Economic Research-Ekonomska Istraživanja

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rero20

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To cite this article: Xinli Li, Xiaodong Li, Jun Cheng, Jiaying Li & Zhenyang Zhao (2023) The influence of institutional fragility on corporate cash holdings: evidence from China, Economic Research-Ekonomska Istraživanja, 36:1, 191-208, DOI: 10.1080/1331677X.2022.2073249

To link to this article: https://doi.org/10.1080/1331677X.2022.2073249

Published online: 18 May 2022.

ECONOMIC RESEARCH-EKONOMSKA ISTRAŽIVANJA
2023, VOL. 36, NO. 1, 191–208
https://doi.org/10.1080/1331677X.2022.2073249

The influence of institutional fragility on corporate cash holdings: evidence from China

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ABSTRACT

This study examines the relationship between institutional fragility and corporate cash holdings. Using data from China between 2004 and 2017, we find that institutional fragility is associated with increased corporate cash holdings. The relationship is stronger for non-state-owned enterprises and stronger when firms have no relationship with banks. Furthermore, we find that institutional fragility reduces current investment opportunities, leading to an increase in corporate cash holdings. Investment opportunities play an intermediary effect; hence, institutional fragility affects corporate cash holdings.

ARTICLE HISTORY
Received 16 September 2021
Accepted 27 April 2022

KEYWORDS
Institutional fragility; cash holdings; the bank–firm relationship; property right nature; investment opportunity

JEL CODES
O11; O38; P21

1. Introduction

Cash has incomparable liquidity and flexibility to other assets and is the 'blood' for enterprises to maintain operations (Yu et al., 2019). Business leaders such as Li Ka-shing and Dong Mingzhu subscribe to the concept of 'cash is king'. Cash holdings affect enterprises' asset allocation and liquidity risk management and have an important relationship with financial and investment ability. Furthermore, cash holdings affect the profitability and market value of enterprises (Wang et al., 2014). The existing literature has examined the motives of cash holdings, including the precautionary, transactional, and agency motives (Bates et al., 2009). Among them, the precautionary motive has been widely considered in the theoretical and practical fields. It is an important reserve resource to avoid a business crisis. Keynes (1936) first proposed the precautionary motive hypothesis of cash holding, and many subsequent studies have used empirical methods to support this hypothesis (Opler et al., 1999; Han & Qiu, 2007). From the perspective of precautionary motive, cash holdings can help enterprises prevent operating risk. Especially for enterprises with financial constraints,

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cash holdings can significantly reduce the 'tail risk' (Chiu et al., 2016). In addition to operating risk, the fragility of the external institutional environment, that is, the uncoordinated and asynchronous development of different institutional dimensions, is also an important risk faced by enterprises (Li et al., 2021).

However, few studies have investigated the relationship between institutional fragility and corporate cash holdings. This study emphasizes the prevalence of institutional development in China, hence the inharmonious institutional development and the resulting conflicts and frictions. According to Shi et al. (2017), institutional fragility is defined as a condition in which different institutional dimensions are not progressing at the same pace, their inharmony and asynchrony lead to internal friction and conflict. In a word, the concept of institutional fragility focuses on the situation that different dimensions of institution are not progressing at the same pace and thus create internal friction and conflict during institution reform. According to existing literature, when different institutional dimensions interact in coherently and consistently (Jackson & Deeg, 2008; Schneider et al., 2010), the cognitive, relational complexity, and uncertainty of the external environment could arise (Boisot & Child, 1999; Child & Rodrigues, 2011; Shi et al., 2017). Thus, institutional fragility inevitably affects managers' expectation of future prospects, and increases their risk aversion (Banalieva, 2014; Kim et al., 2010). Managers' risk aversion may affect corporate cash holdings.

Based on the precautionary motive hypothesis of cash holdings, this study attempts to address the following questions: *(1) Can institutional fragility affect corporate cash holdings? (2) Do property rights nature and bank–firm relationship affect the relationship between institutional fragility and corporate cash holdings? (3) What is the mechanism by which institutional fragility affects corporate cash holdings?*

Our study makes three important contributions to the field of institution and corporate governance. First, unlike existing literature that focuses on institutional diversity and the institutional information-space perspective, our study introduces institutional fragility as a key concept in understanding corporate cash holdings and pays close attention to the scope and speed of institutional reforms. Therefore, we provide a new perspective on institutional reform in emerging economies. Second, the study confirms that the institutional environment affects corporate behaviour (North & Thomas, 1973; Shi et al., 2017). This study expands the factors influencing cash holdings from a macro perspective and enriches the application of the precautionary motive hypothesis of cash holdings. Third, the boundary conditions enrich theoretical basis of precautionary motive hypothesis. As an adaptive system (Boisot & Child, 1999), firms can take heterogeneous actions to respond to institutional fragility. The heterogeneity of financing capacity affects the relationship between institutional fragility and corporate cash holdings.

