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Article

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ARTICLE



Does CEO risk-taking entrepreneurial spirit matter in firm cash holdings?

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ABSTRACT

The psychological factors of senior executives have an important impact on the firm's financial policies. In this paper, we investigate the association between CEO risk-taking entrepreneurial spirit and firm cash holdings, and find that firms with higher CEO risk-taking entrepreneurial spirit have less cash holdings. Further, we find that financing constraints can mitigate the negative association between CEO risk-taking entrepreneurial spirit and firm cash holdings, whereas financing needs enhances the association between them. Mechanism test illustrates that CEO risk-taking entrepreneurial spirit affects firm cash holdings through corporate investment. Finally, the results reveal that CEO risk-taking entrepreneurial spirit not only promotes the value of cash holdings, but also is significantly positively associated with both accounting performance and market performance. Our findings shed lights on the impact of executive psychological factors on financial decisions and have important implications for cash-holding decisions of listed firms.

KEYWORDS

CEO risk-taking
entrepreneurial spirit;
financing constraints;
financing needs; cash
holdings

1. Introduction

The risk-taking entrepreneurial spirit is considered to be one of the most important characteristics of entrepreneurship. For example, Rnigh (1921) declares that it is impossible to be an entrepreneur without the courage to take risks, and the risk-taking entrepreneurial spirit plays a crucial role in promoting the economic growth of a country. If the firm wants to obtain excess profits, the senior executives need to maintain the risk-taking entrepreneurial spirit in the whole process of operation and management.¹ As Disney CEO Robert Iger suggested in his book *The Ride of a Lifetime*, the guiding principle to Disney's success is to 'innovate or die', referring to the practice of constant innovation and adapting to changes in the world to keep the business or product relevant

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¹For instance, Elon Musk, CEO of Tesla, maintains the risk-taking entrepreneurial spirit in the entrepreneurial process and makes cross-field transformative innovations in energy, electric vehicles, aerospace and other areas. He even provides financial support for the company by using the non-traditional method of purchasing firm shares with personal loans.

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and successful. Given the importance of the entrepreneurial spirit, in September 2017, the Central Committee of Communist Party of China and the State Council jointly issued 'Opinions on Building a Healthy Growth Environment for Entrepreneurs, Promoting Excellent Entrepreneurship and Playing the Role of Entrepreneurs' (hereafter *Opinion*). Provision 17 of this *Opinion* states that 'To encourage entrepreneurs to carry forward the spirit of daring to venture, daring to be the first, and daring to take risks', which fully emphasises the importance of risk-taking entrepreneurial spirit. In particular, in July 2020, President Xi Jinping stressed again the 'promotion of entrepreneurship' at the entrepreneurs' forum, proposing that 'the courage to take risks and the bid to be first are the special qualities that need to be promoted to overcome risks challenges and achieve high-quality development'.² However, the existing literature mainly focuses on the innovation spirit of entrepreneurship (King & Levine, 1993; Sathe, 2008; Drucker, 2009), whereas few studies directly examine the impact of risk-taking entrepreneurial spirit. Therefore, how to fully understand the crucial role of risk-taking entrepreneurial spirit in stimulating market vitality and achieving high-quality economic development is an important issue worth further investigation nowadays.

Cash is a relatively conservative and low-risk asset, regarded as the 'blood' of enterprise's production and operation activities, and has a significant impact on the development of firm. As the existing literature suggests, the determinants of cash holdings can be summarised into three aspects in general: imperfection of financial market, corporate governance and firm characteristics (Yu et al., 2014). The imperfection of financial market leads to the increase of external financing capital costs, and enterprises tend to reserve more cash for daily transactions and for future investment opportunities. If corporate governance is of poor quality, the management has more discretion and is more likely to hold more cash for perquisite consumption. Moreover, several studies find that property right (Yang & Yin, 2018), largest shareholder holdings (Li et al., 2018; Xiong et al., 2020), and executive personal traits (Li et al., 2013) would affect firm cash holdings policy. However, as an asset that is most vulnerable to being theft and abused, cash is also easy to be transferred and hidden. Meanwhile, it's worth noting that existing studies find that corporate cash holding levels have been increasing worldwide (Bates et al., 2009; Chen et al., 2012; Dittmar & Mahrt-Smith, 2007; Ferreira & Vilela, 2004), which may cause agency problems that harm shareholders' interests. Therefore, how to maintain firm cash holdings at a reasonable level is a critical issue. In this paper, we investigate the association between CEO risk-taking entrepreneurial spirit and firm cash holdings from the perspective of executive psychological factors, and infers that CEOs with risk-taking entrepreneurial spirit tend not to hold much cash and are more likely to invest the internal operating cash flow into projects with high net present value, which provides a novel perspective for the above-mentioned issue.

There are plenty of studies assuming that senior executives are risk-averse and firms should establish external mechanism that stimulates risk incentives of senior executives, in order to promote risky investment. This line of studies generally use the sensitivity of CEO's equity value to stock return volatility (*Vega*) to measure CEO risk incentives (Coles et al., 2006; Liu & Mauer, 2011; Shen & Zhang, 2013; Tong, 2010). Both Tong (2010) and Liu and Mauer (2011) use *Vega* as independent variable to examine the association between CEO

²<http://politics.people.com.cn/n1/2020/0722/c1024-31792344.html>

risk incentives and firm cash holdings. However, these two papers conclude opposite results: Tong (2010) finds that CEO risk incentives is significantly negatively associated with cash holdings, while Liu and Mauer (2011) finds a significantly positive association between CEO risk incentives and cash holdings. This paper is not intended to discuss the reason why they find opposite results, rather, we mainly emphasise the differences between our paper and these two papers. Firstly, in terms of theoretical foundations, both Tong (2010) and Liu and Mauer (2011) assume that CEOs are inherently risk-averse, and it is necessary to stimulate their risk-taking capacity. On the contrary, in this paper, we support the view of Graham et al. (2013) that CEOs are more adventurous than ordinary people, so the assumption that whether CEOs are risk-averse is debatable. Secondly, the measurement of CEO risk incentives is different. Referring to the questionnaire designed by Graham et al. (2013), we use the questionnaire survey for Chinese listed firms to measure CEO risk-taking entrepreneurial spirit. According to psychological research, psychological characteristics of an individual usually last for a long time (even a lifetime), and this measurement method can effectively avoid the influence of dependent variable on independent variable. Thirdly, the research background is also different. Liu and Mauer (2011) believes that banks require firms with higher CEO risk incentives to hold more cash when interpreting their results, however, such requirement is inconsistent with the reality of China.³

Existing literature finds that to simulate CEO risk incentives would bring about a series of negative economic consequences, such as increase of financial misstatement (Armstrong et al., 2013), reduction of the value of cash holdings (Liu & Mauer, 2011) and firm's future performance (Shen & Zhang, 2013), which are perhaps induced by improper or excessive external simulation of risk incentives. In this paper, we focus on CEO's inherent psychological factor, and use the questionnaire for CEOs to directly measure their risk-taking entrepreneurial spirit. Nevertheless, we are also concerned that CEO risk-taking entrepreneurial spirit may result in irrational behaviour, leading to negative economic consequences. Viewing from this lens, we consider two different scenarios, financing constraints and financing needs, to further verify whether CEO risk-taking entrepreneurial spirit can play a rational role in corporate decision-making. Specifically, on the one hand, a higher degree of financing constraints means that it is difficult for the company to obtain external funds, and the company's investment expenditure is limited. Even adventurous CEOs will choose to increase firm cash holdings under this circumstance. On the other hand, companies with higher financing needs usually have more investment opportunities, and adventurous CEOs will grasp more existing investment opportunities, leading to less cash holdings of their firms.

We investigate the association between CEO risk-taking entrepreneurial spirit and firm cash holdings by using questionnaire survey data about senior executives of China A-share listed firms, which is conducted by the Listed Firms Internal Control Research Group of China Securities Regulatory Commission (CSRC) in September 2014, and we use the score of CEO risk-aversion to proxy CEO risk-taking entrepreneurial spirit following Graham et al. (2013). The empirical results show that firms with higher CEO risk-taking entrepreneurial spirit have less cash holdings, and the negative association between them can be mitigated by financing constraints but strengthened by financing needs. The mechanism test shows

³According to our interviews with bank executives, very few banks in China require companies to maintain a certain level of cash holdings, regardless of whether the company stimulates the CEO to take risks.

that CEO risk-taking entrepreneurial spirit is significantly positively associated with investment expenditure, and the investment expenditure is significantly negatively associated with cash holdings, indicating that CEO risk-taking entrepreneurial spirit affects firm cash holdings through investment. Finally, the results reveal that CEO risk-taking entrepreneurial spirit not only promotes the value of cash holdings, but also is significantly positively associated with both accounting performance and market performance. Our findings not only shed lights on the impact of executive psychological factors on financial decisions both academically and practically, but also provide empirical evidence for the realisation of the important role of risk-taking entrepreneurial spirit as the *Opinion* advocates.

This paper contributes to the literature in the following ways: Firstly, the response rate of the existing questionnaire survey on the management of listed firms is generally about 10%, and the sample selection bias of these studies is very serious. The questionnaire survey used in this paper is led by CSRC, with response rate of approximately 85%, which greatly alleviates the sample selection bias concern compared with prior studies.

Secondly, we design two different scenarios, financial constraints and financial needs, to further examine the association between CEO risk-taking entrepreneurial spirit and firm cash holdings. The results indicate that, CEOs will rationally consider the financial situation of the firm when making financial decisions, instead of acting in a reckless and impulsive manner. Therefore, our findings not only provide supporting evidence for 'promoting excellent entrepreneurship spirit' advocated by the Central Committee and The State Council, but also help to supplement the understanding of the rational and positive role of risk-taking entrepreneurial spirit.

Last but not the least, in general, entrepreneurial spirit consists of risk-taking entrepreneurial spirit, innovative entrepreneurial spirit, and team-collaboration entrepreneurial spirit (Bai et al., 2014), but the existing related research on entrepreneurship spirit mainly concentrates on innovative entrepreneurial spirit and there are few empirical studies directly measuring risk-taking entrepreneurial spirit. In this study, we find that firms with higher CEO risk-taking entrepreneurial spirit would make more investment, thereby reducing the level of cash holdings. Overall, our findings support the assertion that CEOs with strong entrepreneurial spirit are more likely to identify investment opportunities, and supplement the literature on entrepreneurship spirit.

