measurement of excessive investment mainly

[4] The 22nd *Temporary regulations of performance evaluation on the central state enterprise legal person*, revised and implemented by the SASAC.

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refers to the model put forward by Richardson (2006). The total investment consists of value and new investments. The value investment is equal to the depreciation and amortization of the previous period. The new investment is divided into expected and unexpected investments. The expected investment is relevant to corporate growth opportunities, financing constraints and other factors. The unexpected investment is equal to the new investment less the expected investment. In regression Model (1), the dependent variable NI_t is the new investment (equal to the total investment less the value investment). The fitted values $NI^* t$ reflect the expected investment. The residual ε is the unexpected overinvestment. A positive sign indicates excess investment.

$$NI_t = \alpha_1 + \beta_1 Growth_{t-1} + \beta_2 Cf_{t-1} + \beta_3 \Delta Debt_t + \beta_4 \Delta Equity_t + \beta_5 Lev_{t-1} + \beta_6 Ar_{t-1} + \sum Ind + \sum Year + \varepsilon \quad \text{(Model(4))}$$

Our study is an event study that focuses on the influence that the EVA performance evaluation policy had on the value of CSOE cash holdings in 2010. The key to an event study is whether the event window is "clean" and whether something that can affect the cash holding value exists or a similar event occurs. We review the events of the capital market during 2010 and find that the Central Bank raised the RRR six times in 2010,[5] from 15.5% at the end of 2009 to 18.5% at the end of 2010. Studies have shown that monetary policy is an important factor affecting cash holdings (Chen and Chen, 2012). Thus, we control for the monetary policy per year (RRR). If the monetary policy is adjusted several times, we take its maximum value.

Differences in a company's operating, investment and financing capacities may affect any changes in the company's value. To estimate the value of the cash holdings, we require control variables that may affect company value. Cf is the company's annual operating cash flow. Na is the company's net assets, or the balance of assets less its cash and trading financial assets. GI is the annual dividend and interest paid by the company, represented by the dividend and interest in the cash flow statement. Capex is the company's capital expenditure, represented by the cash used to build and dispose of fixed, intangible and other long-term assets. X_t is the level of variable x in year t. dX_t is the change in variable x from years $t-1$ to t, or $X_t - X_{t-1}$, and dX_{t+1} is the change in variable x from years t to $t+1$, or $X_{t+1} - X_t$. Referring to the research of Pinkowitz et al. (2006), we standardize all of the variables by dividing them by total assets. To control for year and industry effects, we add year and industry control variables to our model, represented by Year and Industry, respectively. The specific variables are defined in Table 1.

5. Descriptive statistics

5.1. Descriptive statistics: Analysis of main variables

Table 2 shows the descriptive statistics for the main variables. The mean value of CSOEs is 1.611. The mean value of non-CSOEs is higher, at 1.667. This illustrates that the total market value of non-CSOEs exceeds that of CSOEs. The mean value of Cash is 0.152 for CSOEs and 0.16 for non-CSOEs. The mean value of EVA, which represents the value creation of CSOEs, is 0.021, indicating that companies create EVA by 2.1% on average. Table 2 shows the descriptive statistics for the main variables.

Considering the two cases of enterprise value creation and value loss and the effect of policy implementation, we investigate the descriptive statistics for CSOEs by group. Table 3 shows the descriptive statistics for the main variables in enterprises that create value and suffer value loss. The descriptive statistics for the main variables in different years are shown in Tables 4 and 5.

According to Table 3, 416 enterprises suffer value loss, accounting for 42% of the 987 observations. The enterprises that create value account for 58%, indicating that the majority of CSOEs create value. However, the 42% value loss rate reveals that the value creation ability of CSOEs requires improvement. The mean value of 1.686 for the enterprises that create value exceeds that of 1.506 for the enterprises that suffer value damage. The level of cash holdings in enterprises that create value is also higher.

[5] In 2007, the Central Bank began to raise the RRR to control the currency circulation of the commercial banks. It did so 10 times in 2007, 10 times in 2008 and 6 times in 2010.

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Table 1
Variable definitions.

Variable	Name	Definition
V	Market value of the company	(Company's equity value + creditor value)/total assets
EVA	Economic value added rate	Economic value added/capital occupancy
Imp	Implementation	Dummy variable that takes the value of 1 for all of the years after year 2009 and 0 otherwise
VC	Value creation	Dummy variable that takes the value of 1 if EVA exceeds 0 and 0 otherwise
Cash	Level of cash holding	Cash and cash equivalents/total assets at the end of year t
Cf_t	Cash flow from operating activities	Cash flow from operating activities/total assets at the end of year t
dCf_t	Change in cash flow from operating activities	(CFO at the end of year t − CFO at the end of year $t-1$)/total assets
dCf_{t+1}	Change in cash flow from operating activities	(CFO at the end of year $t+1$ − CFO at the end of year t)/total assets
dNa_t	Change in net assets	(Net assets at the end of year t − net assets at the end of year $t-1$)/total assets
dNa_{t+1}	Change in net assets	(Net assets at the end of year $t+1$ − net assets at the end of year t)/total assets
GI_t	Dividend and interest paid	Dividend and interest paid in year t/total assets
dGI_t	Change in dividend and interest paid	(Dividend and interest paid in year t − dividend and interest paid in year $t-1$)/total assets
dIt_{t+1}	Change in dividend and interest paid	(Dividend and interest paid in year $t+1$ − dividend and interest paid in year t)/total assets
$Capex_t$	Capital expenditures	Capital expenditures at the end of year t/total assets
$dCapex_t$	Change in capital expenditures	(Capital expenditures at the end of year t − capital expenditures at the end of year $t-1$)/total assets
$dCapex_{t+1}$	Change in capital expenditures	(Capital expenditures at the end of year $t+1$ − capital expenditures at the end of year t)/total assets
Mp	Monetary policy	RRR per year
TI_t	Total investment	(Cash used to build fixed assets, intangible assets and long-term assets in the current period + cash for equity investment + cash for debt investment)/total assets in the previous period
MI_t	Hedging investment	(Depreciation of fixed assets + amortization of intangible assets in the previous period)/total assets in the previous period
NI_t	New investment	(Total investment − hedging investment)/total assets in the previous period
NI^*_t	Expected investment	Fitted value of the model
Overinvest	Overinvest	Residuals of Model (4)
$GROWTH_{t-1}$	Growth	Tobin's Q value in the previous period
ΔDEBT	New debt	(New loans + new bonds in the current period)/total assets in the previous period
$\Delta EQUITY_t$	New equity financing	New equity financing in the current period/total assets in the previous period
LEV_{t-1}	Debt ratio	Asset − liability ratio in the previous period
$SIZE_{t-1}$	Size	Natural logarithm of total assets in the previous period
AR_{t-1}	Excess return on equity	The previous yield − the previous market yield
Industry	Industry dummy variables	Classified by one-digit industry codes of CSRC
Year	Year dummy variables	Five dummy variables from 2007 to 2011

Table 4 shows that the mean company value of CSOEs is 1.1 in 2006 and has no fixed pattern in the years afterward. The lowest company value is 1.098, indicating that the Asian Financial Crisis had a negative effect on corporate growth, consistent with the macroeconomic environment circumstance. In addition, from the end of 2008–2010, the development and implementation of the national "4 trillion" investment policy also affect company value. The mean value rebounds to 1.841 in 2009 and reaches its highest level of 2.019 in 2010.

The mean level of CSOE cash holdings fluctuates between 2006 and 2011, reaching its lowest level of 0.145 in 2008 and its highest level of 0.164 in 2009. From 2006 to 2009, EVA maintains a relatively stable mean value, with a maximum of 0.015 and a minimum of 0.010, representing a range of no more than 20% and a small

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Table 2
Descriptive statistics for the main variables.

Variable	Number of observations	Mean	Median	Standard deviation
CSOEs				
V	987	1.611	1.253	1.029
Cash	987	0.152	0.122	0.12
EVA	987	0.021	0.009	0.076
Cf	987	0.048	0.047	0.078
Gl	987	0.034	0.03	0.025
Capex	987	0.061	0.043	0.055
Non-CSOEs				
V	987	1.667	1.399	0.997
Cash	987	0.16	0.133	0.109
Cf	987	0.063	0.058	0.077
Gl	987	0.027	0.024	0.018
Capex	987	0.061	0.049	0.058

Table 3
Descriptive statistics for main variables in enterprises that create value and suffer value loss.