2. Literature review and hypotheses development

2.1. Institutional fragility

Emerging economies have become the new centre of attention in corporate governance.

Rapid economic reform in emerging economies provides a new context for research on institutional reform (Peng, 2003; Wan & Hoskisson, 2003). Existing institutional theories emphasise institutional diversity (Hall & Gingerich, 2009; Hall & Soskice, 2001; Schneider et al., 2010; Zhang et al., 2021) and the institutional information-space argument (Boisot & Child, 1999). The above perspectives regard institutional reform as dynamic (Kim et al., 2010; Banalieva et al., 2015), multidimensional (Jackson & Deeg, 2008; Marquis & Raynard, 2015), rather than as a static (Aoki, 2001), discrete (Bruno, 2000), aggregated or one-dimensional construct. In other words, institutional diversity and the institutional information-space perspective stress the scope of reform, which emphasises the multidimensionality and interconnectedness of institutional reform (Shi et al., 2017).

However, institutional diversity and information-space perspective overlook the speed of reform in driving institutional change. According to Hall and Gingerich (2009), institutional reform should adopt a complementarity method, in which one dimension of an institution complements the other. In other words, different dimensions of institutions should not only support each other, but should also develop at a similar pace to create a more harmonious institutional environment. Fukuyama (2014) also holds the same view, proposing that effective governance consists of three elements: the state, the rule of law, and political accountability. When the above three elements lack complementarity and synchronisation, internal friction and conflict will increase along with institutional reform and lead to institutional fragility. Thus, institutional fragility is defined as a situation in which different institutional dimensions do not progress at the same pace, resulting in incongruent pace of institutional development (Shi et al., 2017). Theoretically, the concept of institutional fragility focuses on how different institutional dimensions can interact coherent and consistently (Jackson & Deeg, 2008). It focuses on internal friction and conflict caused by the asynchronous development of different institutional dimensions. Such friction and conflict could increase the cognitive, relational complexity, and uncertainty of the external environment during institutional reform (Boisot & Child, 1999; Child & Rodrigues, 2011; Shi et al., 2017).

Referring to Shi et al. (2017), we use marketisation reform in the context of China to define institutional fragility. First, we regard marketisation at the provincial level as the first order of institutional development. marketisation is an important form of institutional reform, that can achieve institutional reform through restructuring and changing the institutional environment (Fan et al., 2007, 2010).

Five dimensions of marketisation are strongly related to institutional development: business–government interfaces, development of private firms, development of product markets, development of factor markets, and development of the market and legal intermediaries (Fan et al., 2007, 2010). For example, over the last two decades, private firms in China have become powerful growth engines by increasing industrial output and capital investments (Bai et al., 2006). Thus, the private economy is the most important component of overall institutional development. In product markets, information on market supply and demand affects enterprises to make correct decisions. Thus, if the product market of emerging economies is insufficient, it will become a serious institutional void that blocks institutional development (Khanna et al., 2005).

Second, we modify the index to measure institutional fragility in the second order, which is based on the change in marketisation at the provincial level. The specific measurement of institutional fragility is presented in Section 3.2.2. In other words, it reflects the fact that different institutional dimensions do not progress at the same pace, which leads to internal friction and conflict along with institutional development.

2.2. Cash holdings

The existing literature mainly examines the motivation for cash holdings from three aspects. First, there is a precautionary motive. Enterprises hold a certain amount of cash to prevent adverse shocks in the future, especially when the cost of external financial constraints and the uncertainty of external investment opportunities is high (Bates et al., 2009; Qian et al., 2019; Xiao et al., 2020). Second, there is transactional motive. It is well known that, there is a certain transaction cost for the conversion between non-cash assets and cash assets, so enterprises usually hold a certain amount of cash for daily production and operation. (Miller & Orr, 1966).Third, there is agency motivation. According to Jensen's (1986) 'free cash flow hypothesis', managers can strengthen the control of resources and power by holding excess cash, and seeking personal interests through 'empire construction'. The existing literature mainly examines the factors influencing cash holdings from two aspects: precautionary and transactional motive. Some studies have found that precautionary motive is an important factor for enterprises to maintain more cash holdings (Opler et al., 1999; Bates et al., 2009; Duchin, 2010; Mclean, 2011). However, other studies believe that the internal agency problem is an important factor affecting corporate cash holdings (Dittmar et al., 2003; Dittmar & Mahrt-Smith, 2007; Harford et al., 2008).