2. Theoretical analysis and research hypothesis

Scholars have not reached a consensus on the definition of entrepreneurship spirit, but economists generally agree with the connotation of entrepreneurship spirit including the pursuit of wealth, the spirit of innovation, the spirit of adventure, and the ability to find and capitalise on opportunity. Schumpeter (1934) pioneeringly points out that entrepreneurs promote economic growth through 'disruptive innovation' such as innovating products, developing new markets and applying new technologies. Entrepreneurs are characterised by the pursuit of dreams, the desire for wealth and prestige, and the ability to discover opportunities (Zhou & Liu, 2013). There is a series of studies finding that CEOs are more optimistic than ordinary

people and are more prone to risk (Graham et al., 2013),⁴ which is intuitively sensible because developing and leading a business empire involves a certain amount of risk. More specifically, Sunder et al. (2017) finds that CEOs' hobby of flying airplanes (which captures the personality trait of sensation seeking) is associated with significantly better innovation outcomes, sensation seeking combines risk taking with a desire to pursue novel experiences and has been associated with creativity.

As an intrinsic incentive to seek novelty, CEOs with risk-taking entrepreneurial spirit may also be more aggressive when making financial decisions, which induces these firms usually have higher financial leverage, more merger and acquisition activities, and greater overall risk (Cain & McKeon, 2016). In terms of firm cash holdings policy, cash is not only one of the scarcest and most abused assets, but also one of the least risky assets, even can be regarded as an investment with negative net present value⁵ (Opler et al., 1999). Theoretically, CEOs with higher risk-taking entrepreneurial spirit are more likely to discover and capitalise on potential opportunities in the market, and invest resource into high-risk and high-yield projects, which in turn reduces firm cash holdings level. Therefore, we propose the following hypothesis:

H1: *Ceteris paribus, the higher the CEO risk-taking entrepreneurial spirit, the lower the firm cash holdings level. Namely, CEO risk-taking entrepreneurial spirit is significantly negatively associated with firm cash holdings.*

As stated earlier, external stimulation of CEO's risk incentives results in some negative economic consequences (Armstrong et al., 2013; Liu & Mauer, 2011; Shen & Zhang, 2013), so will the inherent CEO risk-taking entrepreneurial spirit examined in this paper also lead to irrational economic consequences? In order to figure out this concern, we design two different scenarios, financing constraints and financing needs, to further examine whether the association between CEO risk-taking entrepreneurial spirit and firm cash holdings varies under different scenarios, so as to verify the rationality hypothesis of CEO risk-taking entrepreneurial spirit.

Due to the existence of information asymmetry and transaction costs in the capital market, firms often face higher costs when accessing external capital. In general, financing constraints occurs when it is hard to obtain external capital, and firms would fall into financial distress or even go bankrupt when enduring extremely severe financing constraints (Chan & Chen, 1991). Considering these serious economic consequences, we believe that even adventurous CEOs would also rationally make a trade-off between the potential impact of financing constraints and the current investment opportunities. Under such circumstances, CEO would tend to inhibit his internal motives to invest, and store more cash to try to alleviate the negative situation caused by financing constraints, for sake of enterprise's long-term survival and development. It means that the association between CEO risk-taking entrepreneurial spirit and risky investment behaviours will be mitigated by financing constraints. Accordingly, we propose Hypothesis 2:

⁴So executive shareholding is more likely to be a manifestation of management power (Bebchuk & Fried, 2003; Quan et al., 2010).

⁵The benefits of holding cash (mainly refer to interest's revenue) is less than cost of capital.

H2: *Ceteris paribus, financing constraints will mitigate the negative association between CEO risk-taking entrepreneurial spirit and firm cash holdings. Namely, the interaction of financing constraints and CEO risk-taking entrepreneurial spirit is significantly positively associated with firm cash holdings.*

Widely accepted entrepreneurship spirit definition indicates that entrepreneurs have a dream and will to pursue a private empire, and they can more effectively discover and utilise investment opportunities in the process of seeking profits and pursuing wealth (Zhou & Liu, 2013). Hébert and Link (1989) believe that entrepreneurship spirit mainly consists of innovative entrepreneurial spirit, risk-taking entrepreneurial spirit and the ability to identify market opportunities. Demirgüç-Kunt and Maksimovic (1998) defines financing needs as the difference between enterprise growth and achievable internal growth, suggesting that firms with higher financing needs usually have more potential investment opportunities. We infer that adventurous CEOs are more likely to discover and seize those investment opportunities in the market to boost firm growth, then reducing the level of cash holdings Li (2014). Based on the above analysis, we propose Hypothesis 3:

H3: *Ceteris paribus, financing needs will strengthen the negative association between CEO risk-taking entrepreneurial spirit and firm cash holdings. Namely, the interaction of financing needs and CEO risk-taking entrepreneurial spirit is significantly negatively associated with firm cash holdings.*

3. Research design and variable definition

3.1. Data source and sample selection

The CEO risk-taking entrepreneurial spirit data we use in this paper come from a survey sponsored by the Listed Firms Internal Control Research Group of the China Securities Regulatory Commission (CSRC). In 2012, CSRC delegated the China Association for Public Companies, Shanghai Stock Exchange, Shenzhen Stock Exchange and the Research Center for Internal Control of Enterprises and non-profit Organisations of Sun Yat-sen University to conduct the survey. Three of the authors in this paper played a key role in designing the survey. On 5 September 2014, the Research Group sent the questionnaires to A-share listed companies, certified accounting firms with a securities and futures practicing qualification, and institutional investors, through the Shanghai Stock Exchange, Shenzhen Stock Exchange, Accounting Department of CSRC, and Asset Management Association of China.

In order to guarantee a high response rate, we followed previous studies that surveyed executives (e.g. Boivie et al., 2011). In spring 2014, we discussed with scholars and sought their suggestions on the questionnaire design. The CSRC then held two separate meetings in July and August 2014 to solicit feedback from representatives of the China Association for Public Companies, the Shanghai Stock Exchange and the Shenzhen Stock Exchange. Based on this, we then conducted a pre-test of 15 CEOs of public companies and refined

the wording and instructions of the questionnaire according to their feedback.⁶ In the questionnaire, we emphasised that the survey was initiated and approved by the CSRC, as executives are often more willing to comply with survey requests from regulatory bodies⁷ (Bednar & Westphal, 2006). As of 31 October 2014, 2,536 A-share listed companies were issued questionnaires, and 2,154 sets of questionnaires (12,551 copies) were collected, with an overall response rate of 84.95%.⁸ In addition, we randomly selected 12 companies and interviewed the respondents face-to-face in November 2014. The field survey results also revealed that their answers to the questionnaire survey were reliable. Other data are from the CSMAR and Wind databases.

Following previous studies, we use the following criteria to select our sample: (1) we exclude listed companies in the finance industry; (2) we exclude samples with missing data; (3) we exclude firms with CEO turnover in 2014; (4) all continuous variables are winsorised at the levels of 1% and 99%. Since CEO risk-taking entrepreneurial spirit data are from questionnaire survey, sample period covers only 2014. The final sample contains 1,834 firm-year observations.

3.2. Variable definition

3.2.1. CEO risk-taking entrepreneurial spirit

The independent variable is CEO risk-taking entrepreneurial spirit (*AdvSpt*). We follow the approach in Graham et al. (2013) to measure personal risk-aversion, which is then used as the proxy of *AdvSpt*. The questionnaire question is as follows:

- (1) Suppose you are the only income earner in your family. Your doctor recommends you move because of allergies. You have to choose between two possible jobs (choose one):
 - (A) 100% chance that the job pays your current income for life.
 - (B) 50% chance that the job pays twice your current income for life and 50% chance that the job pays 2/3 of your current income for life.

If the respondent picked A, the survey continues to ask question (2):

- (2) Which of the following job would you choose?
 - (C) 100% chance that the job pays your current income for life.

⁶The questionnaire instruction illustrated the mobile phone numbers of three researchers in the research group to facilitate the communication between respondents and research group (corresponding author of this paper was in charge of one phone).

⁷The questionnaire was issued by the China Securities Regulatory Commission (CSRC), which is legally binding to a certain extent and would affect the policy formulation of the CSRC, so CEOs have strong incentive to allocate enough energy and time to fill in the questionnaire. Therefore, the response rate and authenticity of the questionnaire are remarkably high. In addition, the members of the research group conducted a field survey of 12 companies, guided them through telephone and carried out return visits, so as to ensure the authenticity and reliability of the survey data. For more detailed survey process, please refer to Zhao (2015).

⁸We conduct the Kolmogorov-Smirnov two-sample test (Coakley & Conover, 2000) to demonstrate the representativeness of the response. The results suggest that there is no significant difference between CEOs who responded to the survey and CEOs included in the survey in terms of variables used in this study (p values ranged from 0.203 to 0.947).

- (D) 50% chance that the job pays twice your current incomes for life and 50% chance that the job pays 4/5 of your current income for life.

If the respondent picked B, the survey continues to ask question (3):

- (3) Which of the following job would you choose?

(E) 100% chance that the job pays your current income for life.

(F) 50% chance that the job pays twice your current income for life and 50% chance that the job pays 1/2 of your current income for life.

In our analysis, we classify respondents who answer A and C as being the least risk-tolerant and those who answer B and F as the most adventurous. Therefore, if the respondent selects (1) A (2) C, then risk-aversion is assigned as 1; (1) A (2) D, then risk-aversion is assigned as 2; (1) B (3) E, then risk-aversion is assigned as 3; (1) B (3) F, then risk-aversion is assigned as 4. Then we take the natural logarithm of risk-aversion as $AdvSpt$, and the greater the value of $AdvSpt$, the higher the degree of CEO risk-taking entrepreneurial spirit.

