DO STATE OWNERSHIP AND BUSINESS ENVIRONMENT EXPLAIN CORPORATE CASH HOLDINGS? EMPIRICAL EVIDENCE FROM AN EMERGING COUNTRY

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ABSTRACT

This study evaluates the relationship between state ownership and corporate cash holdings by taking into account the role of the business environment in the context of an emerging economy. Both linear and non-linear models are employed for listed enterprises' financial data during the period from 2011 to 2019 in Vietnam. The empirical results show that state ownership reduces the corporate cash holdings in the linear model, and there is a U-shaped relation between corporate cash holdings and state ownership in a non-linear manner. By using the extended models, this study obtains consistent evidence to show that corporates reduce their cash holdings when the business environment becomes better and vice versa. Specifically, we find that the speed of cash adjustment in Vietnam is smaller than that in the developed countries, implying that corporates can shelter their liquid assets in order to avoid the negative effects stemming from agency problems between managers and

state-shareholders. However, they are willing to hold more cash because of the mitigated agency problems in the case of the dominant state ownership. Ultimately, the business environment's quality will have more power in determining the behaviour of corporates' cash holding to meet market risks than state ownership. This study contributes to financial literature by determining the business environment's critical role in the relationship between state ownership and corporate cash holdings.

INTRODUCTION

The role of the state in the market and its impact on corporates have always been of great interest to scholars and policy-makers. The debate about the state's participation in the corporates through ownership always revolves around efficiency and investment opportunities to gain better competitiveness and trading strategies in the market (Megginson et al., 2014; Nguyen et al., 2019; Nguyen et al., 2020b). To meet up, corporates require to look for strategies to optimise their cash flow, in which cash holdings are a feasible option. In recent years, Dittmar and Mahrt-Smith (2007) showed that the United States (U.S.) firms were holding cash, accounting for 13% of total assets during the 2000s. Chen et al. (2012) report that listed corporates in China maintained cash at 20% of their GDP. Meanwhile, according to the authors' estimations with the sample of listed enterprises, the mean of total cash holdings continuously increased from 11.3% to 11.8% of total assets during the period from 2010 to 2014, then continuously decreased to 8.0% in 2019. Notably, in the state-owned enterprises (SOEs), the cash holdings fell from 10.3% to 8.2% of total assets, while the state ownership expanded from 16.4% to 31.7% during the period from 2011 to 2019. The above numbers indicate that the demand for cash holdings of enterprises has been continuously fluctuating to meet up with uncertain conditions in recent years, and it may be related to the ownership structure (see Appendix).

Nonetheless, many previous studies often concentrate on the impact of firms' characteristics and corporate governance on their cash-holding inclination (Khuong et al., 2019; Nguyen & Phan, 2017; Al-Najjar, 2013; Harford et al., 2008; Kalcheva & Lins, 2007), other studies claim the corporates' earning management behaviour (Khuong et al., 2020; Liem et al., 2020), there are few studies mentioning the role of state ownership in the cash holdings for corporates. Indeed, it is essential to capture the relationship between state-owned and cash holdings due to dramatic state intervention, resulting from the rescue efforts in financial crisis and economic reforms in the past (Megginson, 2017; Borisova

et al., 2015). However, the evidence of the state ownership's role in the corporate's cash-holding decisions is still controversial. The literature review shows that there are three major ways in which cash holdings can be influenced. Firstly, corporates endure cash values at a balance between the marginal cost and marginal benefit to withdraw opportunity costs (Opler et al., 1999). It leads to the dilemma of cash holdings in which the corporate has to determine the optimal cash level to meet with risks.

Secondly, state ownership relates to soft budget constraints and agency problems. On the one hand, the soft budget constraint theory shows the link between a supporting organisation to guaranteed one when its financial constraints are violated continuously, according to Kornai (1979). State ownership is a great channel to explore this connection because soft-budget-constrained corporations can always rely on the government as a powerful resource. The government's guarantees and access to preferential credit are often associated with the role of state ownership in enterprises, particularly in promoting efficiency during a period of financial hardship (Borisova et al., 2015; Faccio et al., 2006). It shows that those corporates are less affected by economic shocks, decreased investment, or financial constraints. Therefore, they can minimise the opportunity cost of holding cash by making potential investments.