In summary, the extant literature mainly focuses on the influencing factors of cash holdings from a macro perspective. The institutional environment may affect corporate cash holdings (Jiang & Rao, 2011), which include changes in economic cycle (Almeida et al., 2004), monetary policy (Zhu & Lu, 2009), macroeconomic uncertainty (Han & Liu, 2011; Wang et al., 2014; Li & Shi, 2016; Zhang et al., 2017; Yu et al., 2019), institutional environment (Acemoglu et al.,2003; Yang et al., 2020), investor protection level (Yang & Zhang, 2008; Luo & Qin, 2009), and the support of local governments (Chen et al., 2011). However, to the best of our knowledge, no study has investigated the relationship between asynchronous institutional development and corporate cash holdings, that is, the relationship between institutional fragility and corporate cash holdings.

2.3. Hypotheses development

According to Hall and Gingerich (2009), institutional reform should adopt a complementarity approach; that is, different institutional dimensions should not only support each other but also progress at a similar pace, thus creating a favourable institutional environment. In other words, one dimension of an institution complements the other. When such a complementarity approach is absent, internal friction

and conflict will be created along with the overall institutional reform. Shi et al. (2017) defined this phenomenon as institutional fragility, which mainly focuses on the incongruent pace of institutional development. When different dimensions of institutions do not progress at the same pace, the cognitive, relational complexity, and uncertainty of the external environment will increase along with institutional reform (Boisot & Child, 1999; Child & Rodrigues, 2011; Shi et al., 2017).

The mechanism by which institutional fragility affects cash holdings is similar to that of external environmental uncertainty. Existing literature has found that environmental uncertainty affects risk-taking (Xue, 2019) and cash holdings (Chen & Cheng, 2018; Gao et al., 2021). In general, the complexity and uncertainty of the external environment lead to an increase in transaction costs and efficiency loss (Boisot & Child, 1999; Child & Rodrigues, 2011). An extremely fragile institutional environment leads to frustration and doubt due to environmental uncertainties. Furthermore, inconsistent market reform also brings ambiguous and conflicting expectations to managers (Banalieva, 2014; Kim et al., 2010). In other words, the complexity and uncertainty of the external environment increase the inaccuracy, difficulty in obtaining information, the fuzziness of managers' decision-making, and reduce the accuracy of organisational decision-making. Managers usually reduce venture capital projects to reduce operational risks, even those with positive NPV but with certain risks. From the perspective of precautionary motive, institutional fragility may affect corporate cash holdings.

Keynes (1936) pointed out the precautionary motive theory of cash holdings, which can avoid future uncertainty. The greater the uncertainty in the future, the greater the possibility of future liquidity shortages (Han & Liu, 2011). Enterprises that hold more cash can provide important buffer opportunities for temporary capital shortages and avoid bearing high financial costs due to external capital shortage (Wan & Rao, 2013). Therefore, environmental uncertainty increases the reserves of liquid assets (Liang et al., 2012). Following the above-mentioned theory, institutional fragility raises the cognitive, relational complexity and uncertainty of external environment that firms must face in the environment (Boisot & Child, 1999; Child & Rodrigues, 2011; Shi et al., 2017), which increases the external risks and has an important effect on corporate cash holdings. For example, if a province improves its ownership structure by supporting the development of non-state-owned enterprises, this will improve the level of marketisation. However, if the market factor of the province cannot develop synchronously, the backward market factor will hinder the development of overseas investment or financial markets, which will likely reduce the financing sources and channels. In limited financing sources and channels, enterprises often increase cash holdings for preventive motives. Similarly, if a province reaches a higher level of marketisation by downsizing its government to achieve a higher level of marketisation, and reduces government intervention with enterprises. However, if the province's legal framework has not advanced simultaneously, the legal issues related to intellectual property rights, trademarks, contract enforcement, and patents will lead to a sharp increase, which hinders the motivation and confidence of enterprises to invest in innovation (Li et al., 2021). Thus, this leads to a decrease in cash expenditure.

According to precautionary motive theory, prudent managers will choose to increase cash holdings in a complex and uncertain external environment. This can reduce the financial crisis caused by insufficient liquidity (Bloom et al., 2007). Following the above analysis, this study proposes the following research hypothesis:

Hypothesis 1. Institutional fragility prompts corporates to increase cash holdings.