3.2.2. Financing constraints

Following Whited and Wu (2006), we define financing constraints (FC) as WW index, and the formula is:

$$WW \text{ index} = -0.091CF_{it} - 0.062DIVPOS_{it} + 0.021TLTD_{it} - 0.044LNTA_{it} + 0.102ISG_{it} - 0.0335SG_{it}$$

CF represents the ratio of cash flow to total assets; $DIVPOS$ is an indicator that takes the value of one if the firm pays cash dividends; $TLTD$ is the ratio of long-term debt to total assets; $LNTA$ is the natural log of total assets; ISG is the revenue growth rate of each industry; SG is firm sales growth. In addition to considering the financial characteristics of the firm itself, the WW index also considers the development of the external industry in which the firm operates, which has a wider economic significance. Whited and Wu (2006) perceives that compared with KZ index, WW index can better measure the level of financing constraints of firm. Franzoni (2009) also points out that WW index can more accurately define the degree of financing constraints and capture the firms with severe financing constraints are those firms that have small size, low cash flow, high equity dependence, and low growth rate even in high-growth industries.

3.2.3. Financing needs

Following Demirgüç-Kunt and Maksimovic (1998) and Lu and Zhang (2014), we define the difference between enterprise growth and achievable internal growth as financing needs, and higher difference represents greater financing needs. The formula is: $(A_t - A_{t-1})/A_{t-1} - ROE_t/(1-ROE_t)$, where A is the total assets and ROE is the return on equity. If the value of one firm is larger than the mean value of the industry it belongs to in year t , then financing needs (FN) equals to 1, otherwise 0.

3.3. Empirical model

In order to investigate the association between CEO risk-taking entrepreneurial spirit and firm cash holdings, we refer to Xu et al. (2016) to construct the following regression model (1).

$$\begin{aligned} Cash_{it} = & \alpha_0 + \alpha_1 AdvSpt_{it} + \alpha_2 Cash_{it-1} + \alpha_3 LEV_{it} + \alpha_4 CF_{it} + \alpha_5 AGE_{it} \\ & + \alpha_6 NWC_{it} + \alpha_7 CAPEX_{it} + \alpha_8 ASSET_{it} + \alpha_9 DSD_{it} + \alpha_{10} CFVOL_{it} \\ & + \alpha_{11} BM_{it} + \alpha_{12} DIV_{it} + \alpha_{13} LOSS_{it} + \alpha_{14} SOE_{it} + \alpha_{15} FIRST_{it} + IND + \varepsilon_{it} \end{aligned} \quad (1)$$

where $Cash_{it}$ is the dependent variable and represents the cash holdings level of firm i at year t , defined following Dittmar et al. (2003) as the ratio of cash and cash equivalents to total assets minus cash and cash equivalents. $AdvSpt_{it}$ is the independent variable and its coefficient α_1 should be significantly negative according to Hypothesis 1, which is firm i 's CEO risk-taking entrepreneurial spirit at year t . Since cash is the most flexible asset and its policy is often affected by the previous period, we add $Cash_{it-1}$, the cash holdings level of firm i at year $t-1$, into the model to control the continuity of corporate cash holdings. Moreover, we first add the interaction of financing constraints (FC) and CEO risk-taking entrepreneurial spirit ($AdvSpt$) into Model (1) to test Hypothesis 2, and then add the interaction of financing needs (FN) and CEO risk-taking entrepreneurial spirit ($AdvSpt$) to Model (1) to test Hypothesis 3. We expect that the coefficient on $FC \times AdvSpt$ is significantly positive and the coefficient on $FN \times AdvSpt$ is significantly negative, implying that Hypothesis 2 and Hypothesis 3 are valid.

In addition, we also include several control variables in Model (1): Leverage (LEV), we consider that the higher leverage, the lower cash holdings, and the coefficient on LEV should be negative; Listing Years (AGE), we perceive that the more listing years, the higher cash holdings, and the coefficient on AGE should be positive; Net Working Capital (NWC), the higher net working capital, the lower cash holdings, and the coefficient on NWC should be negative; Firm Size ($ASSET$), the larger firm size, the lower cash holdings; Capital Expenditure ($CAPEX$), the higher capital expenditure, the lower cash holdings; Short-term Debt Changes Rate (DSD), the higher short-term debt changes rate, the higher cash holdings; Book-to-market Ratio (BM), the higher book-to-market ratio, meaning the firm's market price is low, and the higher cash holdings; Whether firm i pays cash dividends at year t (DIV), firms that pay cash dividends tend to hold more cash, so the coefficient on DIV should be positive. We also define SOE as a dummy variable, which equals to 1 if the firm is a state-owned enterprise, and consider the cash holdings of SOEs is high, so the coefficient on SOE should be positive. Besides that, we also control whether firm i posts a loss at year t ($LOSS$), the largest shareholder's shareholding ratio of firm i at year t ($FIRST$), operating cash flow volatility ($CFVOL$) and net operating cash flow (CF), while it is hard to estimate their coefficient symbol. See Table 1 for the variable definitions.

4. Empirical results

4.1. Descriptive statistics

Table 2 presents the distribution of initial CEO risk-taking entrepreneurial spirit scores on a scale of 1 to 4. From the frequency distribution, it is clear that the number of CEOs with the highest risk-taking entrepreneurial spirit is 752 (41.00%), which is consistent with Graham et al. (2013). In their questionnaire survey, CEOs of listed firms in the United States are more

Table 1. Variable definitions.

Variable type	Variables	Variable name	Variable definition
Dependent variable	<i>Cash</i>	Firm cash holdings	Cash and cash equivalents/(Total assets - Cash and cash equivalents)
Independent variables	<i>AdvSpt</i>	CEO risk-taking entrepreneurial spirit	Natural logarithm of the CEO's response to the questions (Graham et al., 2013), see 3.2.1
Moderator variables	<i>FC</i>	Financing constraints	Consistent with Whited and Wu (2006), see 3.3.2
	<i>FN</i>	Financing needs	Consistent with Demirgüç-Kunt and Maksimovic (1998) and Lu and Zhang (2014), see 3.3.3
Control variables	<i>LEV</i>	Leverage	Total liabilities/Total assets
	<i>CF</i>	Net operating cash flow	Net cash flow from operations/Total assets
	<i>AGE</i>	Listed years	Ln (1+Listed years)
	<i>NWC</i>	Net working capital	Net working capital/(Total assets - Cash and cash equivalents)
	<i>CAPEX</i>	Capital expenditure	Capital expenditure/(Total assets - Cash and cash equivalents)
	<i>ASSET</i>	Firm size	Ln (Total assets)
	<i>DSD</i>	Short-term debt changes rate	(Short-term debt at year t - Short-term debt at year $t-1$)/Total assets
	<i>CFVOL</i>	Cash flow volatility	Standard deviation of each firm's net operating cash flow in the same industry at year t
	<i>BM</i>	Book-to-market ratio	Book value of equity/Market value of equity
	<i>DIV</i>	Cash dividend	If the firm paid cash dividends at year t , it equals 1, otherwise 0
	<i>LOSS</i>	Loss	If the firm has negative profit at year t , it equals 1, otherwise 0
	<i>SOE</i>	Property right	If the firm is a state-owned enterprise, it equals 1, otherwise 0
	<i>FIRST</i>	Shares of the largest shareholder	Shares held by the largest shareholder/The total outstanding shares
<i>IND</i>	Industry	CSRC industry classification standards (2012)	

Table 2. Frequency distribution of CEO risk-taking entrepreneurial spirit.

Score	1	2	3	4	Total
Amount	502	305	275	752	1834
Proportion	27.37%	16.63%	14.99%	41.00%	100%

adventurous than ordinary people. The number of CEOs with least risk-taking entrepreneurial spirit is 502 (27.37%). In addition, the number of CEOs with score 3 and 2 are roughly similar (275 and 305).

Table 3 reports the descriptive statistics. The mean value of *Cash* is 0.2082, indicating that nearly a fifth of assets are in cash and cash equivalents, consistent with the existing literature (Yang & Yin, 2018). The standard deviation of *Cash* is 0.2678, the minimum value is 0.0059, and the maximum value is 2.4542, indicating that the cash holding level of listed firms varies considerably. The mean and median of *AdvSpt* are 0.8484 and 1.0986, respectively. The mean and median of financing constraints (*FC*) are -1.0048 and -0.0654 respectively.

In addition, the mean value of cash dividend (*DIV*) is 0.7181, indicating that there are 71.81% of the firms in the sample paying cash dividends, which may be caused by the semi-mandatory dividend payout requirement in China. 17.01% firms report loss and 36.37% firms are state-owned enterprises in our sample. Furthermore, the mean and median of other variables are consistent with the existing literature (Li et al., 2018; Yang & Yin, 2018; Zheng & Chen, 2018).

Table 3. Descriptive statistics.

Variables	N	Mean	Sd	Median	Minimum	Maximum
<i>Cash</i>	1834	0.2082	0.2678	0.1283	0.0059	2.4542
<i>AdvSpt</i>	1834	0.8484	0.5738	1.0986	0	1.3863
<i>FC</i>	1834	-1.0048	0.0721	-0.0654	-1.3005	-0.5807
<i>FN</i>	1834	0.0358	0.1850	0.0146	-0.6456	0.7107
<i>LEV</i>	1834	0.4405	0.2193	0.4245	0.0354	1.1471
<i>CF</i>	1834	0.0475	0.0909	0.0449	-0.2688	0.3200
<i>AGE</i>	1834	2.2547	0.6319	2.2366	0.6222	3.2208
<i>NWC</i>	1834	0.0562	0.2143	0.0683	-0.7371	0.5521
<i>CAPEX</i>	1834	0.0553	0.0535	0.0406	-0.0233	0.2593
<i>ASSET</i>	1834	22.0242	1.2600	21.8730	14.9416	28.0035
<i>DSD</i>	1834	0.0168	0.0663	0.0139	-0.1963	0.2162
<i>CFVOL</i>	1834	0.4530	1.1813	0.1049	0.0440	4.5278
<i>BM</i>	1834	0.8468	0.8355	0.5792	0.0752	7.9269
<i>DIV</i>	1834	0.7181	0.4500	1	0	1
<i>LOSS</i>	1834	0.1701	0.3758	0	0	1
<i>SOE</i>	1834	0.3637	0.4812	0	0	1
<i>FIRST</i>	1834	0.3508	0.1487	0.3325	0.0863	0.7525

4.2. Correlation coefficients

Table 4 shows the Pearson correlation of variables. It should be noted that the correlation coefficient between *AdvSpt* and *Cash* is positive (0.028) but insignificant, which is inconsistent with Hypothesis 1 and needs further regression tests. Financing constraints (*FC*) is significantly positively correlated with cash holdings (*Cash*) at 1% level, revealing that firms facing more financing constraints may have higher cash holdings. Financing needs (*FN*) is significantly negatively correlated with cash holdings (*Cash*) at 1% level, indicating that firms with higher financing demand may have lower cash holdings. Among other variables, *SOE* is significantly negatively correlated with *Cash*, suggesting that cash holdings of state-owned enterprises is relatively low. The correlation coefficients on leverage (*LEV*), listing year (*AGE*), book-to-market ratio (*BM*), whether firm posts a loss (*LOSS*) and *Cash* are all significantly negative at the level of 1%, showing that firms with large listing age and poor performance may hold less cash. Furthermore, net operating cash flow (*CF*), net working capital (*NWC*), capital expenditure (*CAPEX*), cash flow volatility (*CFVOL*) and cash dividend (*DIV*) are all significantly positively correlated with *Cash*. The correlation coefficients between each variable are basically less than 0.600, suggesting that there is no serious multicollinearity problem in the model.