Variables	Value loss		Value creation	
	Number of observations	Mean	Number of observations	Mean
V	416	1.506	571	1.686
Cash	416	0.128	571	0.169
EVA	416	−0.04	571	0.065

Note: if EVA > 0, it is an enterprise that creates value; otherwise, it is an enterprise that suffers value damage.

Table 4
Descriptive statistics for the main variables by year.

Year	*V*	Cash	EVA
2006	1.1	0.142	0.012
2007	1.969	0.147	0.015
2008	1.098	0.145	0.01
2009	1.841	0.164	0.013
2010	2.019	0.159	0.029
2011	1.543	0.151	0.026

Table 5a
Panel A: Effect of the implementation of policy on CSOE efficiency.

Variables	Before 2010		After 2010		The mean test (*T*)
	Number of observations	Mean	Number of observations	Mean	
V	661	1.511	326	1.812	24.63***
Cash	661	0.15	326	0.155	23.44***
EVA	661	0.017	326	0.028	7.33***
ROA	661	0.045	326	0.051	17.90***
ROE	661	0.069	326	0.096	18.61
OROA	661	0.037	326	0.043	15.06***
AR	661	−0.003	326	0.002	2.41**
Overinvest	661	−0.011	326	−0.002	1.36

Note: * represents significance at the 0.1 level.
** Represents significance at the 0.05 level.
*** Represents significance at the 0.01 level.

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Table 5b
Panel B: Efficiency of CSOEs and non-CSOEs before and after the policy implementation.

Policy implementation	Indexes	CSOEs	Non-CSOEs	Mean value test
Before	ROA	0.045	0.054	17.57***
	ROE	0.069	0.088	10.77***
	OROA	0.037	0.046	13.97***
	AR	−0.0033	−0.003	4.01***
	Overinvest	−0.011	0.004	1.36
After	ROA	0.05	0.047	19.26***
	ROE	0.096	0.058	14.54***
	OROA	0.043	0.039	17.51***
	AR	0.0019	0.0018	3.10***
	Overinvest	−0.002	−0.01	0.59

Note: ROA = total profit/total assets, ROE = net profit/net assets, OROA = operating profit/total assets and AR = annual return on equity − market returns. Overinvest is the excess investment variable, calculated according to the Richardson (2006) model.
* Represents significance at the 0.1 level.
** Represents significance at the 0.05 level.
*** Represents significance at the 0.01 level.

degree of fluctuation. However, the mean value of EVA changes drastically in 2010 and after 2011, reaching 0.029 and 0.026, respectively, an obvious increase compared with previous values.

5.2. Does the EVA performance evaluation policy improve company efficiency?

Table 5 shows the descriptive statistics for the main variables before and after policy implementation. The SASAC implemented the EVA performance evaluation of the heads of CSOEs in 2010. The number of observations after 2010 is 326, accounting for 33% of the total sample. The mean company value of CSOEs is 1.511 before 2010 and rises to 1.812 after 2010. The difference in company value before and after the implementation of the policy is obvious. Through differences tests, we find the value of t, representing the difference in company value, which is 24.63 around 2010 and significant at the 0.01 level. The implemented policy thus improves the value of the CSOEs and enterprise growth changed around 2010.

The level of CSOE cash holdings is 0.15 before 2010 and rises to 0.155 after 2010, showing no obvious difference in mean value. The value-creating ability of CSOEs, i.e., the mean value of EVA, is 0.017 before 2010 and rises to 0.028 after 2010 without obvious improvement. Through significance testing, we find that the value of t representing the difference of EVA is −2.055 around 2010 and significant at the 0.05 level. The policy was therefore effectively implemented and improves the value-creating ability of the CSOEs. We also examine the effect of the EVA performance evaluation policy on accounting and market performance. The test results show that after the policy implementation, ROA, ROE and OROA (operating profit/total assets) increase significantly at the 0.01 level. AR also significantly increases at the 0.05 level. Univariate test results show that the EVA performance evaluation system improves CSOE efficiency.

We test the efficiency of the CSOEs and non-CSOEs before and after the policy implementation. Table 5 Panel B shows the test results.

Table 6
Pearson correlation coefficients of the main variables.

Variables	V	Cash	EVA	Imp
V	1			
Cash	0.2100***	1		
EVA	0.2033***	0.2211***	1	
Imp	0.1372***	0.0198	0.0653**	1

Note: * represents significance at the 0.1 level.
** Represents significance at the 0.05 level.
*** Represents significance at the 0.01 level.

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As Table 5 Panel B shows, before the policy implementation, ROE of CSOEs is significantly lower than that of non-CSOEs. However, ROE of CSOEs is significantly higher after the policy implementation. The results indicate that the implemented policy improves accounting performance. Judging from the market performance, the excess returns on CSOE stocks are significantly higher around the policy implementation.

5.3. Correlation analysis of the main variables

We conduct a correlation analysis of the main CSOE variables. The Pearson correlation coefficient matrix in Table 6 shows that the variable correlations are consistent with expectations and also provide a basis for the study's hypotheses. Cash and *V* have a significant positive correlation at the 1% level, consistent with the findings of previous studies. This indicates a positive correlation between a company's cash holdings and value, and that an increase in the former can increase the latter. EVA and V also have a significant positive correlation at the 1% level, indicating that the stronger a company's ability to create value, the higher the company's value. Furthermore, Imp and *V* have a significant positive correlation at the 1% level, indicating that the implemented policy effectively improves company value. EVA and Cash are significantly associated at the 1% and 5% levels, as are Imp and EVA. Other control variables are also significantly correlated at a certain level. In addition, to avoid the effects of multicollinearity on the results, we investigate the variance inflation factors (VIFs) of the variables used in the regression. The VIFs of the variables are less than 5.

6. Empirical tests

6.1. Test of H1

We conduct an OLS multiple regression for the effect of the level of cash holdings of the CSOEs, LSOEs and entire sample on overinvestment and underinvestment before and after the policy implementation. Table 7 Panel A shows the results.

As shown in regression (1) in Table 7 Panel A, the cash regression coefficient of 0.129 is significantly positive at the 0.05 level, indicating that the more cash a SOE holds before the implementation of the EVA performance evaluation policy, the more it overinvests. The regression coefficient of the interaction term imp * cash is −0.053, indicating that the effect of cash holdings on overinvestment is weakened but not significantly so after the policy implementation. The EVA performance evaluation policy has less of an effect on the LSOEs and overinvestments. Regression (2) focuses on CSOEs. The cash regression coefficient is 0.172 and is significant at the 0.01 level. The regression coefficient of imp * cash is −0.13, which is also significant at the 0.01 level. The results show that the more cash holdings a CSOE has, the more likely it is to overinvest before policy implementation. In addition, the influencing factor is 0.042 (0.172 −0.13), indicating that the effect of cash holdings on overinvestments is significantly weakened after the policy implementation. However, in regression (3), which focuses on LSOEs, we find no significant change before and after the policy implementation.

To further examine the effect of the EVA performance evaluation policy on CSOE overinvestment and underinvestment, we divide the CSOE sample into overinvestment and underinvestment sub-samples, corresponding with regression (4) and regression (5), respectively. In regression (4), the cash regression coefficient is 0.257 and the imp * cash regression coefficient is −0.158. Both values are significant at the 0.01 level, indicating that the EVA policy implementation significantly decreases the effect of CSOEs' cash holdings on overinvestment. However, in regression (5), we do not find the CSOEs' cash holdings to have a great effect on underinvestment before or after the implementation of the EVA performance evaluation policy.

In regression (6), we examine the differences in CSOEs and LSOEs before and after policy implementation. The regression coefficient of imp * central * cash is 0.198. It fails to pass the significance test, probably because the cash holdings influence different investments in different directions before and after the policy implementation. Regressions (7) and (8) investigate the effects of the two types of enterprises on overinvestment and underinvestment before and after the policy implementation. The regression coefficient of imp * central * cash is −0.233 in regression (7) and significant at the 0.01 level. The result shows that the effect of CSOEs' cash holdings on overinvestment is significantly weakened after the implementation of the EVA policy compared with those of LSOEs. The regression coefficient of imp * central * cash is 0.266 in regression (8) and fails to

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pass the significance test. This indicates that the level of CSOEs' cash holdings does not improve underinvestment after the EVA policy implementation compared with LSOEs.