3. Data, variable definitions, and model specifications

3.1. Data

Listed companies that issued in Shanghai and Shenzhen stock markets from 2004–2017 are selected as samples. Institutional fragility is a province-level variable, which is based on the marketisation index. Market-based reforms in China vary among different provinces (Jia, 2014). The National Economic Research Institute (NERI) developed a series of comprehensive indexes to capture the multiple dimensions of reform across provinces and years. One such index is the marketisation index., which is widely applied in existing literatures (Jia, 2014; Chang & Wu, 2014; Shi et al., 2017). Other data are from the China Stock Market and Accounting Research Database. To ensure data quality, we exclude financial, ST-listed and listed companies with missing financial data. Therefore, 14,138 final samples of 2, 455 listed companies are obtained.

3.2. Variables

3.2.1. Cash holdings (cash)

Dependent variables: following the research of Ozkan and Ozkan, (2004), Cash holding level is measured by ratio of cash and cash equivalents to total assets. At the same time, following the research of Opler et al. (1999), cash and cash equivalents divided by total assets minus cash and cash equivalents used for robustness check.

3.2.2. Institutional fragility (fragility)

Following Shi et al. (2017), this article do not directly use marketisation index at provincial level to define institutional fragility. Instead, we use marketisation index as the first order of institutional development, and institutional fragility as the second order mainly based on the change of marketisation at the provincial level. As the first order of institutional development, marketisation index by Wang et al. (2017) is an important basis to measure institutional fragility, which include five dimensions (Sub-index): (1) business–government interfaces; (2) development of private firms; (3) development of product markets; (4) development of factor markets; and (5) development of market and legal intermediaries (Fan et al., 2010).

First, we measure 'the pace of change' in each of sub-index among 30 provinces by Model (1):

$$\Delta Reform\ \ Sub\_index_{jrt} = \left| Reform\ \ Sub\_index_{jrt} - Reform\ \ Sub\_index_{jrt-1} \right| \qquad (1)$$

$\Delta Reform\ \ Sub_{index}jrt$ measures the absolute value of the sub-index$_j$ change from the year t–1 to the year t in the jth dimension of sub-index and in the rth province.

Second, we calculate how the change of one sub-index is related to the change of all five dimensions as a whole by Model (2):

$$\Delta R_{jrt} = \Delta Reform\ \ Sub\_index_{jrt} / \sum_{j=1}^{5} \Delta Reform\ \ Sub\_index_{jrt} \tag{2}$$

After adjusting by the sum of five dimensions of sub-index changes, ΔR_{jrt} does not relate to the scale of any sub-index.

We mainly use an entropy formula to capture the synchronisation of pace of change under the five dimensions (Banalieva, 2014). Entropy formula is given by $\sum_{j=1}^{5} \Delta R_{jrt} * ln(1/\Delta R_{jrt})$.We then define institutional fragility as the following:

$$Fragility_{rt} = Max_t - \sum_{j=1}^{5} \Delta R_{jrt} * ln(1/\Delta R_{jrt}) \tag{3}$$

Specifically, Max_t is the largest synchronisation values from entropy formula among all provinces in year t. The higher the institutional fragility score calculated by Equation (3), the higher degree of institutional fragility in the rth province in the year t. The entropy approach fully captures the institutional fragility in which institutional reforms include five different dimensions.

3.2.3. Control variables

We control several variables that affect corporate cash holdings (Liang et al., 2019). Firm characteristic variables: (1) Firm size (*Size*); (2) Cash flow (*CFO*); (3) Net operating capital (*WCAP*); (4) Asset-liability ratio (*Lev*); (5) Capital expenditure (*CAPEX*); (6) Cash dividends(*DIV*); and (7) The revenue growth rate (*Growth*). Furthermore, we also control provinces, industries, and year effects on corporate cash holdings.

3.3. Empirical model

To test Hypothesis 1, the following model is established:

$$Cash = \alpha_0 + \alpha_1 Fragility + \lambda Controls + \varepsilon \tag{4}$$

Model (4) is used to test research Hypothesis 1. If the coefficient of α_1 is positive, Hypothesis 1 is verified.

4. Empirical results

4.1. Descriptive statistics

Table 1 presents descriptive statistics. The mean value of cash holdings (*Cash*) is 0.187, and the standard deviation is 0.152, indicating large differences in cash holdings among the sample enterprises. The mean value of institutional fragility (*fragility*) is greater than the median, indicating that the data contain a considerable degree of

Table 1. Descriptive statistics.