4.3. Empirical results

Table 5 shows the regression results of firm cash holdings on CEO risk-taking entrepreneurial spirit (Hypothesis 1). We just control industry fixed effect in Column (1), and the coefficient on *AdvSpt* is -0.0176, significant at the level of 10%. In Column (2), following Li and Shi (2016), we include the cash holdings of previous one year. The result shows that the coefficient on *AdvSpt* is significantly negative at the level of 5% (coefficient is -0.0187; t-value is -2.1088). The above results suggest that the psychological factors of executives have an important impact on the corporate financial policies and that firms with higher CEO risk-taking entrepreneurial spirit are more likely to hold less cash, consistent with Hypothesis 1. The underlying intuition is that given cash is a low-risk item with negative



Table 4. Pearson correlations.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.Cash	1.000																
2.AdvSpt	0.028	1.000															
3.FC	0.180	0.047	1.000														
4.FN	-0.17	0.033	-0.01	1.000													
5.LEV	-0.36	-0.01	-0.24	0.125	1.000												
6.CF	0.161	-0.03	-0.19	-0.23	-0.24	1.000											
7.AGE	-0.17	-0.03	-0.08	-0.09	0.393	-0.09	1.000										
8.NWC	0.076	-0.02	0.089	-0.06	-0.56	-0.11	-0.32	1.000									
9.CAPEX	0.058	-0.00	-0.04	0.069	-0.17	0.246	-0.23	-0.12	1.000								
10.ASSET	-0.25	-0.04	0.439	0.036	0.466	0.009	0.271	-0.22	-0.04	1.000							
11.DSD	-0.02	-0.01	-0.03	0.332	0.080	-0.07	-0.06	-0.03	0.063	0.024	1.000						
12.CFVOL	0.212	0.062	-0.10	0.073	-0.11	0.034	-0.10	0.084	0.011	-0.122	0.086	1.000					
13.BM	-0.23	-0.05	-0.48	0.081	0.587	-0.10	0.273	-0.29	-0.14	0.669	0.052	-0.143	1.000				
14.DIV	0.091	-0.01	-0.53	-0.10	-0.25	0.205	-0.28	0.262	0.129	0.146	0.059	0.042	-0.063	1.000			
15.LOSS	-0.06	0.005	0.346	0.127	0.244	-0.20	0.180	-0.25	-0.111	-0.099	-0.049	-0.033	0.088	-0.519	1.000		
16.SOE	-0.10	0.018	-0.22	-0.03	0.301	-0.04	0.461	-0.26	-0.14	0.345	-0.047	-0.077	0.307	-0.098	0.131	1.000	
17.FIRST	0.000	-0.06	-0.26	-0.10	0.060	0.078	-0.05	0.008	-0.02	0.256	-0.043	-0.089	0.135	0.122	-0.101	0.206	1.000

Note: The significance levels at 10% and below are in bold.

Table 5. CEO risk-taking entrepreneurial spirit and firm cash holdings.

Variables	(1) <i>Cash</i>	(2) <i>Cash</i>
<i>AdvSpt</i>	-0.0176* (-1.9287)	-0.0187** (-2.1088)
<i>Cash_{t-1}</i>		0.7783*** (43.9587)
<i>LEV</i>		-0.1413*** (-3.5095)
<i>CF</i>		-0.0483 (-0.7521)
<i>AGE</i>		0.0644*** (6.0069)
<i>NWC</i>		-0.1625*** (-4.5695)
<i>CAPEX</i>		-0.2227** (-2.1133)
<i>ASSET</i>		-0.0330*** (-5.4104)
<i>DSD</i>		-0.2739*** (-3.5125)
<i>CFVOL</i>		0.1925 (1.1754)
<i>BM</i>		0.0249*** (2.7079)
<i>DIV</i>		0.0258* (1.8213)
<i>LOSS</i>		0.0237 (1.4347)
<i>SOE</i>		0.0062 (0.4777)
<i>FIRST</i>		0.0478 (1.2941)
<i>IND</i>	YES	YES
<i>Constant</i>	-0.0054 (-0.1378)	0.5744*** (4.3684)
<i>F</i>	8.49***	110.38***
<i>Observations</i>	1,834	1,834
<i>Adj-R²</i>	0.0467	0.6081

Note: The *T* statistic is in parentheses. Significant at: ***0.01; **0.05; and *0.1 levels, the same below.

net present value, adventurous CEOs tend to identify and seize market opportunities, and invest cash assets more in projects with high-risk and high-yield, which is consistent with Tong (2010).

Among other variables, we find that coefficient on *Cash_{it-1}* is significantly positive at 1% level, which means that firm's cash policy holds consistent over time. Firms with higher listing age (*AGE*), higher book-to-market ratio (*BM*), and paying dividends (*DIV*) tend to hold more cash. To the opposite, leverage (*LEV*), net working capital (*NWC*), capital expenditure (*CAPEX*), firm size (*ASSET*), and short-term debt changes rate (*DSD*) are significantly negatively associated with cash holdings.

In Table 6, we investigate whether financing constraints can mitigate the association between CEO risk-taking entrepreneurial spirit and firm cash holdings. The empirical result in Column (1) shows that there is a significantly positive association between financing constraints (*FC*) and firm cash holdings (*Cash*) at 1% level (coefficient is 0.0824), illustrating that firms with higher financing constraints usually hold more cash.

Table 6. CEO risk-taking entrepreneurial spirit, financing constraints and firm cash holdings.

Variables	(1) <i>Cash</i>	(2) <i>Cash</i>
<i>AdvSpt</i>	-0.0198** (-2.2341)	-0.0014 (-0.5098)
<i>FC</i>	0.0824*** (5.0060)	0.0482*** (5.6845)
<i>AdvSpt</i> × <i>FC</i>		0.0069*** (2.6048)
<i>Cash</i> _{<i>t</i>-1}	0.7816*** (43.8419)	0.4982*** (54.0165)
<i>LEV</i>	-0.1159*** (-2.9341)	-0.1305*** (-6.3877)
<i>CF</i>	0.0478 (0.7159)	0.1471*** (4.2550)
<i>AGE</i>	0.0638*** (5.8671)	0.0228*** (4.1017)
<i>NWC</i>	-0.1619*** (-4.4913)	-0.0723*** (-3.9086)
<i>CAPEX</i>	-0.2233** (-2.1114)	-0.0885 (-1.6133)
<i>SIZE</i>	0.0217* (1.7599)	0.0291*** (4.5975)
<i>DSD</i>	-0.2646*** (-3.3938)	-0.2055*** (-5.0693)
<i>CFVOL</i>	0.0110 (1.1504)	0.1028 (1.1994)
<i>BM</i>	0.0535 (1.4828)	-0.0554*** (-3.0271)
<i>DIV</i>	0.0868*** (4.5653)	0.0513*** (5.2048)
<i>LOSS</i>	0.0119 (0.7075)	0.0062 (0.7130)
<i>SOE</i>	0.0031 (0.2359)	0.0115* (1.7130)
<i>FIRST</i>	0.0498 (1.3484)	0.0213 (1.1100)
<i>IND</i>	YES	YES
<i>Constant</i>	-0.6661** (-2.4532)	-0.6238*** (-4.4800)
<i>F</i>	83.19***	173.81***
<i>Observations</i>	1,834	1,834
<i>Adj-R</i> ²	0.6109	0.7254

In Column (2), we find that the coefficient on the interaction of CEO risk-taking entrepreneurial spirit and financing constraints (*AdvSpt* × *FC*) is significantly positive at 1% level (coefficient is 0.0069), indicating that it is more difficult for firms to access to external financing when facing financing constraints, and adventurous CEOs tend to rationally and reasonably increase firm cash holdings. In short, the results demonstrate that financing constraints can mitigate the negative association between CEO risk-taking entrepreneurial spirit and firm cash holdings, which is consistent with Hypothesis 2.

In Table 7, we further examine whether financing needs would strengthen the association between CEO risk-taking entrepreneurial spirit and firm cash holdings. The empirical result in Column (1) shows that the financing needs (*FN*) is significantly negatively associated with firm cash holdings (*Cash*) at 1% level (coefficient is -0.1967), which is consistent with intuition that higher financing demand means more investment opportunities and less cash holdings. Column (2) reveals that the

Table 7. CEO risk-taking entrepreneurial spirit, financing needs and firm cash holdings.