We use the difference-in-difference method, which has its own inherent limitations (Bertrand et al., 2004), to investigate the economic consequences of the CSOEs after EVA performance evaluation. The effects of the cash holdings of CSOEs and LSOEs on investment may have their own systemic differences. Using the interaction term imp * central * cash may not allow us to solve this problem. Thus, we conduct a falsification test as a supplement to the difference-in-difference method. We cross-multiply the dummy variables and the central * cash variable of each year to set a multitude of three intersecting variables. If we do not find the same result before and after the policy implementation, we confirm the empirical results obtained from the difference-in-difference method and conclude that the policy implementation leads to a systemic change in the two types of enterprises. Table 7 Panel B shows the regression results. From 2006 to 2009, the cross-variable regression coefficients are insignificant regardless of overinvestment or underinvestment. This verifies the empirical results obtained from the difference-in-difference method to some extent. Thus, the regression results in Table 7 support H1.

6.2. Test of H2

After validating H1, we further investigate the effect of the level of cash holdings on firm value. Table 8 shows the results.

According to Table 8 Panel A, the regression coefficients of cash are 1.118 and 1.262 in regressions (1) and (2) before and after the EVA performance evaluation of CSOEs, respectively, and significant at the 0.01 and 0.05 levels, respectively. In regression (3), the regression coefficient of imp * cash is 1.157 and significant at the 0.01 level. This indicates that the effect of cash on firm value increases significantly after CSOEs' implementation of the EVA assessment. Compared with no assessment, firm value increases 1.157 units when the ratio of monetary capital to total assets increases by 1 unit and is economically significant. In contrast, the regression coefficients of the cash variable and imp*cash are not significant in regression (4) for LSOEs.

In regression (5), which covers the entire sample, the regression coefficient of imp * central * cash is 1.701 and significant at 0.05 level, indicating that the value of CSOEs' cash holdings improves significantly after the EVA performance evaluation compared with that of LSOEs.

We also conduct a falsification test for the value of the cash holdings. Table 8 Panel B shows the specific regression results.

As shown in the falsification test results in Table 8 Panel B, from 2006 to 2009, the interaction term has no significant positive relationship with the dependent variable, reinforcing the conclusion of regression (5) in Table 8 Panel A. Compared with the value of the cash holdings of LSOEs, the value of CSOEs' cash holdings significantly increases after the implementation of the EVA policy.

Therefore, the regression results shown in Table 8 support H2.

6.3. Does curbing overinvestment or improving underinvestment account for the increase in value of the cash holdings?

In our analysis, we find that CSOEs significantly decrease their overinvestment levels and improve the value of their cash holdings after implementing the EVA performance evaluation, beginning in 2010. In the theoretical analysis, our claim is that the EVA performance evaluation ultimately affects the value of the cash holdings by improving corporate investment. We conduct a test to determine whether the EVA performance evaluation policy improves the value of the cash holdings by curbing overinvestment or improving underinvestment. Table 9 shows the results.

Table 9 shows the value of the cash holdings under different investment conditions. In regression (1), which focuses on the CSOE overinvestment sub-sample, the regression coefficient of cash is 1.814 and significant at the 0.01 level. This indicates that cash holdings have a positive effect on the value of CSOEs that invest excessively before the policy implementation and no significantly positive effect on the value after the policy implementation. In regression (2), which focuses on the CSOE underinvestment sub-sample, the regression coefficient of cash is −0.566, indicating that cash holdings have a negative yet insignificant effect on CSOE value before the policy implementation. The regression coefficient of imp*cash is 1.317 and significant at

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Table 7a
Panel A: OLS multiple regression of the effect on overinvestment before and after implementation of the EVA performance evaluation policy.

Variables	Regression (1)	Regression (2)	Regression (3)	Regression (4)	Regression (5)	Regression(6)	Regression (7)	Regression (8)
	CSOEs and local enterprises	CSOEs	Local enterprises	CSOEs	CSOEs	CSOEs and local enterprises	CSOEs and local enterprises	CSOEs and local enterprises
	Whole sample	Whole sample	Whole sample	Overinvestment	Underinvestment	Whole sample	Overinvestment	Underinvestment
Cash	0.129**	0.172***	0.199	0.257***	−0.040	0.148*	0.162***	0.075
	(1.970)	(5.148)	(1.573)	(7.263)	(−0.759)	(1.654)	(4.545)	(0.412)
Imp	−0.003	0.028**	−0.065	0.001	0.026*	−0.057*	−0.013	−0.065
	(−0.138)	(2.414)	(−1.299)	(0.0781)	(1.792)	(−1.722)	(−0.956)	(−1.016)
Central						0.036	−0.010	0.109**
						(1.473)	(−0.952)	(2.298)
imp_cash	−0.053	−0.130***	0.056	−0.158***	−0.005	0.059	0.070	−0.262
	(−0.513)	(−2.698)	(0.271)	(−2.922)	(−0.0691)	(0.389)	(1.214)	(−0.754)
central_cash						−0.069	0.100**	−0.332
						(−0.571)	(2.171)	(−1.233)
imp_central						0.088**	0.010	0.095
						(2.186)	(0.598)	(1.247)
imp_central_cash						−0.164	−0.233***	0.266
						(−0.791)	(−2.936)	(0.587)
Cf	2.481***	2.307***	2.840***	1.888***	2.155***	2.519***	1.884***	2.331***
	(23.81)	(41.33)	(13.52)	(24.55)	(25.41)	(24.13)	(38.00)	(9.311)
dcf_t	−2.534***	−2.370***	−2.712***	−2.024***	−2.245***	−2.561***	−2.035***	−2.409***
	(−30.97)	(−62.29)	(−16.22)	(−35.64)	(−34.29)	(−31.31)	(−47.56)	(−11.41)
dcf_t_1	0.031	0.006	−0.098	−0.046	−0.027	0.022	0.000	0.027
	(0.580)	(0.201)	(−0.795)	(−1.209)	(−0.751)	(0.410)	(0.0114)	(0.283)
dna_t	−0.266***	−0.139***	−0.665***	0.067***	−0.267***	−0.303***	0.097***	−0.574***
	(−6.556)	(−7.532)	(−6.781)	(2.893)	(−11.24)	(−7.318)	(5.292)	(−7.455)
dna_t_1	0.021	0.005	0.039	0.003	0.020*	0.014	−0.002	0.050
	(1.235)	(0.638)	(0.708)	(0.443)	(1.711)	(0.789)	(−0.390)	(1.259)
Capex	−0.990***	−1.187***	−1.014***	−1.033***	−1.080***	−1.023***	−0.911***	−0.714***
	(−7.396)	(−16.49)	(−4.064)	(−9.589)	(−12.42)	(−7.666)	(−12.97)	(−3.027)
capex_t	−0.052	0.027	−0.041	0.096	0.090	0.002	0.126*	0.032
	(−0.380)	(0.396)	(−0.158)	(1.017)	(1.136)	(0.0132)	(1.860)	(0.138)
capex_t_1	0.030	−0.018	0.080	0.015	−0.107	0.027	0.079*	−0.095
	(0.319)	(−0.371)	(0.427)	(0.252)	(−1.609)	(0.284)	(1.879)	(−0.541)
Gl	−0.843**	−0.074	−2.515***	0.128	−0.230	−1.204***	0.123	−2.681***
	(−2.578)	(−0.493)	(−3.064)	(0.778)	(−1.015)	(−3.506)	(0.934)	(−3.580)
dgl_t	−0.185	0.170	−0.351	−0.010	0.401	0.099	0.134	−0.078
	(−0.466)	(0.968)	(−0.385)	(−0.0545)	(1.468)	(0.245)	(0.895)	(−0.0876)
dgl_t_1	−0.372	−0.107	−1.079	0.022	−0.440**	−0.651**	−0.100	−1.318**
	(−1.279)	(−0.739)	(−1.636)	(0.143)	(−2.032)	(−2.199)	(−0.892)	(−2.082)

(*continued on next page*)

Table 7a (*continued*)

Variables	Regression (1)	Regression (2)	Regression (3)	Regression (4)	Regression (5)	Regression(6)	Regression (7)	Regression (8)
	CSOEs and local enterprises	CSOEs	Local enterprises	CSOEs	CSOEs	CSOEs and local enterprises	CSOEs and local enterprises	CSOEs and local enterprises
	Whole sample	Whole sample	Whole sample	Overinvestment	Underinvestment	Whole sample	Overinvestment	Underinvestment
dv_t_1	0.004	0.004*	0.010	−0.001	0.006*	0.004	−0.002	0.002
	(0.918)	(1.729)	(1.039)	(−0.331)	(1.802)	(0.846)	(−1.073)	(0.235)
Rate	−0.043	0.109	−0.073	0.320**	−0.002	−0.022	0.340***	−0.151
	(−0.177)	(0.902)	(−0.156)	(2.212)	(−0.0134)	(−0.0908)	(3.410)	(−0.329)
Constant	−0.078	−0.158***	0.050	−0.107**	−0.246***	−0.079	−0.093***	−0.131
	(−0.930)	(−3.828)	(0.318)	(−2.330)	(−4.303)	(−0.948)	(−2.823)	(−0.783)
Industry	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Observations	1974	987	987	491	496	1974	1008	966
R-squared	0.400	0.853	0.304	0.807	0.764	0.408	0.764	0.190

Note: The dependent regression variable in this table is overinvest. Regression (1) is for the entire sample of CSOEs and LSOEs; regression (2) is for the entire sample of CSOEs; regression (3) is for the entire sample of LSOEs; regression (4) is for the overinvestment sample of CSOEs (overinvest greater than zero); regression (5) is for the underinvestment sample of CSOEs (overinvest less than zero); regression (6) is for the entire sample of CSOEs and LSOEs; regression (7) is for the overinvestment sample of CSOEs and LSOEs; and regression (8) is for the underinvestment sample of CSOEs and LSOEs, with *t*-statistics in brackets.