Variables	Observation	Mean	Std. Dev.	Min	Median	Max
Cash	14 138	0.187	0.152	0.0149	0.139	0.738
Fragility	14 138	0.327	0.335	0.0272	0.193	1.395
Size	14 138	22.010	1.245	19.890	21.820	25.960
CFO	14 138	0.055	0.072	−0.154	0.052	0.270
WCAP	14 138	0.258	0.268	−0.316	0.241	0.900
Lev	14 138	0.419	0.198	0.048	0.419	0.832
CAPEX	14 138	0.060	0.053	0.000	0.045	0.250
DIV	14 138	0.013	0.014	0.001	0.008	0.083
Growth	14 138	0.379	0.951	−0.578	0.140	6.621

Source: Self-Calculated.

skewness to the right. The mean of Firm Size (*Size*) equals 22.010, and the standard deviation is 1.245, indicating large differences in size among sample enterprises. The other control variables were within reasonable ranges.

4.2. Regression analysis

Table 2 presents the regression results for Hypothesis 1. In Column (1), the coefficient of institutional fragility is significant (coefficient = 0.286 [t = 2.86]), indicating a significant positive relationship between institutional fragility and corporate cash holdings. In Columns (2) and (3), the data are adjusted by industry mean and industry median, and the positive relationship between institutional fragility and cash holdings is robust. Thus, Hypothesis 1 is strongly supported.

4.3. Robustness test

4.3.1. Instrumental variable regression

Hansen (1959) believes that transportation infrastructure is an important factor affecting economic development. The space-time compression effect caused by the opening of high-speed railways changes the convenience between cities, reduces transaction costs, and promotes the flow speed and scale of production factors such as labour, capital, and products among cities. For example, the development of the product market needs a high-quality factor market to match it, because high-quality factor market can provide sufficient financial capital and human capital (Hoskisson et al., 2013). However, high-speed railways have broken the barriers between cities and countries, accelerating the flow of labour and other production factors. Registered residence systems have hindered the effective flow of human capital from one area to another (Ji & Yang, 2020). Therefore, this study believes that the opening of a high-speed railway promotes the synchronous development of institutions and reduces the uncoordinated and asynchrony among different institutional factors. Institutional fragility may be inversely proportional to the number of high-speed railway stations (Li et al., 2021). This study selects the opposite number of high-speed railway stations within 150 km of listed companies (*Trainstation*) as the instrumental variable of institutional fragility (Li et al., 2021).

Table 3 presents the regression results of the instrumental variable approach. Column (1) shows a significant positive relationship between the instrumental variable and institutional fragility. In Column (2), the coefficient of institutional fragility

Table 2. Basic I regression.

Variables	Cash Principal regression (1)	Cash adjusted by industry mean (2)	Cash adjusted by industry median (3)
Fragility	0.286***	0.150**	0.208**
	(2.86)	(2.09)	(2.50)
Size	−0.011***	−0.006***	−0.006***
	(-11.60)	(-5.78)	(-5.78)
CFO	0.408***	0.378***	0.378***
	(22.54)	(20.88)	(20.88)
WCAP	0.295***	0.254***	0.254***
	(48.85)	(42.01)	(42.01)
Lev	−0.049***	−0.049***	−0.049***
	(-6.09)	(-6.05)	(-6.05)
CAPEX	0.152***	0.157***	0.157***
	(7.07)	(7.27)	(7.27)
DIV	−0.230***	−0.008	−0.008
	(-2.62)	(-0.09)	(-0.09)
Growth	0.006***	0.005***	0.005***
	(4.47)	(3.71)	(3.71)
Constant	−0.054	0.066***	0.113***
	(-0.38)	(3.19)	(5.49)
Province	YES	YES	YES
Industry	YES	YES	YES
Year	YES	YES	YES
N	14138	14138	14138
Adj_R^2	0.405	0.311	0.323
F	277.135	86.959	86.687

Note: ***, **, and * mean significance level at the 1%, 5%, and 10%, respectively. Numbers in parentheses are T-values.
Source: Self-Calculated.

is significant (coefficient = 0.087 (t = 10.61), indicating a positive relationship between institutional fragility and corporate cash holdings. The regression results in Table 3 support these conclusions.

4.3.2. Change model

In this study, change model is used to test the influence of the change in the value of the independent variable on the change value of the dependent variable. Column (1) in Table 4 presents the regression results, which indicate a positive relationship between institutional fragility and corporate cash holdings. This conclusion is robust.

4.3.3. Time delay effect

It is difficult for micro variables to have a reverse relationship with the macro variables. Thus, there is no reverse causal relationship between institutional fragility and corporate cash holdings. However, we consider that institutional fragility may have a time-delayed effect on corporate cash holdings. In this study, cash holdings lagged behind one year. Column (2) presents the regression results, thus confirming the study conclusion is robust.

4.3.4. Eliminate the interference of major events

In 2008, the subprime mortgage crisis in the United States spread from the real estate market to the credit market, resulting in a serious financial crisis. Owing to the continuous development of economic globalisation, the financial crisis in the United

Table 3. Instrumental variable regression.