Variables	(1) <i>Cash</i>	(2) <i>Cash</i>
<i>AdvSpt</i>	-0.0048* (-1.6912)	-0.0010 (-0.1825)
<i>FN</i>	-0.1967*** (-3.4995)	-0.1105*** (-3.3686)
<i>AdvSpt</i> × <i>FN</i>		-0.1040*** (-3.2679)
<i>Cash</i> _{<i>t-1</i>}	0.6647*** (19.4693)	0.6656*** (61.4428)
<i>LEV</i>	-0.1069*** (-2.8826)	-0.1146*** (-4.6530)
<i>CF</i>	0.0464 (0.9392)	0.0516 (1.2791)
<i>AGE</i>	0.0266*** (4.0460)	0.0276*** (4.1799)
<i>NWC</i>	-0.1247*** (-4.0452)	-0.1257*** (-5.7673)
<i>CAPEX</i>	-0.1485* (-1.8931)	-0.1430** (-2.2101)
<i>ASSET</i>	-0.0039 (-0.9124)	-0.0075** (-2.0043)
<i>DSD</i>	-0.0758*** (-2.8451)	-0.0730 (-1.4555)
<i>CFVOL</i>	0.2521*** (6.1975)	0.2673*** (2.6657)
<i>BM</i>	-0.0198 (-1.3552)	0.0043 (0.7614)
<i>DIV</i>	0.0117 (0.6698)	0.0114 (1.3115)
<i>LOSS</i>	0.0259 (1.2060)	0.0249** (2.4589)
<i>SOE</i>	0.0122** (2.4751)	0.0115 (1.4587)
<i>FIRST</i>	-0.0073 (-0.3314)	-0.0033 (-0.1458)
<i>IND</i>	YES	YES
<i>Constant</i>	0.0681 (0.6429)	0.1319 (1.6392)
<i>F</i>	212.80***	206.65***
<i>Observations</i>	1,834	1,834
<i>Adj-R</i> ²	0.7608	0.7622

coefficient on the interaction of CEO risk-taking entrepreneurial spirit and financing needs (*AdvSpt* × *FN*) is significantly negative at 1% level (coefficient is -0.1040), illustrating that firms with larger financing needs usually possess more investment opportunities, and CEO with higher risk-taking entrepreneurial spirit is prone to make more investment, which leads to a decrease in cash holdings. Overall, the results reveal that financing needs can strengthen the negative association between CEO risk-taking entrepreneurial spirit and firm cash holdings, which is consistent with Hypothesis 3.

5. Mechanism test

Based on the logic that we apply in previous context, CEO risk-taking entrepreneurial spirit would affect cash holdings through the channel of corporate investment. We

can conjecture that corporate investment is the mediator between CEO risk-taking entrepreneurial spirit and firm cash holdings. We follow the definitions of corporate investment by Pan and Chen (2017) and construct four investment variables as follows:

(1) Cash paid for fixed assets, intangible assets and other long-term assets scaled by total assets at the beginning of year t (*INVEST1*); (2) (Cash paid for fixed assets, intangible assets and other long-term assets + net cash paid for acquiring subsidiaries and their business units) scaled by total assets at the beginning of year t (*TINVEST*); (3) (Cash paid for fixed assets, intangible assets and other long-term assets – net cash received from the disposal of fixed assets, intangible assets and other long-term assets) scaled by total assets at the beginning of year t (*INVEST3*); (4) (Cash paid for fixed assets, intangible assets and other long-term assets + net cash paid for acquiring subsidiaries and their business units – net cash received from the disposal of fixed assets, intangible assets and other long-term assets – net cash received from the disposal of subsidiaries and other business units) scaled by total assets at the beginning of year t (*NINVEST*).

Table 8 shows the mechanism test results with total investment expenditure (*TINVEST*) and net investment expenditure (*NINVEST*). In this paper, we follow Sun et al. (2016) and adopt Sobel (1982) method to test mediation effect. The empirical results show that CEO risk-taking entrepreneurial spirit is significantly positively associated with corporate investment (both *TINVEST* and *NINVEST*, column (1) and (3)), while there is a significantly negative association between corporate investment (both *TINVEST* and *NINVEST*) and firm cash holdings (column (2) and (4)). More importantly, results in column (2) and (4) reveal that the coefficients on *AdvSpt* turn to be insignificant, and the Sobel Z-statistics are significant at 5% level in both regressions, suggesting that there really exists a full mediating effect. Beyond that, untabulated results by using *INVEST1* and *INVEST3* as mediator are basically consistent with those in Table 8. Overall, the results prove that CEO risk-taking entrepreneurial spirit affects firm cash holdings mainly through the channel of corporate investment.

6. Endogeneity test

Due to the particularity of independent variable (derived from questionnaire survey), we adopt typical cross-sectional regression method in this paper. While there could be potential endogenous problems such as sample selection bias, reverse causality, and omitted variables, we further conduct the following tests to alleviate these concerns.

Firstly, we find that approximately 80% of the targeted firms respond to the questionnaire after excluding samples with missing values, which may perhaps result in sample selection bias. In other words, the cash holdings of firms which did not respond is significantly different from that of respondents. To tackle this issue, we first conduct T test of mean value of cash holdings between respondents and firms that did not respond, and find that there is no significant difference in cash holdings between the two groups.

In addition, we consider two extreme cases, assuming that all CEOs who did not respond to the questionnaire are either the least adventurous or the most adventurous, and assign the value of 1 or 4 correspondingly. If the results remain unchanged, we can conclude that there is no sample selection bias to some extent. Table 9 reports the results.

Table 8. Mechanism test: CEO risk-taking entrepreneurial spirit, corporate investment and firm cash holdings.

Variables	(1) <i>TINVEST</i>	(2) <i>Cash</i>	(3) <i>NINVEST</i>	(4) <i>Cash</i>
<i>TINVEST (NINVEST)</i>		-0.2238*** (-7.2304)		-0.2530*** (-8.0137)
<i>AdvSpt</i>	0.0044** (2.0990)	0.0021 (0.7780)	0.0044** (2.1452)	0.0022 (0.8289)
<i>Cash_{t-1}</i>	-0.0052 (-0.5049)	0.5748*** (44.1204)	-0.0001 (-0.0111)	0.5759*** (44.3666)
<i>LEV</i>	-0.1040*** (-5.2211)	-0.1880*** (-7.4474)	-0.0762*** (-3.9141)	-0.1840*** (-7.3405)
<i>CF</i>	-0.2851*** (-8.4606)	0.0260 (0.6018)	-0.2137*** (-6.4945)	0.0357 (0.8364)
<i>AGE</i>	-0.0133** (-2.1731)	0.0196** (2.5449)	-0.0210*** (-3.5193)	0.0172** (2.2428)
<i>NWC</i>	-0.1033*** (-5.8301)	-0.1397*** (-6.2115)	-0.0811*** (-4.6872)	-0.1371*** (-6.1397)
<i>CAPEX</i>	1.5782*** (26.5319)	0.3022*** (3.3847)	1.6390*** (28.2076)	0.3638*** (4.0107)
<i>ASSET</i>	0.0095*** (2.7992)	0.0002 (0.0395)	0.0104*** (3.1267)	0.0007 (0.1562)
<i>DSD</i>	0.1430*** (3.6241)	-0.1899*** (-3.8159)	0.2272*** (5.8962)	-0.1644*** (-3.2938)
<i>CFVOL</i>	0.0003 (0.0360)	0.0100 (0.8809)	0.0029 (0.3309)	0.0107 (0.9429)
<i>BM</i>	-0.0073 (-1.2740)	0.0004 (0.0554)	-0.0062 (-1.1048)	0.0005 (0.0652)
<i>DIV</i>	-0.0051 (-0.7120)	0.0002 (0.0230)	0.0042 (0.6064)	0.0024 (0.2700)
<i>LOSS</i>	0.0052 (0.6491)	0.0059 (0.5831)	-0.0018 (-0.2288)	0.0043 (0.4240)
<i>SOE</i>	-0.0358*** (-5.2238)	-0.0070 (-0.8033)	-0.0219*** (-3.2720)	-0.0045 (-0.5233)
<i>FIRST</i>	-0.0369* (-1.8638)	0.0449* (1.8016)	-0.0364* (-1.8848)	0.0439* (1.7690)
<i>IND</i>	YES	YES	YES	YES
<i>Constant</i>	-0.0193 (-0.2615)	0.0799 (0.8638)	-0.0836 (-1.1620)	0.0631 (0.6839)
<i>F</i>	49.98***	102.35***	55.65***	103.49***
<i>Observations</i>	1,675	1,675	1,675	1,675
<i>Adj-R²</i>	0.4321	0.6204	0.4591	0.6231
<i>Sobel Z-statistic</i>		-2.016**		-2.072**

In Column (1), we assume that CEOs who did not respond to the questionnaire is the least adventurous, i.e. the missing value of *AdvSpt* is Ln(1) (*Miss* = 1). The result shows that the coefficient on *AdvSpt* is still significantly negative at the level of 5%. Analogously, Column (2) assumes that CEOs who did not respond to the questionnaire are the most adventurous, which means that the missing value of *AdvSpt* is Ln(4) (*Miss* = 4), and the coefficient on *AdvSpt* is significantly negative at 10%. The above results are consistent with the main results, indicating that there is no sample selection bias in this study.

Secondly, there may be a reverse causality problem in this study, which means firms with less cash holdings are more likely to choose CEOs with higher risk-taking entrepreneurial spirit. With regard to this possibility, we adopt the following methods to figure it out: we perceive that current cash holdings level can hardly affect CEO turnover in previous years, and CEO risk-taking entrepreneurial spirit always has high continuity and stability, which does not change over time frequently. Thus, we further investigate

Table 9. The endogeneity test of sample selection bias.

Variables	(1) Cash <i>Miss=1</i>	(2) Cash <i>Miss=4</i>
<i>AdvSpt</i>	-0.0147** (-1.9778)	-0.0161* (-1.9458)
<i>Cash</i> _{<i>t-1</i>}	0.8046*** (50.6771)	0.8065*** (50.7463)
<i>LEV</i>	-0.0688* (-1.9546)	-0.0678* (-1.9263)
<i>CF</i>	-0.0567 (-0.9847)	-0.0590 (-1.0247)
<i>AGE</i>	0.0595*** (6.0749)	0.0606*** (6.2007)
<i>NWC</i>	-0.2002*** (-6.2551)	-0.2009*** (-6.2761)
<i>CAPEX</i>	-0.2548*** (-2.6833)	-0.2566*** (-2.7016)
<i>ASSET</i>	-0.0302*** (-5.3592)	-0.0295*** (-5.2203)
<i>DSD</i>	-0.3637*** (-5.2651)	-0.3644*** (-5.2733)
<i>CFVOL</i>	0.0080 (0.9315)	0.0081 (0.9427)
<i>BM</i>	0.0567* (1.7643)	0.0535* (1.6602)
<i>DIV</i>	0.0202 (1.5997)	0.0203 (1.6043)
<i>LOSS</i>	0.0018 (0.1222)	0.0011 (0.0726)
<i>SOE</i>	0.0019 (0.1632)	0.0030 (0.2592)
<i>FIRST</i>	0.0273 (0.8235)	0.0271 (0.8154)
<i>IND</i>	YES	YES
Constant	0.5198*** (4.5117)	0.5071*** (4.4145)
Observations	2,297	2,297
Adj-R ²	0.6243	0.6243

the association between CEO risk-taking entrepreneurial spirit and firm cash holdings when CEOs have held the position for at least 5 years, 6 years, 7 years, 8 years, and 9 years at the time of the survey, respectively. Table 10 reveals that there is still a significant negative association between CEO risk-taking entrepreneurial spirit (*AdvSpt*) and firm cash holdings (*Cash*). We suppose that the endogeneity problem of reverse causality does not affect our findings.