* $p < 0.1$.

** $p < 0.05$.

*** $p < 0.01$.

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Table 7b
Panel B: Falsification test for the effect of the cash holdings of CSOEs and LSOEs on investment before and after performance evaluation.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Overinvestment	Underinvestment	Overinvestment	Underinvestment	Overinvestment	Underinvestment	Overinvestment	Underinvestment	Overinvestment	Underinvestment	Overinvestment	Underinvestment
Cash	0.187***	−0.035	0.176***	−0.020	0.216***	−0.042	0.199***	0.034	0.160***	−0.006	0.200***	0.032
	(5.929)	(−0.204)	(5.541)	(−0.116)	(6.855)	(−0.241)	(6.190)	(0.178)	(5.068)	(−0.0348)	(6.243)	(0.198)
y2006	−0.001	−0.098										
	(−0.0786)	(−1.205)										
Central	−0.008	0.141***	−0.012	0.153***	−0.003	0.142***	−0.008	0.150***	−0.010	0.140***	−0.008	0.117***
	(−0.823)	(3.263)	(−1.283)	(3.488)	(−0.336)	(3.251)	(−0.899)	(3.371)	(−1.154)	(3.104)	(−0.866)	(2.804)
y2006_cash	0.025	0.210										
	(0.302)	(0.469)										
central_cash	0.015	−0.206	−0.010	−0.186	0.008	−0.169	0.026	−0.229	0.083**	−0.191	0.028	−0.300
	(0.350)	(−0.861)	(−0.244)	(−0.799)	(0.201)	(−0.694)	(0.617)	(−0.900)	(2.026)	(−0.754)	(0.675)	(−1.299)
y2006_central	−0.002	−0.003										
	(−0.0966)	(−0.0295)										
y2006_central_cash	0.078	−0.068										
	(0.746)	(−0.110)										
y2007			−0.031**	0.039								
			(−2.156)	(0.510)								
y2007_cash			0.058	0.335								
			(0.803)	(0.667)								
y2007_central			0.018	−0.031								
			(0.834)	(−0.300)								
y2007_central_cash			0.169*	−0.500								
			(1.781)	(−0.699)								
y2008					0.033**	0.025						
					(2.121)	(0.362)						
y2008_cash					−0.162**	0.224						
					(−2.174)	(0.560)						
y2008_central					−0.024	−0.022						
					(−1.085)	(−0.237)						
y2008_central_cash					0.082	−0.280						
					(0.806)	(−0.504)						
y2009							0.014	0.043				
							(0.878)	(0.670)				
y2009_cash							−0.055	−0.151				
							(−0.816)	(−0.445)				
y2009_central							0.004	−0.067				
							(0.198)	(−0.764)				
y2009_central_cash							−0.010	0.091				
							(−0.113)	(0.184)				
y2010									−0.044***	0.017		
									(−2.718)	(0.258)		
y2010_cash									0.157**	−0.018		
									(2.232)	(−0.0469)		
y2010_central									0.023	−0.015		
									(1.044)	(−0.176)		
y2010_central_cash									−0.346***	−0.037		
									(−3.500)	(−0.0730)		
y2011											0.047***	−0.046
											(2.746)	(−0.494)
y2011_cash											−0.045	−1.026*
											(−0.617)	(−1.704)
y2011_central											−0.010	0.130
											(−0.464)	(1.111)
y2011_central_cash											−0.006	1.011
											(−0.0627)	(1.366)

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Table 7b (*continued*)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Overinvestment	Underinvestment	Overinvestment	Underinvestment	Overinvestment	Underinvestment	Overinvestment	Underinvestment	Overinvestment	Underinvestment	Overinvestment	Underinvestment
Cf	1.877***	2.359***	1.892***	2.365***	1.885***	2.357***	1.882***	2.366***	1.917***	2.369***	1.905***	2.415***
	(37.48)	(9.389)	(38.39)	(9.390)	(37.76)	(9.367)	(37.71)	(9.384)	(38.79)	(9.335)	(38.26)	(9.661)
dcf_t	−2.031***	−2.403***	−2.037***	−2.394***	−2.035***	−2.407***	−2.033***	−2.391***	−2.063***	−2.399***	−2.051***	−2.422***
	(−47.30)	(−11.37)	(−48.12)	(−11.31)	(−47.42)	(−11.32)	(−47.27)	(−11.27)	(−48.57)	(−11.21)	(−48.01)	(−11.53)
dcf_t_1	0.006	0.053	−0.008	0.065	0.000	0.057	0.003	0.056	−0.008	0.064	0.005	0.028
	(0.264)	(0.557)	(−0.365)	(0.689)	(0.0209)	(0.599)	(0.123)	(0.585)	(−0.366)	(0.670)	(0.233)	(0.303)
dna_t	0.087***	−0.582***	0.101***	−0.586***	0.091***	−0.569***	0.087***	−0.567***	0.101***	−0.570***	0.093***	−0.563***
	(4.663)	(−7.539)	(5.411)	(−7.588)	(4.858)	(−7.414)	(4.655)	(−7.320)	(5.551)	(−7.414)	(5.086)	(−7.365)
dna_t_1	−0.003	0.043	−0.005	0.052	−0.004	0.046	−0.004	0.049	−0.001	0.048	−0.003	0.052
	(−0.534)	(1.079)	(−0.809)	(1.302)	(−0.625)	(1.154)	(−0.644)	(1.245)	(−0.240)	(1.199)	(−0.565)	(1.322)
Capex	−0.894***	−0.694***	−0.900***	−0.690***	−0.906***	−0.708***	−0.899***	−0.707***	−0.921***	−0.711***	−0.896***	−0.753***
	(−12.60)	(−2.923)	(−12.87)	(−2.897)	(−12.78)	(−2.986)	(−12.66)	(−2.971)	(−13.31)	(−2.997)	(−12.73)	(−3.208)
capex_t	0.114*	0.007	0.118*	0.018	0.119*	−0.002	0.126*	0.014	0.128*	0.012	0.114*	0.037
	(1.655)	(0.0311)	(1.730)	(0.0800)	(1.729)	(−0.00673)	(1.820)	(0.0592)	(1.908)	(0.0532)	(1.677)	(0.162)
capex_t_1	0.079*	−0.082	0.076*	−0.067	0.079*	−0.103	0.079*	−0.096	0.077*	−0.084	0.086**	−0.056
	(1.876)	(−0.465)	(1.822)	(−0.378)	(1.870)	(−0.582)	(1.858)	(−0.545)	(1.854)	(−0.474)	(2.043)	(−0.323)
Gl	0.140	−2.734***	0.115	−2.661***	0.111	−2.624***	0.106	−2.569***	0.105	−2.580***	0.133	−2.695***
	(1.059)	(−3.639)	(0.891)	(−3.569)	(0.846)	(−3.519)	(0.804)	(−3.432)	(0.812)	(−3.448)	(1.019)	(−3.649)
dgl_t	0.087	−0.072	0.103	−0.257	0.110	−0.235	0.152	−0.276	0.104	−0.205	0.015	0.032
	(0.576)	(−0.0809)	(0.694)	(−0.290)	(0.733)	(−0.263)	(0.971)	(−0.301)	(0.710)	(−0.230)	(0.102)	(0.0363)
dgl_t_1	−0.098	−1.074*	−0.135	−1.027	−0.129	−1.180*	−0.085	−1.148*	−0.095	−1.063*	−0.093	−1.354**
	(−0.866)	(−1.712)	(−1.209)	(−1.623)	(−1.123)	(−1.835)	(−0.755)	(−1.816)	(−0.869)	(−1.687)	(−0.835)	(−2.165)
dv_t_1	−0.001	−0.005	0.003*	−0.011	0.000	−0.001	0.000	−0.004	−0.002	−0.006	0.000	−0.002
	(−0.334)	(−0.471)	(1.655)	(−1.146)	(0.235)	(−0.112)	(0.0944)	(−0.456)	(−1.014)	(−0.635)	(0.0967)	(−0.216)
Rate	0.258**	−1.127**	0.200***	−0.435	0.190***	−0.484	0.191***	−0.491*	0.312***	−0.510	−0.012	−0.196
	(2.344)	(−2.271)	(3.131)	(−1.459)	(2.963)	(−1.641)	(2.982)	(−1.666)	(4.646)	(−1.566)	(−0.146)	(−0.551)
Constant	−0.074**	0.004	−0.071**	−0.136	−0.068**	−0.129	−0.072**	−0.124	−0.081***	−0.129	−0.041	−0.142
	(−2.164)	(0.0214)	(−2.268)	(−0.833)	(−2.175)	(−0.789)	(−2.277)	(−0.754)	(−2.647)	(−0.779)	(−1.293)	(−0.868)
Industry	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Observations	1008	966	1008	966	1008	966	1008	966	1008	966	1008	966
R-squared	0.759	0.184	0.765	0.185	0.760	0.184	0.758	0.183	0.770	0.182	0.763	0.202