Variables	Fragility (1)	Cash (2)
Trainstation	0.000***	___
	(7.38)	
Fragility	___	0.087***
		(10.61)
Size	−0.001***	−0.010***
	(-8.09)	(-8.58)
CFO	0.002*	0.359***
	(1.70)	(21.85)
WCAP	−0.001***	0.311***
	(-2.59)	(55.90)
Lev	−0.001	−0.046***
	(-1.57)	(-5.67)
CAPEX	0.006***	0.210***
	(3.62)	(9.61)
DIV	−0.008	−0.038
	(-1.27)	(-0.48)
Growth	−0.001***	0.004***
	(-9.45)	(3.51)
Constant	1.407***	0.324***
	(804.57)	(12.00)
Province	YES	YES
Industry	YES	YES
Year	YES	YES
N	13936	13936
Adj_R^2	0.999	0.369

Note: ***, **, and * mean significance level at the 1%, 5%, and 10%, respectively. Numbers in parentheses are T-values.
Source: Self-Calculated.

States has rapidly spread worldwide with unprecedented scope. To exclude the relationship of the 2008 financial crisis on the conclusions, we omit the samples between 2008 and 2009 to exclude the relationship of major events on corporate cash holdings. Column (3) shows that the positive relationship between institutional fragility and corporate cash holdings is still robust.

4.3.5. Redefining the dependent variable

In this test, we replace the measurement of corporate cash holdings, which is measured by the ratio of cash and cash equivalents to total assets minus cash and cash equivalents. From the regression results in Column (4) of Table 4, the positive relationship between institutional fragility and corporate cash holdings is robust.

4.3.6. Missing variables

Considering possible missing variables, especially the macroeconomic relationship on corporate cash holdings, we add the macro-level factors GDP growth rate (*DGDP*) in Model (4). Column (5) shows that the positive relationship between institutional fragility and cash holdings remains robust.

4.3.7. The GMM estimator

Through the dynamic panel model, this study analyses the influence of institutional fragility on corporate cash holdings. To solve the endogenous and estimation errors in the static panel model, we use the dynamic panel GMM model to estimate the

Table 4. Robust test.

Variables	Cash (1) Change model	Cash (2) Time delay effect	Cash (3) Eliminate major events	Cash (4) Redefining variable	Cash (5) Missing variable	Cash (6) Dynamic GMM
Fragility	0.298***	0.361***	0.512***	0.871***	0.283***	0.692***
	(3.43)	(2.69)	(3.72)	(3.05)	(2.62)	(2.91)
Size	−0.007***	−0.010***	−0.012***	−0.019***	−0.013***	−0.004**
	(-6.80)	(-5.18)	(-11.99)	(-7.50)	(-13.89)	(-2.26)
CFO	0.404***	0.670***	0.410***	0.953***	0.412***	0.349
	(20.89)	(6.03)	(21.54)	(17.59)	(23.10)	(18.99)***
WCAP	0.279***	0.454***	0.293***	0.690***	0.289***	0.183***
	(44.44)	(9.24)	(46.10)	(36.53)	(47.71)	(16.34)
Lev	−0.046***	0.099**	−0.047***	−0.194***	−0.044***	−0.033**
	(-5.28)	(2.57)	(-5.55)	(-8.86)	(-5.47)	(-3.25)
CAPEX	−0.176***	0.209**	0.163***	0.380***	0.157***	0.086**
	(-8.95)	(2.06)	(7.05)	(6.25)	(7.30)	(3.21)
DIV	−0.087	−0.396*	−0.168*	−1.454***	−0.147*	−0.124*
	(-0.94)	(-1.90)	(-1.83)	(-5.75)	(-1.69)	(-1.68)
Growth	−0.003**	−0.001*	0.005***	0.009*	0.005***	0.013***
	(-2.33)	(-1.80)	(3.52)	(1.94)	(3.71)	(7.77)
DGDP	___	___	___	___	−5.110**	
					(-2.38)	
LCash						0.256***
						(4.94)
Constant	−0.025	−0.194	−0.295	−0.545	0.953***	−0.043
	(-0.24)	(-0.95)	(-1.52)	(-1.34)	(4.13)	(0.68)
Province/ Industry/Year	YES	YES	YES	YES	YES	NO
N	10406	12296	12870	14138	14138	10406
Adj_R^2	0.445	0.420	0.420	0.341	0.418	
AR(1)						0.000
AR(2)						0.622
Sargon						0.316

Note: ***, **, and * mean significance level at the 1%, 5%, and 10%, respectively. Numbers in parentheses are T-values.
Source: Self-Calculated.

dynamic panel. Corporate cash holdings with a lag of one period were added to model (4).