We further use two stage least square (2SLS) method to mitigate the endogeneity problem by adopting instrumental variable (*ND*). According to psychological research, people who suffered psychological trauma early in life are more conservative as adults. We construct a dummy variable *ND* to identify whether the CEO experienced the Great Chinese Famine (1959–1961) when he or she was 1–18 years old; if yes, *ND* equals to 1, otherwise 0. Obviously, *ND* is correlated with *AdvSpt*, and uncorrelated with *Cash*. Table 11 reports the 2SLS results by using *ND* as instrumental variable. Column (1) is the regression

Table 10. The endogeneity test of reverse causality.

Variables	(1) Cash <i>Tenure</i> >5	(2) Cash <i>Tenure</i> >6	(3) Cash <i>Tenure</i> >7	(4) Cash <i>Tenure</i> >8	(5) Cash <i>Tenure</i> >9
<i>AdvSpt</i>	-0.0321** (-2.1745)	-0.0377** (-2.1823)	-0.0433** (-1.9874)	-0.0541* (-1.8295)	-0.0654* (-1.8348)
<i>Cash_{t-1}</i>	0.8944*** (31.8009)	0.9287*** (26.4916)	1.0178*** (21.8635)	1.2532*** (18.4429)	1.2765*** (16.8339)
<i>LEV</i>	-0.1804*** (-2.6022)	-0.1918** (-2.3301)	-0.1264 (-1.2171)	-0.1789 (-1.2577)	-0.2802 (-1.6111)
<i>CF</i>	-0.2296** (-2.0221)	-0.3215** (-2.3940)	-0.3159* (-1.7891)	-0.5271** (-2.1562)	-0.6921** (-2.3807)
<i>AGE</i>	0.1102*** (5.6582)	0.1243*** (5.2336)	0.1451*** (4.5917)	0.1764*** (3.7333)	0.2227*** (3.7384)
<i>NWC</i>	-0.2463*** (-3.8860)	-0.2840*** (-3.8530)	-0.2940*** (-3.2223)	-0.2717** (-2.2677)	-0.3377** (-2.3523)
<i>CAPEX</i>	-0.1536 (-0.8507)	-0.0567 (-0.2625)	-0.0702 (-0.2545)	-0.1643 (-0.4062)	-0.2658 (-0.5217)
<i>ASSET</i>	-0.0565*** (-5.1819)	-0.0699*** (-5.5145)	-0.0854*** (-5.4605)	-0.0971*** (-4.8179)	-0.1045*** (-4.4366)
<i>DSD</i>	-0.2087 (-1.4415)	-0.2407 (-1.4509)	-0.1630 (-0.7829)	0.0012 (0.0042)	0.0598 (0.1791)
<i>CFVOL</i>	0.0232 (1.2446)	0.0159 (0.6624)	0.0249 (0.7280)	0.0364 (0.9289)	0.0396 (0.9291)
<i>BM</i>	0.1681*** (2.7675)	0.1899*** (2.6936)	0.2092** (2.3463)	0.3392*** (2.7629)	0.4315*** (2.9414)
<i>DIV</i>	0.0132 (0.5444)	0.0225 (0.7975)	0.0442 (1.2409)	0.0398 (0.8002)	0.0547 (0.9346)
<i>LOSS</i>	0.0185 (0.6605)	0.0092 (0.2839)	0.0315 (0.7750)	0.0434 (0.7864)	0.0638 (0.9843)
<i>SOE</i>	-0.0128 (-0.5824)	-0.0239 (-0.9304)	-0.0464 (-1.4814)	-0.0581 (-1.4385)	-0.0837* (-1.7208)
<i>FIRST</i>	0.0972 (1.5106)	0.1181 (1.5520)	0.1076 (1.1010)	0.1273 (0.9396)	0.1639 (0.9986)
<i>IND</i>	YES	YES	YES	YES	YES
<i>Constant</i>	0.9725*** (4.2708)	1.2732*** (4.6910)	1.4718*** (4.2397)	1.6051*** (3.6577)	1.6652*** (3.2271)
<i>Observations</i>	906	727	547	361	295
<i>Adj-R²</i>	0.6427	0.6199	0.6071	0.6468	0.6664

result of the first stage, and the coefficient on *ND* is significantly negative at 5% level (we also add CEO age in the regression model). Column (2) shows the results of the second stage, and the coefficient on *AdvSpt* is still significantly negative, which supplements that our findings are not affected by potential endogeneity problem (reverse causality).

Finally, with regard to the concern of omitted variables, we add CEO personal traits variables, including CEO's age (*CEOAGE*), whether CEO holds shares (*CEOHLD*), and CEO compensation (*CEOPAY*)⁹ into the model in the robustness test part (Table 12). Meanwhile, taking Cheng et al. (2018) as reference, we have already added the cash holdings of previous one year into Model (1) to partially mitigate the possibility of omitted variables. As the results shows, there is still a significantly negative association between CEO risk-taking entrepreneurial spirit and firm cash holdings (see Tables 5 to 7).

⁹*CEOAGE* is the natural logarithm of the CEO's age; *CEOHLD* is a dummy variable, which equals to 1 if the CEO holds firm's share and 0 otherwise. *CEOPAY* is the natural logarithm of CEO cash compensation.

Table 11. 2SLS results – Instrumental variable.

Variables	(1) AdvSpt	(2) Cash
<i>AdvSpt</i>		−0.2837** (−2.0641)
<i>ND</i>	−0.0065** (−2.0071)	
<i>Cash_{t-1}</i>	0.0961** (2.2496)	0.7097*** (28.6972)
<i>LEV</i>	0.0915 (0.9171)	−0.1010*** (−3.7495)
<i>CF</i>	0.0144*** (10.6427)	0.0011 (0.4636)
<i>AGE</i>	−0.0568** (−2.0521)	0.0207*** (2.6031)
<i>NWC</i>	−0.1176 (−0.9464)	−0.1407*** (−3.9051)
<i>CAPEX</i>	−0.3675 (−1.1629)	−0.1910* (−1.7921)
<i>ASSET</i>	0.0009 (0.0542)	−0.0033 (−0.6659)
<i>DSD</i>	−0.1994 (−0.7833)	−0.2831*** (−3.4273)
<i>CFVOL</i>	−0.0809 (−0.8750)	0.1670*** (8.7147)
<i>BM</i>	−0.0317 (−1.1081)	−0.0097 (−1.6281)
<i>DIV</i>	−0.0128 (−0.6735)	0.0120 (1.2041)
<i>LOSS</i>	−0.0317 (−1.3936)	0.0060 (0.4318)
<i>SOE</i>	−0.0826*** (−3.8282)	0.0311** (2.1327)
<i>FIRST</i>	−0.2817*** (−4.7091)	−0.0658 (−1.3879)
<i>CEOage</i>	−0.0740 (−0.9392)	0.0074 (0.3132)
<i>IND</i>	YES	YES
<i>Constant</i>	4.1994*** (5.5508)	0.3074 (1.5382)
<i>Observations</i>	1,834	1,834
<i>Adj-R²</i>	0.0268	0.3472

7. Robustness test

Considering the subjectivity of executives when filling out the questionnaire, we use another question to measure CEO risk-taking entrepreneurial spirit for cross-validation.¹⁰ The results are shown in column (1) of Table 12, and the coefficient on *AdvSpt* is still significantly negative at 5% level. Besides, we further consider the effects of other CEO personal traits on cash holdings, and add CEO age (*CEOAGE*), whether CEO holds shares

¹⁰There is another question in the survey that we can use as an alternative proxy of risk-taking entrepreneurial spirit, and the question measures CEO's risk preference from the perspective of personal asset allocation (this is a representative question for banks to evaluate clients' risk preference at the present stage). The specific question is as follows: which of the following can best explain your investment behaviour? A. Except for deposits and treasury bonds, I seldom invest in other financial products; B. I mostly invest in deposits, treasury bonds, etc., but invest less in stocks, funds and other risky products; C. My assets are evenly distributed in deposits, treasury bonds, bank financial products, trust products, stocks, funds and so on; D. I mostly invest in stocks, funds, foreign exchange and other high-risk products, but invest less in deposits and treasury bonds. The corresponding values of A, B, C, and D is 1, 2, 3, and 4, which means the higher the value, the higher risk-tolerance. We then take the natural logarithm of the value as an alternative proxy of CEO risk-taking entrepreneurial spirit (*AdvSpt*).

Table 12. Robustness test using alternative measures of CEO risk-taking entrepreneurial spirit and adding CEO personal traits.

Variables	(1) Cash	(2) Cash
<i>AdvSpt</i>	-0.0173** (-2.0818)	-0.0185** (-2.0541)
<i>Cash_{t-1}</i>	0.6074*** (39.7410)	0.7842*** (43.4476)
<i>LEV</i>	-0.1411*** (-5.3939)	-0.1243*** (-3.0999)
<i>CF</i>	0.0189*** (8.2386)	-0.0259 (-0.3954)
<i>AGE</i>	0.0116 (1.5894)	0.0630*** (5.5639)
<i>NWC</i>	-0.1466*** (-6.1225)	-0.1647*** (-4.4988)
<i>CAPEX</i>	-0.3470*** (-4.8204)	-0.2413** (-2.2530)
<i>ASSET</i>	0.0086* (1.8937)	-0.0302*** (-4.5064)
<i>DSD</i>	-0.0450 (-0.8531)	-0.2667*** (-3.3750)
<i>CFVOL</i>	0.0024 (0.3734)	0.0158* (1.6506)
<i>BM</i>	-0.0291 (-1.1761)	0.0551 (1.4998)
<i>DIV</i>	0.0098 (1.0220)	0.0228 (1.5833)
<i>LOSS</i>	0.0050 (0.4478)	0.0242 (1.4460)
<i>SOE</i>	-0.0041 (-0.4630)	0.0024 (0.1833)
<i>FIRST</i>	0.0093 (0.3712)	0.0415 (1.0904)
<i>CEOAGE</i>		0.0373 (0.9549)
<i>CEOHLD</i>		-0.0117 (-1.0024)
<i>CEOPAY</i>		-0.0012 (-0.4822)
<i>IND</i>	YES	YES
<i>Constant</i>	-0.0426 (-0.4659)	0.3954** (1.9621)
<i>F</i>	71.60***	76.75***
<i>Observations</i>	1,796	1,818
<i>Adj-R²</i>	0.5722	0.6067

(*CEOHLD*) and CEO's compensation (*CEOPAY*) in column (2). In both column (1) and column (2), CEO risk-taking entrepreneurial spirit (*AdvSpt*) is still significantly negatively associated with firm cash holdings (*Cash*) at 5% level, which is basically consistent with the results in Table 5.