Note: The dependent variable of this table is the value of the company V. Regressions (1), (3), (5), (7), (9) and (11) are for the overinvestment sub-sample and regressions (2), (4), (6), (8), (10) and (12) are for the underinvestment sub-sample, with *t*-statistics in brackets.

* $p < 0.1$.

** $p < 0.05$.

*** $p < 0.01$.

Table 8a
Panel A: OLS multiple regression for EVA policy implementation, cash holdings and corporate value.

Variables	(1) Before CSOEs' policy implementation	(2) After CSOEs' policy implementation	(3) CSOEs	(4) LSOEs	(5) CSOEs and LSOEs
Cash	1.118***	1.262**	1.072***	0.476	0.167
	(3.021)	(2.439)	(2.773)	(1.283)	(0.438)
Imp			−0.142	−0.298**	−0.178
			(−1.002)	(−2.086)	(−1.294)
Central					−0.275***
					(−2.708)
imp_cash			1.157**	0.083	−0.042
			(2.042)	(0.142)	(−0.0667)
central_cash					0.456
					(0.898)
imp_central					−0.005
					(−0.0292)
imp_central_cash					1.701**
					(1.995)
cf	2.410***	5.064***	3.386***	1.730***	2.283***
	(3.343)	(4.797)	(5.084)	(2.806)	(5.165)
dcf_t	−1.008**	−0.955	−0.906*	−0.682	−1.290***
	(−2.018)	(−1.303)	(−1.958)	(−1.388)	(−3.696)
dcf_t_1	0.618*	4.226***	1.187***	−0.626*	−0.115
	(1.740)	(6.366)	(3.410)	(−1.734)	(−0.513)
dna_t	−0.093	0.125	0.061	−0.337	0.145
	(−0.420)	(0.247)	(0.275)	(−1.227)	(0.839)
dna_t_1	0.055	2.117***	0.456***	−1.064***	0.116
	(0.626)	(11.44)	(5.189)	(−6.571)	(1.574)
capex	−1.824**	−3.786**	−2.459***	−3.970***	−3.031***
	(−1.994)	(−2.564)	(−2.819)	(−5.431)	(−5.344)
capex_t	1.304	2.236	1.506*	2.859***	2.165***
	(1.545)	(1.373)	(1.805)	(3.809)	(3.716)
capex_t_1	0.464	−1.898	0.253	−0.315	−0.008
	(0.780)	(−1.494)	(0.424)	(−0.588)	(−0.0208)
gl	0.876	−3.625	−0.323	0.882	0.752
	(0.473)	(−1.106)	(−0.182)	(0.374)	(0.525)
dgl_t	−2.630	−0.248	−3.601*	−0.059	−2.826*
	(−1.307)	(−0.0543)	(−1.769)	(−0.0226)	(−1.722)
dgl_t_1	4.363**	−1.308	0.919	−5.650***	1.030
	(2.469)	(−0.351)	(0.525)	(−2.954)	(0.829)
dv_t_1	−0.100***	−1.450***	−0.250***	0.261***	−0.021
	(−3.690)	(−16.34)	(−8.930)	(9.310)	(−1.029)
Rate	6.390***	2.340	2.442*	2.270	4.241***
	(4.547)	(0.544)	(1.675)	(1.642)	(4.134)
Constant	−0.303	0.802	0.819	2.192***	1.325***
	(−0.589)	(0.667)	(1.613)	(4.690)	(3.690)
Industry	Controlled	Controlled	Controlled	Controlled	Controlled
Observations	661	326	987	987	1974
R-squared	0.178	0.654	0.239	0.194	0.124

Note: The dependent variable of this table is the value of the company *V*. Regression (1) is for the CSOE observations before policy implementation; regression (2) is for the CSOE observations after policy implementation; regression (3) is for the CSOE sub-sample; regression (4) is for the LSOE sub-sample; and regression (5) is for both the CSOE and LSOE observations, with *t*-statistics in brackets.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

the 0.1 level, indicating that the effect of the cash holdings on the value of CSOEs that invest insufficiently increases significantly after the policy implementation. The influencing factor of cash on CSOE value is between 1.317 and 0.566 after the policy implementation.

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Table 8b
Panel B: Falsification test for the value of cash holdings.

Variables	Regression (1) 2006	Regression (2) 2007	Regression (3) 2008	Regression (4) 2009	Regression (5) 2010	Regression (6) 2011
Cash	0.041	0.449	0.046	−0.005	0.339	−0.093
	(0.124)	(1.347)	(0.138)	(−0.0156)	(0.984)	(−0.280)
y2006	−0.788***					
	(−4.246)					
Central	−0.290***	−0.145	−0.333***	−0.272***	−0.247***	−0.306***
	(−3.181)	(−1.564)	(−3.665)	(−2.912)	(−2.652)	(−3.406)
y2006_cash	0.762					
	(0.864)					
central_cash	1.326***	0.721	1.340***	1.188**	0.601	1.069**
	(2.977)	(1.622)	(3.023)	(2.537)	(1.298)	(2.422)
y2006_central	0.284					
	(1.308)					
y2006_central_cash	−2.569**					
	(−2.240)					
y2007		0.826***				
		(5.472)				
y2007_cash		−0.794				
		(−0.953)				
y2007_central		−0.442**				
		(−2.131)				
y2007_central_cash		0.933				
		(0.850)				
y2008			−0.671***			
			(−4.416)			
y2008_cash			0.329			
			(0.414)			
y2008_central			0.258			
			(1.239)			
y2008_central_cash			−1.472			
			(−1.358)			
y2009				0.391***		
				(2.617)		
y2009_cash				0.007		
				(0.0102)		
y2009_central				−0.051		
				(−0.255)		
y2009_central_cash				−0.342		
				(−0.354)		
y2010					0.470***	
					(3.101)	
y2010_cash					−1.154	
					(−1.559)	
y2010_central					−0.256	
					(−1.268)	
y2010_central_cash					2.562**	
					(2.565)	
y2011						−0.979***
						(−5.795)
y2011_cash						1.164
						(1.396)
y2011_central						0.273
						(1.232)
y2011_central_cash						−0.068
						(−0.0582)
Cf	2.332***	2.169***	2.111***	2.316***	2.111***	2.127***
	(5.327)	(4.991)	(4.878)	(5.268)	(4.802)	(4.884)

(*continued on next page*)

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Table 8b (*continued*)