On the other hand, SOEs' directors are often political representatives who tend to follow socio-political aims instead of maximising the value of stakeholders (Chen et al., 2018). It causes the agency problem and affects corporates' profitability, investment and trading strategies significantly. Boubakri et al. (2013) and Megginson and Netter (2001) showed that state ownership was related to weak governance, low performance, and negative risk-taking. However, Nguyen et al. (2020b) suggested that state ownership on a corporate's risk appetite had a non-linear effect. They implied that the level of state ownership would decide the risk-taking behaviour and also lead to changes in business strategies. In turn, the changes in business strategies impact the cash holdings strategies (Magerakis & Tzelepis, 2020). Therefore, the role of state ownership in enterprises is still an interesting topic of debate, especially in socialist-oriented economies.

Thirdly, Seifert and Gonenc (2018) showed that not only firm-level governance but also country-level governance made impacts on corporate's cash holdings when capturing a large number of international firms from 2002 to 2013. They found that firms in the better-background countries and stronger firm-level governance would be able to hold less cash than the others. Basically, corporates preserve more cash for potential risks such as shocks from the weak economy (Opler et al., 1999) or reduce it in countries with a less powerful legal

system and inadequate shareholder protection (Kalcheva & Lins, 2007; Dittmar et al., 2003). Furthermore, previous studies discuss the corporate's motivation to adjust their cash in the context of the risky environment because cash is easily convertible into the own benefits of politicians (Smith, 2016; Caprio et al., 2013). Nevertheless, the business environment's impact on corporate cash holdings has been inadequately reflected in prior studies (Chen et al., 2018; Xu & Li, 2018).

Vietnam is a suitable sample to study the impacts of state ownership because it contains a history of the centrally planned economy with the dominance of SOEs. Since the 1986 reform, the proportion of state ownership in SOEs has significantly declined, but its role is still essential. State ownership is often considered the "tactful" tool for intervention and orientation of the government into the market (Ben-Nasr et al., 2015). Moreover, Vietnam may fall into a weak-form efficient market characterised by the lack of transparency and poor corporate governance as well as weak protection standards for investors (Gupta et al., 2014; Vo, 2018). It significantly affects corporate governance behaviour to adapt to the systemic risks and unsystematic hazards, which consequently impacts corporate behaviour in holding liquid assets like cash. Previous studies in Vietnam have failed to provide evidence of the relationship between state ownership and cash holdings, although some studies have addressed corporate performance or risk-taking behaviour (Nguyen et al., 2019; Vu & Pratoomsuwan, 2019; Vo, 2018). However, the business environment influences on cash management behaviour have not been explored, especially firms with state ownership characterised by political and financial privileges in transitional economies. Therefore, this study will shed light on the relationship between state ownership, business environment, and cash holdings in Vietnam to contribute to the current literature in the line of this issue.

Our study begins with three arguments: (i) firms will reduce the amount of available cash to avoid extraction from corrupt officials; (ii) agency theory predicts managers in SOEs will lead their firms to hoard more cash for political goals than maximising financial profits; and (iii) trade-off theory envisions that corporates will be willing to accept low cash holdings in exchange for investment opportunities as long as low transaction costs and favourable business environment. We use financial data from listed firms on the Hanoi Stock Exchange and Ho Chi Minh City Stock Exchange during the period 2011–2019. To measure the business environment, we use the Provincial Competitiveness Index (PCI), which is designed to assess the governance quality and business conditions by the Vietnam Chamber of Commerce and Industry (VCCI) and the U.S. Agency for International Development (USAID). We also utilise OLS and GMM methods

to estimate the nexus between the business environment and state ownership on cash holdings and check the robustness of them by optimal cash holdings models.

Our contributions are summarised on five main points: First, our study is one of few studies to investigate the dominance of state ownership in an emerging and socialist-oriented economy. Second, both linear and non-linear models are employed for financial data of listed enterprises during the period from 2011 to 2019 in Vietnam. Third, our results show that state ownership reduces the corporate cash holdings in the linear model, and there is a U-shaped relation between corporate cash holdings and state ownership in a non-linear manner. Fourth, we find that the speed of cash adjustment is smaller than those in the developed countries. Finally, our study demonstrates the critical role of the business environment in the relationship with state ownership and corporate cash holdings as appreciated contributions for financial theories.