In Hypothesis 2, we examine the moderating effect of financing constraints on the association between CEO risk-taking entrepreneurial spirit and firm cash holdings. Another commonly used variable of financing constraints is KZ index, and Franzoni (2009) points out that firms with financial constraints defined by KZ index are mainly firms with low cash reserves, low cash flow and high leverage. In order to make our results more robust, we use KZ index as an alternative proxy variable for financing constraints

Table 13. CEO risk-taking entrepreneurial spirit, financial constraints (KZ index) and firm cash holdings.

Variables	(1) Cash	(2) Cash
<i>AdvSpt</i>	-0.0085** (-1.9781)	-0.0085* (-1.7590)
<i>FC</i>	0.0301*** (4.6274)	0.0062 (0.9132)
<i>AdvSpt</i> × <i>FC</i>		0.0092* (1.9021)
<i>Cash</i> _{<i>t</i>-1}	0.7911*** (44.3808)	0.7156*** (55.9024)
<i>LEV</i>	-0.2479*** (-5.3579)	-0.1559*** (-4.7149)
<i>CF</i>	0.0637 (0.9307)	0.2010*** (4.1270)
<i>AGE</i>	0.0603*** (5.6389)	0.0368*** (4.8270)
<i>NWC</i>	-0.1548*** (-4.3732)	-0.1151*** (-4.5628)
<i>CAPEX</i>	-0.2195** (-2.0934)	-0.2099*** (-2.8188)
<i>SIZE</i>	-0.0242*** (-3.8074)	-0.0043 (-0.9406)
<i>DSD</i>	-0.2451*** (-3.1473)	-0.2379*** (-4.3003)
<i>CFVOL</i>	0.1714 (1.0518)	0.2565** (2.2162)
<i>BM</i>	0.0210** (2.2882)	-0.0008 (-0.1201)
<i>DIV</i>	0.0402*** (2.8105)	0.0195* (1.9175)
<i>LOSS</i>	0.0242 (1.4610)	0.0152 (1.2896)
<i>SOE</i>	0.0010 (0.0763)	0.0107 (1.1616)
<i>FIRST</i>	0.0573 (1.5599)	0.0128 (0.4895)
<i>IND</i>	YES	YES
<i>Constant</i>	0.0099 (0.1013)	0.3653*** (2.6715)
<i>F</i>	83.19***	173.81***
<i>Observations</i>	1,834	1,834
<i>Adj-R</i> ²	0.6179	0.7170

(*FC*) and repeat the test of Hypothesis 2. The results are shown in Table 13. In column (1), the coefficient on *AdvSpt* is significantly negative at 5% level, while the coefficient on *FC* (KZ index) is significantly positive at 1% level. In column (2), the coefficient on the interaction of *AdvSpt* and *FC* is significantly positive at 10% level (coefficient is 0.0092), which is roughly consistent with those in Table 6 (although the significant level decreases, it is still significant at 10% level), showing that our result is robust.

In Hypothesis 3, we also examine the moderating effect of financing needs on the association between CEO risk-taking entrepreneurial spirit and firm cash holdings, where financing needs represents investment opportunities of the firm. So as to make the result

Table 14. CEO risk-taking entrepreneurial spirit, investment opportunities (*Growth*) and firm cash holdings.

Variables	(1) Cash	(2) Cash
<i>AdvSpt</i>	-0.0193** (-2.1761)	-0.0136 (-1.4683)
<i>AdvSpt</i> × <i>Growth</i>		-0.0411** (-2.0139)
<i>Growth</i>	-0.0475*** (-4.7026)	-0.0254* (-1.7068)
<i>Cash</i> _{<i>t</i>-1}	0.7850*** (44.4237)	0.7854*** (44.4782)
<i>LEV</i>	-0.1031*** (-2.6264)	-0.1039*** (-2.6494)
<i>CF</i>	-0.0453 (-0.7073)	-0.0418 (-0.6533)
<i>AGE</i>	0.0615*** (5.7635)	0.0608*** (5.7032)
<i>NWC</i>	-0.1582*** (-4.4616)	-0.1583*** (-4.4674)
<i>CAPEX</i>	-0.2142** (-2.0376)	-0.2160** (-2.0566)
<i>ASSET</i>	-0.0274*** (-4.2369)	-0.0271*** (-4.1935)
<i>DSD</i>	-0.2431*** (-3.1250)	-0.2365*** (-3.0399)
<i>CFVOL</i>	0.2305 (1.4106)	0.2371 (1.4517)
<i>BM</i>	0.0319 (0.9064)	0.0313 (0.8883)
<i>DIV</i>	0.0212 (1.5073)	0.0228 (1.6164)
<i>LOSS</i>	0.0172 (1.0377)	0.0164 (0.9924)
<i>SOE</i>	0.0040 (0.3123)	0.0037 (0.2851)
<i>FIRST</i>	0.0421 (1.1419)	0.0412 (1.1194)
<i>IND</i>	YES	YES
<i>Constant</i>	0.4453*** (3.3872)	0.4356*** (3.3135)
<i>F</i>	107.85***	104.32***
<i>Observations</i>	1,834	1,834
<i>Adj-R</i> ²	0.6172	0.6181

more robust, we use the sales revenue growth rate to represent investment opportunities (*Growth*) of the firm. In Column (1) of Table 14, we find that investment opportunity (*Growth*) is significantly negatively associated with firm cash holdings. In Column (2), the interaction of CEO risk-taking entrepreneurial spirit (*AdvSpt*) and investment opportunities (*Growth*) is also significantly negatively associated with firm cash holdings at 5% level, which is consistent with the results of Table 7, suggesting that when there are more investment opportunities, adventurous CEOs are more likely to hold less cash.

Finally, we further conduct other robustness tests to make our findings more robust. (1) Change sample period. In this paper, we assume that CEO risk-taking entrepreneurial spirit may not change within a short time, thus we investigate the association between

CEO risk-taking entrepreneurial spirit and firm cash holdings respectively in the previous year (2013) and the next year (2015) of the survey. The untabulated results reveal that CEO risk-taking entrepreneurial spirit is still significantly negatively associated with firm cash holdings. At the meanwhile, we also test the pooled sample for three consecutive years from 2013 to 2015, and the results remain unchanged. (2) Use alternative measurement of firm cash holdings (*Cash*). Consistent with the method of Opler et al. (1999), we use the excess cash holding and the industry-adjusted cash holding to substitute the dependent variable (*Cash*) respectively, and the results remain unchanged.

8. Further analysis

The above findings demonstrate that CEO risk-taking entrepreneurial spirit would lower the level of firm cash holdings. Intuitively, an interesting question is whether CEO risk-taking entrepreneurial spirit would promote the value of cash holdings?

Firstly, we follow the methodology in Faulkender and Wang (2006) to study the association between CEO risk-taking entrepreneurial spirit, firm cash holding and excess stock return. Specifically, we evaluate the value of cash holdings by investigating how the change in cash holdings affects excess stock return (marginal value of cash) using the regression Model (2).

$$\begin{aligned} Exret_{it} = & \beta_0 + \beta_1 AdvSpt_{it} + \beta_2 \frac{\Delta C_{it}}{M_{it-1}} + \beta_3 AdvSpt_{it} \times \frac{\Delta C_{it}}{M_{it-1}} + \beta_4 \frac{\Delta E_{it}}{M_{it-1}} + \beta_5 \frac{\Delta NA_{it}}{M_{it-1}} + \beta_6 \frac{\Delta RD_{it}}{M_{it-1}} + \beta_7 \frac{\Delta I_{it}}{M_{it-1}} \\ & + \beta_8 \frac{\Delta D_{it}}{M_{it-1}} + \beta_9 \frac{C_{it-1}}{M_{it-1}} + \beta_{10} L_{it} + \beta_{11} \frac{NF_{it}}{M_{it-1}} + \beta_{12} \frac{C_{it-1}}{M_{it-1}} \times \frac{\Delta C_{it}}{M_{it-1}} + \beta_{13} L_{it} \times \frac{\Delta C_{it}}{M_{it-1}} + \sum Industry + \varepsilon_{it} \end{aligned} \quad (2)$$

where:

ΔX_{it} indicates the change in the variable X of firm i from year $t-1$ to t .

(e.g. $\Delta C_{it} = Cash_{it} - Cash_{it-1}$)

$Exret_{it}$ indicates stock return of firm i during fiscal year t minus firm i 's benchmark return at year t (we use the 25 Fama and French portfolios formed on size and book-to-market as our benchmark portfolios at year t , and group every firm into one of 25 size and book-to-market portfolios)

M_{it-1} indicates market value of firm i at year $t-1$

E_{it} indicates earnings before interest and tax of firm i at year t

NA_{it} equals to total assets net of cash of firm i at year t

RD_{it} indicates R&D expenditures of firm i at year t

I_{it} indicates interest expense of firm i at year t

D_{it} indicates total dividends of firm i at year t

L_{it} indicates leverage (total debt/total assets) of firm i at year t

NF_{it} is firm i 's net financing during fiscal year t , and equals to net new equity issues financing (equity issued minus repurchases) plus net new debt issues financing (debt issued minus debt repayment)

Table 15. CEO risk-taking entrepreneurial spirit, firm cash holdings and excess stock return.