Variables	Regression (1) 2006	Regression (2) 2007	Regression (3) 2008	Regression (4) 2009	Regression (5) 2010	Regression (6) 2011
dcf_t	−1.349***	−1.059***	−1.021***	−1.418***	−1.084***	−1.187***
	(−3.915)	(−3.096)	(−2.993)	(−4.081)	(−3.127)	(−3.465)
dcf_t_1	−0.165	−0.020	0.065	−0.138	0.001	−0.137
	(−0.742)	(−0.0923)	(0.295)	(−0.616)	(0.00329)	(−0.617)
dna_t	0.130	0.004	0.063	0.125	0.153	0.085
	(0.756)	(0.0226)	(0.370)	(0.725)	(0.894)	(0.499)
dna_t_1	0.111	0.143**	0.180**	0.142*	0.123*	0.118
	(1.517)	(1.983)	(2.479)	(1.947)	(1.677)	(1.632)
capex	−3.052***	−2.727***	−2.911***	−3.130***	−3.023***	−3.190***
	(−5.427)	(−4.883)	(−5.243)	(−5.537)	(−5.363)	(−5.699)
capex_t	2.067***	1.994***	2.460***	2.403***	2.267***	2.365***
	(3.585)	(3.478)	(4.312)	(4.130)	(3.920)	(4.112)
capex_t_1	0.062	0.122	−0.041	−0.060	0.012	0.045
	(0.158)	(0.314)	(−0.106)	(−0.152)	(0.0295)	(0.115)
gl	−0.374	0.377	2.033	0.484	1.496	0.504
	(−0.265)	(0.270)	(1.460)	(0.342)	(1.058)	(0.360)
dgl_t	−1.398	−3.175**	−1.881	−0.871	−2.814*	−1.070
	(−0.856)	(−1.975)	(−1.173)	(−0.520)	(−1.732)	(−0.658)
dgl_t_1	0.882	0.397	0.655	1.365	1.114	0.972
	(0.720)	(0.325)	(0.532)	(1.106)	(0.907)	(0.797)
dv_t_1	−0.031	−0.057***	−0.045**	−0.041**	−0.026	−0.036*
	(−1.527)	(−2.772)	(−2.237)	(−2.131)	(−1.311)	(−1.874)
Rate	−2.243**	4.483***	3.479***	3.661***	2.171***	7.610***
	(−2.043)	(6.843)	(5.386)	(5.574)	(3.068)	(9.355)
Constant	2.323***	0.997***	1.472***	1.254***	1.442***	0.817**
	(6.197)	(2.922)	(4.355)	(3.651)	(4.190)	(2.358)
Industry	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Observations	1974	1974	1974	1974	1974	1974
R-squared	0.140	0.154	0.160	0.131	0.134	0.149

Note: The dependent variable of this table is the value of the company *V*. *t*-statistics are in brackets.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

Regressions (3) and (4) compare CSOEs with general SOEs according to the different investment conditions. The regression coefficient of imp * central * cash is 2.636 in regression (3) and significant at the 0.05 level. Among the overinvestment observations, the value of CSOE cash holdings significantly increases after the policy implementation compared with that of the LSOEs' cash holdings. However, in regression (4), which focuses on overinvestment observations, the regression coefficient of the interaction term is insignificant.

The regression results in Table 9 show that the increase in the value of the cash holdings may be attributed to the improved underinvestment of CSOEs. However, in the full sample, it may be attributed to CSOEs' overinvestment inhibition compared with LSOEs.

6.4. Effect of accounting performance on the value of the cash holdings

After the implementation of the EVA performance evaluation, company managers improved their enterprises' investment structures out of personal interest and invested money in profitable projects. Does a company's accounting performance affect its investment performance and thereby the value of its cash holdings? The rate of net profit to equity (ROE), an accounting indicator, has relatively close links with the cost of equity capital. We divide the sample according to the annual industry median. We define a company as high performance if its ROE exceeds the annual industry median; otherwise, we define it as low performance. Table 10 shows the sub-sample regression results.

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Table 9
Overinvestment and the value of corporate cash holdings.

Variables	Regression (1) Overinvestment of CSOEs	Regression (2) Underinvestment of CSOEs	Regression (3) Overinvestment	Regression (4) Underinvestment
Cash	1.814***	−0.566	0.604	−0.258
	(3.345)	(−0.974)	(1.128)	(−0.460)
Imp	−0.183	−0.079	0.113	−0.466**
	(−0.770)	(−0.488)	(0.556)	(−2.368)
Central			−0.294*	−0.194
			(−1.951)	(−1.333)
imp_cash	0.951	1.317*	−1.039	0.696
	(1.131)	(1.706)	(−1.255)	(0.654)
central_cash			0.849	−0.615
			(1.249)	(−0.744)
imp_central			−0.386	0.362
			(−1.529)	(1.546)
imp_central_cash			2.636**	0.991
			(2.315)	(0.712)
cf	5.656***	0.347	3.184***	0.523
	(4.855)	(0.367)	(4.413)	(0.681)
dcf_t	−1.480*	−0.248	−1.646***	−0.611
	(−1.651)	(−0.340)	(−2.616)	(−0.943)
dcf_t_1	2.273***	−0.000	−0.107	−0.211
	(3.852)	(−0.00114)	(−0.311)	(−0.720)
dna_t	0.669*	−0.413	0.582**	−0.134
	(1.790)	(−1.557)	(2.225)	(−0.567)
dna_t_1	0.475***	0.537***	0.090	0.216*
	(3.947)	(4.116)	(0.956)	(1.775)
Capex	−5.523***	−1.273	−3.331***	−2.613***
	(−3.319)	(−1.313)	(−3.275)	(−3.608)
capex_t	2.103	1.757**	2.517**	1.906***
	(1.366)	(1.984)	(2.517)	(2.712)
capex_t_1	0.096	−0.042	0.456	−0.531
	(0.101)	(−0.0570)	(0.767)	(−0.989)
gl	3.712	−9.306***	4.886**	−6.398***
	(1.422)	(−3.678)	(2.536)	(−2.783)
dgl_t	−4.663*	0.088	−4.435**	0.400
	(−1.669)	(0.0289)	(−2.094)	(0.147)
dgl_t_1	1.336	−4.460*	2.272	−2.045
	(0.528)	(−1.849)	(1.378)	(−1.053)
dv_t_1	−0.324***	−0.202***	−0.084***	0.055*
	(−7.436)	(−5.918)	(−3.022)	(1.882)
Rate	3.393	1.478	5.530***	3.579**
	(1.445)	(0.866)	(3.677)	(2.539)
Constant	0.211	1.532**	0.902*	1.455***
	(0.275)	(2.407)	(1.782)	(2.825)
Industry	Controlled	Controlled	Controlled	Controlled
Observations	491	496	1008	966
R-squared	0.310	0.237	0.178	0.115

Note: The dependent variable of this table is the value of the company *V*. Regression (1) is for the overinvestment sub-sample of CSOEs; regression (2) is for the underinvestment sub-sample of CSOEs; regression (3) is for the overinvestment sub-samples of both CSOEs and LSOEs; and regression (4) is for the underinvestment sub-samples of both CSOEs and LSOEs, with *t*-statistics in brackets.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.1$.

Regression (1) in Table 10 shows that the regression coefficients of cash and imp * cash are 1.239 and 1.715, respectively, and are both significant at the 0.05 level. Among the CSOEs with high accounting performance, cash holdings have a significant positive effect on CSOEs' value before and after the implementation of the

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Table 10
Value of cash holdings according to accounting performance.