LITERATURE REVIEW AND RELATED THEORIES

According to Gill and Shah (2011), cash holdings are understood as the set of accessible cash and liquid assets that can be easily converted into cash with maturities of less than three months. The objective of cash holdings is to ensure financial flexibility and capture investment opportunities without financial risks (Morgan, 2005). However, holding cash is not the firm's primary target because cash demand can still be financed by financial institutions. Bolo et al. (2012) suggested that corporates may suffer various problems regardless of cash level. Thus, holding cash is still a controversial issue for a long time in both theoretical and empirical terms.

The Theories of Cash Holdings

According to the trade-off theory, the motivation for holding cash is considered from the marginal benefit and marginal cost of keeping the money to maximise shareholder's wealth (Dittmar et al., 2003). According to Keynes's theory, the benefits of cash holdings relate to the liquidity of assets in three aspects: transaction costs, precaution and speculation. Regarding transaction costs, holding cash allows avoiding or saving costs to increase the liquidity of assets. From the precaution aspect, holding cash can help enterprises grasp investment opportunities or projects when other financial sources are not available. In addition, firms hold cash or marketable securities to get high profits from future rate hikes as a speculative scheme. The marginal benefit of cash holdings allows to reduce the risk of financial exhaustion, implement its targeted investment policy, and reduce

high costs associated with unexpected losses, while the marginal cost of holding cash is the opportunity cost of capital invested in liquid assets (Opler et al., 1999). As a result, corporate cash holdings tend to lower when their opportunity costs are higher (Bates et al., 2009).

However, the pecking order theory results in that there is no optimal cash level (Myers, 1984). It means that firms use cash as a buffer between retained profits and investment demands. According to this theory, firms use internal funds to finance new investments, repay debts or dividends, and eventually accumulate cash through cash flow. In case of insufficient cash flow, firms issue new debt to finance new investments. Finally, firms will issue securities when they get out of their debt-servicing capacity. Thus, cash holdings are only an outcome of financing and investing decisions (Dittmar et al., 2003). Moreover, free cash flow theory argues that free cash flow is a priority for managers to improve the company's total assets and help them gain special powers in investment and funding decisions without shareholders' permission (Jensen, 1986). By retaining the excess cash flow, managers reduce the need to raise capital from the capital market, thereby helping them get out of the supervision of capital providers. This also raises serious agency problems when managers can make some investments that negatively affect the wealth of stakeholders. Therefore, Dittmar and Mahrt-Smith (2007) and Pinkowitz et al. (2006) argued that cash was less worth when the firms' agency problem was serious.

Institutional theory, in recent years, has become a connecting factor in explaining the differences in market outcomes among countries. It has been understood to be particular rules, principles that shape each firm's behaviours within social structuring scale and related operating adjustment (North, 1990). Organisations and individuals react to changes in the environment, such as laws and regulations applied by governments, and this is a way to respond to externally coercive pressures (Pfeffer & Salancik, 1978; Aguilera & Jackson, 2003). Cohen et al. (1983) and Ho and Michaely (1988) suggested that high quality of institution would help to minimise problems about information asymmetry, transaction costs and, risks while increasing market efficiency, asset allocation, and protecting property rights. Moreover, Kang and Kim (2012) argued that a weak institutional and regulatory framework could lead to a significant output drop, asset-stripping of insiders, rent-seeking, and blocks of future reforms by existing interest groups. Thereby, the corporate's behaviour of cash holding is also dominated.

Cash Holdings and State Ownership

Previous studies explain the effects of corporate governance on corporate cash holdings from different perspectives. One of these characteristics is ownership structure, especially in state or private ownership. The central theories related to the relationship between ownership structure and cash holdings are agency problems, soft budget constraint theory, and opportunity costs.