In Column (6) of Table 4, the difference of the disturbance term has first-order autocorrelation, but there is no second-order autocorrelation. Therefore, the original assumption that the disturbance term has no autocorrelation is accepted; the *p* values corresponding to the Sargan test are 0.316, and greater than 10%, which indicates that there is no over-identification in the regression results. Therefore, the results are robust.

5. Further analysis

5.1. Cross-sectional heterogeneity regression analysis

5.1.1. Heterogeneity analysis of property rights

Institutional fragility increases the cognitive, relational complexity and uncertainty of the external environment (Boisot & Child, 1999; Child & Rodrigues, 2011; Shi et al., 2017). This may affect the future expectations of banks, which may reduce debt loans, aggravating corporate financial constraints (Li et al., 2021). However, corporate cash

Table 5. Heterogeneity analysis.

Variables	Cash (1)	Cash (2)
Fragility	0.305***	0.259**
	(2.76)	(2.51)
Fragility×SOE	−0.025***	___
	(-4.15)	
SOE	0.016***	___
	(5.09)	
Fragility×Relate	___	−0.022***
		(-3.21)
Relate	___	−0.016***
		(-4.61)
Size	−0.014***	−0.012***
	(-14.33)	(-12.11)
CFO	0.410***	0.409***
	(22.99)	(23.00)
WCAP	0.292***	0.287***
	(47.83)	(47.76)
Lev	−0.044***	−0.042***
	(-5.52)	(-5.21)
CAPEX	0.166***	0.153***
	(7.68)	(7.10)
DIV	−0.152*	−0.164*
	(-1.74)	(-1.87)
Growth	0.005***	0.006***
	(3.65)	(4.68)
Constant	0.050	0.087
	(0.32)	(0.59)
Province	YES	YES
Industry	YES	YES
Year	YES	YES
N	14138	14138
Adj_R^2	0.419	0.421
F	118.986	120.248

Note: ***, **, and * mean significance level at the 1%, 5%, and 10%, respectively. Numbers in parentheses are T-values.
Source: Self-Calculated.

holdings are affected by corporate financial constraint (Zhang et al., 2017). As we all know, China's financial system is dominated by state-owned banks, which often adopt loose pre-loan review and post-loan supervision for state-owned enterprises. In other words, the 'natural' blood relationship between state-owned enterprises and the government undoubtedly provides an implicit guarantee for state-owned enterprises (Yu et al., 2019). However, it is difficult for non-state-owned enterprises to obtain credit support; they often face strong financial constraints, which usually have a strong preventive motive to increase cash holdings.

We set the dummy variable *SOE* to distinguish between state-owned enterprises and non-state-owned enterprises. When the ultimate controller is the government, the *SOE* is 1 and 0 if otherwise. In Column (1) of Table 5, the coefficient of *Fragility* *SOE is significantly negative at the 1% level. Compared with state-owned enterprises, non-state-owned enterprises usually have a strong preventive motivation to increase cash holdings.

5.1.2. Heterogeneity analysis of the bank–firm relationship

As discussed above, institutional fragility aggravates enterprises' financial constraints (Li et al., 2021). However, when organisations lack sufficient resources and cannot to

deal with institutional fragility, fragility mediation is a useful strategy (Shi et al., 2017). Thus, corporations try to cope with institutional fragility by relying on other parties (Child & Rodrigues, 2011). Ozkan & Ozkan. (2004) regarded the bank–firm relationship as an alternative to corporate cash holdings. When enterprises establish a long-term cooperative relationship with banks, the probability of obtaining bank loans increases, and enterprises do not need to hold too many cash holdings for the preventive motive (Luo, 2019). Therefore, we expect that the existence of a bank–firm relationship can buffer the relationship between institutional fragility and cash holdings.

According to Cao et al. (2017) and Zhai et al. (2014), we set the dummy variable *Relate to* distinguish the bank–firm relationship. If the enterprise executives are or had worked in banks, *Relate* is 1, and 0 if otherwise. Enterprise executives refer to directors and senior managers. In Column (2) of Table 5, the coefficient of *Fragility* *Relate* is significantly negative at the 1% level, which is opposite to the coefficient of institutional fragility, indicating that the bank–firm relationship weakens the relationship between institutional fragility and corporate cash holdings. In other words, compared with enterprises related to banks, the relationship between institutional fragility and cash holdings is more significant than that of enterprises not associated with banks.