Variables	(1) High performance of CSOEs	(2) Low performance of CSOEs	(3) High performance of full sample	(4) Low performance of full sample
Cash	1.239**	0.431	−0.097	−0.165
	(2.131)	(0.859)	(−0.176)	(−0.309)
Imp	−0.275	−0.105	0.034	−0.503***
	(−1.218)	(−0.647)	(0.174)	(−2.664)
Central			−0.579***	−0.093
			(−3.828)	(−0.655)
imp_cash	1.715**	0.179	−0.959	1.045
	(1.970)	(0.264)	(−1.075)	(1.215)
central_cash			1.194*	−0.103
			(1.667)	(−0.133)
imp_central			−0.237	0.308
			(−0.970)	(1.353)
imp_central_cash			3.194***	−0.274
			(2.679)	(−0.228)
cf	4.989***	0.711	3.729***	0.147
	(4.695)	(0.833)	(5.880)	(0.226)
dcf_t	−1.429*	−0.220	−2.129***	−0.393
	(−1.793)	(−0.436)	(−4.021)	(−0.850)
dcf_t_1	1.846***	0.203	0.343	−0.435
	(3.617)	(0.449)	(1.145)	(−1.310)
dna_t	0.862**	−0.781***	0.573**	−0.411*
	(2.251)	(−3.043)	(2.174)	(−1.702)
dna_t_1	1.325***	0.306***	0.864***	−0.106
	(6.833)	(3.457)	(6.012)	(−1.206)
Capex	−5.554***	−0.472	−4.035***	−2.297***
	(−3.564)	(−0.497)	(−4.550)	(−3.107)
capex_t	3.019*	0.724	2.996***	1.467**
	(1.948)	(0.832)	(3.187)	(1.996)
capex_t_1	−1.796*	0.856	−1.011*	0.091
	(−1.779)	(1.272)	(−1.680)	(0.173)
gl	2.574	−7.888***	5.587***	−8.560***
	(0.946)	(−3.602)	(2.883)	(−3.894)
dgl_t	−2.798	−2.763	−4.629**	−0.938
	(−0.797)	(−1.235)	(−1.982)	(−0.411)
dgl_t_1	0.794	−1.229	0.559	0.871
	(0.280)	(−0.618)	(0.340)	(0.466)
dv_t_1	−0.232***	−0.296***	−0.031	−0.013
	(−5.599)	(−8.583)	(−1.131)	(−0.464)
Rate	3.367	3.192*	3.402**	6.104***
	(1.454)	(1.899)	(2.381)	(4.231)
Constant	1.480*	0.376	1.365***	1.533***
	(1.711)	(0.674)	(2.760)	(3.013)
Industry	Controlled	Controlled	Controlled	Controlled
Observations	485	502	978	996
R-squared	0.319	0.310	0.216	0.126

Note: The dependent variable of this table is the value of the company *V*. High and low performances are divided according to the annual industry median. High performance is determined when a company's ROE exceeds the annual industry median, otherwise, low performance is determined. Regression (1) is for high-performance CSOEs; regression (2) is for low-performance CSOEs; regression (3) is for high-performance CSOEs and LSOEs; and regression (4) is for low-performance CSOEs and LSOEs, with *t*-statistics in brackets.

*** $p < 0.01$.

** $p < 0.05$.

* $p < 0.1$.

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Table 11
Comparison of the value of cash holdings in enterprises that create value and suffer value loss.

Variables	EVA > 0			EVA < 0		
	Before implementation	After implementation	Before and after implementation	Before implementation	After implementation	Before and after implementation
	Regression (1)	Regression (2)	Regression (3)	Regression (4)	Regression (5)	Regression (6)
Cash	1.283***	1.653**	1.102**	0.130	0.063	0.140
	(2.611)	(2.382)	(2.168)	(0.200)	(0.0738)	(0.223)
Imp			−0.137			−0.165
			(−0.693)			(−0.890)
imp_cash			1.074			0.693
			(1.443)			(0.820)
cf	3.630***	7.375***	5.672***	−0.021	0.133	−0.125
	(3.526)	(4.926)	(6.173)	(−0.0184)	(0.0752)	(−0.123)
dcf_t	−1.454*	−1.153	−1.512**	−0.156	−0.359	0.043
	(−1.858)	(−1.133)	(−2.228)	(−0.245)	(−0.302)	(0.0716)
dcf_t_1	0.690	5.716***	1.809***	0.568	0.943	0.454
	(1.455)	(6.288)	(3.972)	(0.991)	(1.010)	(0.876)
dna_t	0.238	1.039	0.555*	−0.474	−1.205	−0.549*
	(0.699)	(1.480)	(1.649)	(−1.551)	(−1.537)	(−1.865)
dna_t_1	0.461*	2.226***	1.327***	0.165*	1.120**	0.308***
	(1.844)	(10.22)	(7.556)	(1.683)	(2.172)	(3.165)
capex	−4.024***	−3.112	−5.116***	−0.964	−2.879	−1.413
	(−2.875)	(−1.280)	(−3.884)	(−0.776)	(−1.536)	(−1.319)
capex_t	2.465*	2.143	2.816**	0.162	1.478	0.606
	(1.898)	(0.909)	(2.259)	(0.152)	(0.680)	(0.599)
capex_t_1	−0.499	−1.215	−1.277	0.967	−1.470	1.156
	(−0.544)	(−0.703)	(−1.484)	(1.222)	(−0.785)	(1.523)
gl	6.299**	−3.399	3.410	−7.978***	−6.603	−8.497***
	(2.366)	(−0.767)	(1.391)	(−2.981)	(−1.342)	(−3.450)
dgl_t	−2.828	−2.855	−2.785	−2.352	−0.609	−4.069
	(−0.922)	(−0.476)	(−0.938)	(−0.864)	(−0.0820)	(−1.547)
dgl_t_1	10.771***	−4.625	5.101**	−2.842	−1.869	−3.977*
	(4.044)	(−0.945)	(2.025)	(−1.224)	(−0.309)	(−1.777)
dv_t_1	−0.106***	−1.431***	−0.271***	−0.125***	−1.447***	−0.237***
	(−2.875)	(−12.00)	(−7.318)	(−3.072)	(−10.82)	(−5.955)
Rate	6.417***	6.073	2.098	7.487***	−2.687	4.620**
	(2.978)	(1.021)	(0.967)	(4.048)	(−0.445)	(2.554)
Constant	0.224	−0.236	2.215**	0.165	1.951	0.678
	(0.214)	(−0.159)	(2.038)	(0.300)	(1.325)	(1.216)
Industry	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Observations	368	203	571	293	123	416
R-squared	0.234	0.685	0.328	0.226	0.704	0.281

Note: Regressions (1), (2) and (3) are for the EVA > 0 sub-sample and regressions (4), (5) and (6) are for the EVA < 0 sub-sample, with *t*-statistics in brackets.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.1$.

EVA performance evaluation policy. After the policy implementation, the value of cash holdings increases significantly. Among the CSOEs with low accounting performance, the value of cash holdings is negative and does not improve after the implementation of the EVA performance evaluation.

We find similar results for LSOEs. In the high-performance companies, the value of CSOE cash holdings increases significantly after the implementation of the EVA policy compared with that of LSOE cash holdings. The results of regressions (3) and (4) provide evidence of this. We divide the companies into high- and low-performance groups according to the 5.5% rate of equity capital cost, which is regulated by the SASAC, and find no significant results regardless of performance group.

We also analyze the value of CSOE cash holdings under different EVA levels. Table 11 shows the results.

According to Table 11, cash holdings have a significant positive effect on company value in the value creation sub-sample from regressions (1)–(3). However, the positive effect of cash holdings on company value does not pass the significance test in the value loss sub-sample from regressions (4)–(6). Furthermore, we examine the changes in cash holding value before and after the policy implementation. Looking at the value creation sub-sample from regressions (1)–(3), the regression coefficient of cash in regression (2) is greater than that in regression (1). However, the regression coefficient of the interaction term imp_cash is insignificant. The case is the same in the value loss sub-sample.

The regression results in Table 11 show that value creation is an important factor affecting cash value. However, the EVA policy implementation does not significantly change the cash holdings value of enterprises that create value.

7. Conclusions and limitations

7.1. Conclusions

CSOEs account for a significant proportion of the Chinese economy. Motivating heads of CSOEs to work hard and protecting the state-owned assets and interests of shareholders are important economic targets of state regulators. As a performance supervisor, the SASAC is focused on evaluation and value creation, and assesses the heads of CSOEs to these ends. However, accounting performance may not be a perfect indicator of how CSOEs can fundamentally improve the philosophies and efficiency of their businesses. In addition, CSOEs are often large because their monopolies lead them to hold large amounts of cash, whether intentionally or unintentionally. Facing serious agency problems, an enterprise may abuse its cash or store large amounts of cash needlessly, resulting in a decline in corporate investment efficiency and ultimately leading to a fall in the value of its cash holdings. The SASAC must determine how to motivate executives to work hard, improve the investment efficiency of enterprises and enhance the value of their cash holdings. In 2010, it decided to fully implement EVA performance evaluations of CSOEs in an effort to improve business efficiency.

This study considers the background and transition of China's economic system. In 2010, the SASAC implemented an EVA performance evaluation policy to raise the value of cash holdings in CSOEs and protect shareholder equity. We adopt a difference-in-difference method and conduct comparison tests to determine the changes in the value of cash holdings between CSOEs and LSOEs before and after the policy execution from 2006 to 2011. The investment structure of CSOEs improved after the 2010 implementation of the EVA performance evaluation, resulting in significant increases in the value of their cash holdings. The findings of our falsification test and difference-in-difference method are consistent.