Variables	(1) Exret
$AdvSpt_{it}$	0.0023 (0.1884)
$\frac{C_{it}}{M_{it-1}}$	1.4257** (2.2751)
$AdvSpt_{it} \times \frac{C_{it}}{M_{it-1}}$	0.1884** (2.0469)
$\frac{E_{it}}{M_{it-1}}$	1.1093*** (6.2886)
$\frac{NA_{it}}{M_{it-1}}$	0.0859 (1.5288)
$\frac{RD_{it}}{M_{it-1}}$	2.2636 (1.0413)
$\frac{I_{it}}{M_{it-1}}$	395.0422* (1.9318)
$\frac{D_{it}}{M_{it-1}}$	-0.6440 (-1.0618)
$\frac{C_{it-1}}{M_{it-1}}$	0.8246*** (5.1441)
L_{it}	-0.6395*** (-4.2425)
$\frac{NF_{it}}{M_{it-1}}$	0.0801 (0.5028)
$\frac{C_{it-1}}{M_{it-1}} \times \frac{C_{it}}{M_{it-1}}$	-0.6399 (-0.7025)
$L_{it} \times \frac{C_{it}}{M_{it-1}}$	-3.7501* (-1.8477)
Constant	-0.1151*** (-6.4093)
F	7.26***
Observations	1,684
Adj-R ²	0.2378

Table 15 reports the results of excess stock return on CEO risk-taking entrepreneurial spirit and cash holdings change. The interaction of CEO risk-taking entrepreneurial spirit ($AdvSpt_{it}$) and cash holdings change ($\frac{\Delta C_{it}}{M_{it-1}}$) is significantly positively associated with excess return (coefficient is 0.1884, significant at 5% level), suggesting that marginal value of cash is higher in firm with higher CEO risk-taking entrepreneurial spirit, which is consistent with Tong (2010), who found that firms with higher CEO risk incentives (*vega*) hold less cash and have higher value of cash holdings.

Secondly, we intend to further explore the association between CEO risk-taking entrepreneurial spirit, firm cash holdings and value of cash holdings following Luo and Qin (2009), and construct Model (3) as follows.

$$\begin{aligned}
 MV_{it} = & \beta_0 + \beta_1 AdvSpt_{it} + \beta_2 Cash_{it} + \beta_3 AdvSpt_{it} \times Cash_{it} + \beta_4 E_{it} + \beta_5 DE_{it} + \beta_6 DE_{it+1} \\
 & + \beta_7 DNA_{it} + \beta_8 DNA_{it+1} + \beta_9 D_{it} + \beta_{10} DD_{it} + \beta_{11} I_{it} + \beta_{12} DI_{it} + \beta_{13} DI_{it+1} + \beta_{14} DMV_{it+1} + \sum Industry + \varepsilon_{it}
 \end{aligned}
 \tag{3}$$

Table 16. CEO risk-taking entrepreneurial spirit, firm cash holdings and firm value.

<i>Variables</i>	(1) <i>MV</i>	(2) <i>MV</i>
<i>AdvSpt</i>	0.1123** (2.3112)	0.0090 (0.1363)
<i>Cash</i>	0.9300*** (7.9862)	0.7028** (2.5682)
<i>AdvSpt</i> × <i>Cash</i>		0.4756** (2.0742)
E_t	4.5403*** (4.8186)	4.7027*** (4.8930)
DE_t	1.5970** (2.2943)	1.7311** (2.2613)
DE_{t+1}	-1.1892* (-1.7754)	-0.8259 (-1.0864)
DNA_t	0.3503 (1.0070)	0.1836 (0.5200)
DNA_{t+1}	-1.5605*** (-4.7813)	-1.6347*** (-4.5270)
D_t	-8.3701*** (-3.1656)	-8.1052*** (-3.0381)
DD_t	-4.6516* (-1.7008)	-5.1698* (-1.8658)
DD_{t+1}	-6.0707* (-1.9309)	-5.4602* (-1.7043)
I_t	-20.9532*** (-6.4063)	-20.5972*** (-6.1544)
DI_t	-13.6915*** (-2.8462)	-10.6767** (-1.9649)
DI_{t+1}	-10.0951** (-2.0686)	-8.7466 (-1.6178)
DMV_{t+1}	0.0459* (1.7787)	-0.0008 (-0.0379)
<i>IND</i>	YES	YES
<i>Constant</i>	2.2240*** (9.7050)	2.3135*** (9.8442)
<i>F</i>	15.97***	15.49***
<i>Observations</i>	1,642	1,642
<i>Adj-R²</i>	0.2411	0.2239

The dependent variable of Model (3) is firm value of firm i at year t (MV_{it}), which is standardised by assets net of cash. We also control the net earnings, actual net earnings growth of firm i at year t and expected net earnings growth of firm i at year $t + 1$ (E_t , DE_t , DE_{t+1}) to control the impact of firm profitability on market value. In addition, to reflect the impact of the firm's dividend policy and financing policy on firm value, we add dividend payment and dividend payment growth of firm i at year t (D_t , DD_t), interest expense, actual interest expense growth of firm i at year t and expected interest expense growth of firm i at year $t + 1$ (I_t , DI_t , DI_{t+1}). In terms of the effect of corporate investment on firm value, we also control actual growth of non-cash assets of firm i at year t and expected growth of non-cash assets of firm i at year $t + 1$ (DNA_t , DNA_{t+1}). DMV_{t+1} is the expected growth of firm value of firm i at year $t + 1$, and *Industry* reflects industry fixed effect.

The results in column (1) Table 16 show that CEO risk-taking entrepreneurial spirit (*AdvSpt*) is significantly positively associated with firm value at 5% level (coefficient is 0.1123), and the level of cash holdings (*Cash*) is also significantly positively associated with firm value. The coefficient on interaction of *AdvSpt* and *Cash* in column (2) is significantly

Table 17. CEO risk-taking entrepreneurial spirit and firm performance.

Variables	(1) ROA	(1) Tobin'sQ
<i>AdvSpt</i>	0.0028** (2.5093)	0.1531*** (3.9714)
<i>CF</i>	0.1809*** (4.6482)	1.7089** (2.6201)
<i>LEV</i>	-0.1064*** (-17.6792)	-1.1213*** (-3.3262)
<i>ASSET</i>	0.0109*** (13.6638)	-0.8539*** (-10.3374)
<i>FIRST</i>	0.0153** (2.4621)	0.6478*** (4.2609)
<i>SOE</i>	-0.0100*** (-2.7525)	-0.1511* (-1.6446)
<i>AGE</i>	-0.0058*** (-3.5736)	0.2970*** (3.8509)
<i>BDSIZE</i>	0.0057 (1.3579)	-0.1850 (-0.7197)
<i>IND</i>	YES	YES
<i>Constant</i>	-0.1912*** (-10.6300)	20.5599*** (16.1524)
<i>F</i>	37.72***	50.21***
<i>Observations</i>	1,834	1,834
<i>R-squared</i>	0.3691	0.4378

positive at 5% level, indicating that CEO risk-taking entrepreneurial spirit can promote the value of cash holdings.

Finally, we want to investigate whether CEO risk-taking entrepreneurial spirit could promote firm's accounting performance and market performance regardless of cash holdings in general. As shown in Table 17, CEO risk-taking entrepreneurial spirit is significantly positively associated with *ROA* (return on assets, accounting performance), as well as *Tobin's Q* (firm's market value, market performance). The results complement the inference that CEO risk-taking entrepreneurial spirit is conducive to promote firm performance, which provides empirical supporting evidence for the positive effect of 'Promoting Excellent Entrepreneurship' as *Opinion* declares.

9. Conclusions

This paper investigates the association between CEO risk-taking entrepreneurial spirit and firm cash holdings based on the unique questionnaire survey on senior executives of China listed firms in 2014. We find that firms with higher CEO risk-taking entrepreneurial spirit have less cash holdings. In order to further explore the association between CEO risk-taking entrepreneurial spirit and firm cash holdings, we ulteriorly examine the moderating effect of financing constraints and financing needs. The results show that financing constraints can mitigate the negative association between CEO risk-taking entrepreneurial spirit and firm cash holdings, and on the contrary, financing needs strengthens the negative association. In the mechanism test, we find that CEO risk-taking entrepreneurial spirit affects firm cash holdings through corporate investment. Further analysis reveals that CEO risk-taking entrepreneurial spirit not only promotes the value of cash holdings, but

also is significantly positively associated with both accounting performance and market performance, suggesting that this kind of executive psychological traits, CEO risk-taking entrepreneurial spirit, can boost firm value, which also provides a new perspective for investors when making their investment decisions. Our findings shed lights on the impact of executive psychological factors on financial decisions and have important implications for cash-holding decisions of listed firms.

Given the important role of entrepreneurial spirit emphasised in the *Opinions*, our findings provide a feasible thought for the high-quality development of enterprises: Rational risk-taking entrepreneurial spirit of senior executives can not only stimulate their own enthusiasm, initiative and creativity, but also facilitate the national strategy of innovation-driven economic development and 'Mass entrepreneurship and innovation', which would contribute to high-quality economic development.

Our findings also have some critical policy implications. Firstly, on the one hand, corporations and stakeholders should encourage CEO risk-taking entrepreneurial spirit, cultivate CEO's sense of innovation, and support entrepreneurs in their pursuit of excellence and sensitivity to investment opportunities to promote innovation and reform of firms. On the other hand, firms should also establish and improve the corresponding risk management mechanism to deal with potential risk-taking decision failure. Secondly, we suggest the firms set up and optimise executive recruitment system accordingly. Specifically, in technology-intensive and strategic emerging industries, there is a greater need for firms to innovate and capture market opportunities, and these firms could recruit more adventurous CEO who would be more prone to make transformative strategy decisions to improve the core competitiveness and market power of the firm. For traditional industries, such as labour-intensive manufacturing industry, relatively prudent and conservative CEO would be more suitable to maintain the firm's risk level in an accepted low range. Thirdly, firms should advocate senior executives to keep learning. Since bounded rationality and impulsive behaviours are generally induced by risk-taking entrepreneurial spirit, senior executives are highly recommended to constantly enrich their cognitive system to make more reasonable financial decisions.

Overall, our paper contributes to the literature on the effect of executives' psychological factors on firm cash holdings. As we know, firm cash holdings is directly related to the firm's financial decisions such as investment, financing and dividend payout, future research should investigate the impact of executives' risk-taking entrepreneurial spirit on other firm's financial behaviours.

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