5.2. Intermediary effect test

According to the existing literature, macroeconomic policies mainly affect corporate cash holdings through investment opportunities (Lu & Han, 2013; Yuan et al., 2018). Thus, investment opportunities may be an important path for institutional fragility that affects cash holdings. As the above analysis shows, institutional fragility increases the cognitive, relational complexity and uncertainty of the external environment during institutional reform (Boisot & Child, 1999; Child & Rodrigues, 2011; Shi et al., 2017). As institutional fragility becomes more severe, the cognitive, relational complexity, and uncertainty of the external environment will decrease corporate investment opportunities. The increase in corporate cash holdings is at the expense of existing poor investment opportunities (Duchin, 2010; Lu & Han, 2013). This study holds that enterprises increase cash holdings in the context of institutional fragility, which is at the cost of leaving existing investment opportunities. Investment opportunities have an intermediary effect between institutional fragility and corporate cash holdings.

Table 6 presents the result of the intermediary effect test. In Column (1), institutional fragility significantly increases corporate cash holdings, and reduces corporate investment opportunities in Column (2). In Column (3), enterprises choose to hold more cash because of fewer investment opportunities. Therefore, the investment opportunity is an important path that institutional fragility affects corporate cash holdings.

6. Conclusions and implications

Institutional fragility is mainly manifested in the unsynchronised and unsynchronised development of institutions, which may increase the cognitive, relational complexity

Table 6. Intermediary effect test.

Variables	Cash (1)	TQ (2)	Cash (3)
Fragility	0.286***	−1.642**	0.286***
	(2.86)	(-2.55)	(2.65)
TQ	——	——	0.001
			(1.53)
Size	−0.011***	−0.482***	−0.013***
	(-11.60)	(-37.92)	(-12.19)
CFO	0.408***	2.882***	0.408***
	(22.54)	(13.82)	(22.66)
WCAP	0.295***	1.174***	0.287***
	(48.85)	(18.14)	(46.51)
Lev	−0.049***	−1.398***	−0.042***
	(-6.09)	(-16.27)	(-5.20)
CAPEX	0.152***	2.280***	0.153***
	(7.07)	(9.95)	(7.12)
DIV	−0.230***	14.286***	−0.166*
	(-2.62)	(12.50)	(-1.88)
Growth	0.006***	−0.017	0.005***
	(4.47)	(-1.26)	(3.72)
Constant	−0.054	14.066***	0.026
	(-0.38)	(14.43)	(0.17)
Province	YES	YES	YES
Industry	YES	YES	YES
Year	YES	YES	YES
N	14138	14138	14138
Adj_R^2	0.405	0.485	0.418
F	277.135	172.178	119.664

Note: ***, **, and * mean significance level at the 1%, 5%, and 10%, respectively. Numbers in parentheses are T-values. Source: Self-Calculated.

and uncertainty of the external environment (Boisot & Child, 1999; Child & Rodrigues, 2011; Shi et al., 2017). The mechanism by which institutional fragility affects cash holdings is similar to that of external environmental uncertainty. Using the preventive motivation of cash holdings, we find that institutional fragility is associated with increased corporate cash holdings. The relationship is stronger for non-state-owned enterprises and stronger when firms have no relationship with banks. Meanwhile, we test the intermediary path by which institutional fragility affects corporate cash holdings, and find that investment opportunity is an intermediary variable between institutional fragility and corporate cash holdings.

The major theoretical implications are as follows: First, the existing literature has studied institutional diversity and the institutional information-space argument, which mainly regards institutional reform as a process consisting of multiple dimensions and overlooked the speed of institutional reform in driving institutional change. Our study pays close attention to the scope and speed of institutional reform, which provides a new perspective on institutional reform in emerging economies. Second, the existing literature has mainly examined the factors influencing cash holdings from a macro perspective, such as changes in the economic cycle, monetary policy, macroeconomic uncertainty, institutional environment, investor protection level, and the support of local governments. There is no literature on institutional fragility and cash holdings. This study enriches the literature on institutions and cash holdings.

This study has several practical implications. First, institutional fragility increases corporate cash holdings at the cost of giving up existing investment opportunities.

Therefore, the government should pay attention to the synchronous development of different institutional dimensions. Second, the positive relationship between institutional fragility and corporate cash holdings is more significant in non-state-owned enterprises and firms with no relationship with banks. Fragility mediation is a useful strategy when enterprises lack the power and resources to cope with a complex environment. In this situation, enterprises deal with complexity and uncertain environments through reliance on other parties (Child & Rodrigues, 2011; Shi et al., 2017; Li et al., 2021). Therefore, enterprises can adopt buffer strategies to deal with the negative effects of institutional fragility.

Disclosure statement

No potential conflict of interest was reported by the authors.

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