This paper makes the following contributions. First, it empirically tests the EVA performance evaluation policy implemented by the SASAC in 2010 to determine whether it improved business efficiency and the value of cash holdings in practice. This provides empirical evidence for EVA performance evaluation policy and its wider applications. Second, it enriches and develops the literature related to the value of cash holdings. It considers whether EVA performance evaluation can increase that value in transition economies such as China and enriches the economic consequences of EVA research areas. Third, it enriches the theoretical research literature related to investor protection and the mitigation of agency costs in transition economies and emerging markets.

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7.2. Limitations

This paper considers the EVA performance evaluation policy implemented by the SASAC in 2010 for CSOEs to be an exogenous event. Although it is undeniable that some companies (including CSOEs and LSOEs) voluntarily implemented the EVA performance evaluation before 2010, it is impossible to determine the years in which these implementations occurred. This may affect our conclusions to some extent. In addition, we do not investigate the EVA performance evaluations of CSOE subsidiaries in our sample, as it is difficult to obtain this information, which may also affect our conclusions.

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References

Acharya, V., Davydenko, S.A., Strebulaev, I.A., 2012. Cash holdings and credit risk. Rev. Financ. Stud. 25 (12), 3573–3609.
Almeida, H., Campello, M., Weisbach, M.S., 2004. The cash flow sensitivity of cash. J. Finance 59, 1777–1804.
Bates, T.W., Kahle, K.M., Stulz, R.M., 2009. Why do U.S. firms hold so much more cash than they used to? J. Finance 64 (5), 1985–2020.
Bertrand, M., Duflo, E., Mullaianathan, S., 2004. How much should we trust differences-in-differences estimates? Quart. J. Econ. 119 (1), 249–275.
Biddle, G.C., Bowen, R.M., Wallace, J.S., 1997. Does EVA beat earnings? Evidence on associations with stock returns and firm values. J. Account. Econ. 24 (3), 301–336.
Chen, D., Chen, X., Wan, H., 2005. Compensation regulation and job consumption in state-owned enterprises. Econ. Res. J. 2, 100–111 (in Chinese).
Chen, D., Chen, Y., 2012. Bank shares association, monetary policy changes and the listed company's cash management. J. Financ. Res. 12, 122–136 (in Chinese).
Chen, D., Li, S., Wang, C., 2011. The quality of the government, the ultimate property right and corporate cash holdings. Manage. World 11, 127–141 (in Chinese).
Chen, Q., Chen, X., Schipper, K., Xu, Y.X., Xue, J., 2012. The sensitivity of corporate cash holdings to corporate governance. Rev. Financ. Stud. 25 (12), 3610–3644.
Chen, S.M., Dodd, J.L., 1997. Economic value added (EVA™): an empirical examination of a new corporate performance measure. J. Manage. 9 (3), 318–333.
Dittmar, A., Mabrt-Smith, J., Servaes, H., 2003. International corporate governance and corporate cash holding. J. Financ. Quant. Anal. 38 (1), 111–134.
Dittmar, A., Jan, M.S., 2007. Corporate governance and the value of cash holdings. J. Financ. Econ. 83, 599–634.
Faulkender, M., Wang, R., 2006. Corporate financial policy and the value of cash. J. Finance 61 (4), 1957–1990.
Garvey, G.T., Milbourn, T.T., 2002. The optimal and actual use of economic value added in incentive compensation. Working paper.
Han, S., Qiu, J., 2007. Corporate precautionary cash holdings. J. Corp. Finance 13, 43–57.
Harford, J., Mansi, S., Maxwell, W., 2008. Corporate governance and firm's cash holdings. J. Financ. Econ. 87, 535–555.
Jensen, M.C., Murphy, K.J., 1990. Performance pay and top management incentives. J. Polit. Economy 98, 225–264.
Jensen, M.C., 1986. Agency costs of free cash flow, corporate finance, and takeovers. Am. Econ. Rev. 76, 323–329.
Jensen, M.C., Meckling, W.H., 1976. Theory of the firm: managerial behavior, agency costs and ownership structure. J. Financ. Econ. 3 (4), 305–360.
Jiang, B., Bi, X., 2006. Excessive cash holdings and firm value relationship analysis – a perspective based on agency costs. Res. Econ. Manage. 12, 49–55 (in Chinese).
John, T.A., 1993. Accounting measures of corporate liquidity, leverage, and costs of financial distress. Financ. Manage. 22 (3), 91–100.
Kim, C.S., Mauer, D.C., Sherman, A.E., 1998. The determinants of corporate liquidity: theory and evidence. J. Financ. Quant. Anal. 33 (3), 335–359.

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Kleiman, R.T., 1999. Some new evidence on EVA companies. J. Appl. Corp. Finance 12 (2), 80–91.
Lehn, K., Makhija, A.K., 1997. EVA, accounting profits, and CEO turnover: an empirical examination, 1985–1994. J. Appl. Corp. Finance 10, 90–97.
Lin, K.L., Hervaes, H., Tufano, P., 2010. What drives corporate liquidity? An international survey of cash holdings and lines of credit. J. Financ. Econ. 98, 160–176.
Liu, Y.X., Mauer, D., 2011. Corporate cash holdings and CEO compensation incentives. J. Financ. Econ. 102, 183–198.
Lovata, L.M., Costigan, M.L., 2002. Empirical analysis of adopters of economic value added. Manage. Account. Res. 13, 215–228.
Machuga, S.M., Pfeiffer, R.J., Verma, K., 2002. Economic value added, future accounting earnings, and financial analysts' earnings per share forecasts. Rev. Quant. Financ. Acc. 18, 59–73.
Mikkelson, W.H., Partch, M.M., 2003. Do persistent large cash reserves hinder performance? J. Financ. Quant. Anal. 38 (2), 275–294.
Miller, M.H., Orr, D., 1966. A model of the demand for money by firms. Quart. J. Econ. 80, 413–435.
Mulligan, C.B., 1997. Scale economies, the value of time, and the demand for money: longitudinal evidence from firms. J. Polit. Econ. 105, 1061–1079.
Myers, S.C., Rajan, R.G., 1998. The paradox of liquidity. Q. J. Econ. 113 (3), 733–771.
Nikolov, B., Whited, T.M., 2011. Agency conflicts and cash: estimates from a structural model. Working paper <http://ssrn.com/abstract=1508556>.
Opler, T., Pinkowitz, L., Stulz, R.M., Williamson, R., 1999. The determinants and implications of corporate cash holdings. J. Financ. Econ. 52, 3–46.
Pinkowitz, L., Williamson, R., 2007. What is the market value of a dollar of corporate cash? J. Appl. Corp. Finance 19, 74–81.
Pinkowitz, L., Stulz, R., Williamson, R., 2006. Does the contribution of corporate cash holdings and dividends to firm value depend on governance? A cross-country analysis. J. Finance 61, 2725–2751.
Richardson, S., 2006. Over-investment of free cash flow. Rev. Acc. Stud. 11, 159–189.
Riddick, L.A., Whited, T.M., 2009. The corporate propensity to save. J. Finance 64, 1729–1766.
Rogerson, W.P., 1997. Intertemporal cost allocation and managerial investment incentives: a theory explaining the use of economic value added as a performance measure. J. Polit. Econ. 105 (4), 770–795.
Saddour, K., 2006. The determinants and the value of cash holdings: evidence from French firms. Working paper, University Paris Dauphine.
Shen, Y., Kuang, X., Nie, Y., 2008. The empirical research of the ultimate controlling shareholder's excessive control and the value of the cash holdings. Nankai Bus. Rev. 11, 15–23 (in Chinese).
Sloan, R.G., 1993. Accounting earnings and top executive compensation. J. Account. Econ. 16, 55–100.
Stern, J., Stewart, S., 2004. Corporate governance, EVA, and shareholder value. J. Appl. Corp. Finance 16 (2–3), 91–99.
Stewart, G.B., 1994. EVA: fact or fantasy? J. Appl. Corp. Finance 7 (2), 71–84.
Xia, L., Fang, Y., 2005. Government control, environmental management and corporate value – empirical evidence from Chinese stock market. Econ. Res. J. 4, 40–51 (in Chinese).
Xin, Y., Xu, L., 2006. Corporate governance and excessive cash holdings. Manage. World 5, 136–141 (in Chinese).
Yueh, L.Y., 2004. Wage reforms in China during the 1990s. Asian Econ. J. 18 (2), 149–164.
Zhang, X., Wu, C., 2006. The financing constraints affect the cash holdings of listed companies policy? From cash and cash flow sensitivity analysis. Manage. Rev. 10, 55–62 (in Chinese).

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