Soft budget constraint theory (Kornai et al., 2003) suggests that the SOEs' budget constraint can be relaxed to tax supports, preferential credit and other forms of support from the government. Thus, Kornai et al. (2003) and many others believed that SOEs should not hold too much cash to finance their activities. On the one hand, state ownership transmits a signal that state-enterprises have more opportunities to be supported by the government through the "helping hand" (Le & Chizema, 2011; Shleifer, 1998). Also, authority-related firms have precious information, and they are easier to get financing from different channels than non-state firms (Gordon & Li, 2003; Hitt et al., 2000). Therefore, they tend to reduce the available cash to take advantage of governmental supports due to lower opportunity costs. For instance, Frydman et al. (2000) determined that there were differences in performance between corporates controlled by outsiders and corporates controlled by the government. They argued that government-controlled corporates received the support of tax authorities to soften budgetary constraints while it was not disciplined by state banks. Faccio et al. (2006) illustrated a "political connection" channel in which state ownership affected company decisions, and these corporates were more likely to be guaranteed by the state during a financial crisis. Further, Chaney et al. (2011) described that politician-related firms experienced lower interest expenditure even when they offered poor financial reports, and their leverage was increased following the involvement of politicians in the board (Boubakri et al., 2012). Consequently, there is often a negative change between the amount of cash that a firm holds and the level of participation of state ownership. Hence, we first set the following hypothesis to be tested in our paper is:

H1: State ownership has a negative impact on cash holdings.

On the other hand, according to agency theory, the inefficiency of SOEs is a natural result of the separation between the owners and the managers. First, managers are often appointed by the state so that no shareholder has a strong incentive to monitor the management actively. In addition, managers of SOEs are judged on the merits of political goals rather than maximising wealth for shareholders and less impact from market pressure (Chen et al., 2018). Thus,

SOEs' managers are motivated to pursue private interests because of the lack of both internal monitoring and external governance mechanisms. This line of argument argues that when the government privatises SOEs but still retains a large number of shares, the improvements of SOEs' efficiency are unclear (Guedhami et al., 2009). Borisova et al. (2012) determined that higher state ownership was associated with lower quality of corporate governance, while Jaslowitzer et al. (2018) found that state ownership was negatively related to investment efficiency. Therefore, this theory predicts a positive relationship between state ownership and cash holdings of businesses because SOEs' managers often try to hold cash as much as possible to compensate for the vulnerability of inefficient investments. Moreover, since social goals and short-term political objectives are also top priorities of state-owned enterprises (Abramov et al., 2017), cash is often extracted for these goals by its liquidity. However, some authors argue that holding cash will depend on the level of state ownership, which is considered as the political connection between the firms and the authorities. Thus, in this view, if the level of state ownership is lower than a certain threshold, SOEs are also similar to non-SOEs in terms of political influence, and thus, cash holdings will be reduced to escape extraction and short-term political goals from corrupt officials. On the other hand, if the level of state ownership exceeds a certain threshold, the state-connection is stronger. Based on the above arguments, we set the following hypothesis in our paper to be tested:

> H2: Cash holding is a non-linear function of state ownership.

Cash Holdings and Business Environment

Prior studies often focus on the relations of cash holdings and financial determinants (e.g., capital structure, leverage, firm size, net-working capital, dividend payout, or cash flow volatility). However, these determinants may not be good enough to reveal firms' cash-holding behaviours. To circumvent the limitations, some recent studies investigate whether the business environment will have an impact on the rate of cash holdings. For instance, Dittmar et al. (2003) pointed out that firms in countries with inadequate protection for investors often were inclined to hold more cash than firms in countries with strong protection for investors. They explained that countries with weak rights for shareholders do not have adequate power to force managers to issue dividends by cash. Thus, self-motivation will push managers to hold more cash to do individual goals, career advancement, empire-building, and other self-serving acts, exacerbating the agency problem (Jensen & Meckling, 1976).

Meanwhile, cash holdings can be interpreted as balancing the costs and benefits of holding cash (Myers & Majluf, 1984). It means that holding cash will eliminate the transaction cost of selling other assets and provide funds to finance investments if external financing is costly or unavailable. The institutional theory argues that countries with a transparent business environment provide better property protection and reduce asymmetric information, risks, and marginal costs (Acemoglu & Robinson, 2010; Duncan, 2014; Stefan et al., 2014; Tee, 2018). However, under the impact of external factors, firms consider transaction costs and extraction to make their decisions in holding cash. For example, transaction costs often tend to increase in countries with poor governance or in ineffective markets. As a result, firms tend to keep more cash to finance their activities to reduce transaction costs (Dittmar et al., 2003).

Moreover, firms must hold a greater amount of cash for extraction from corrupt officials (Xu & Li, 2018). Chen (2010) concluded that enterprises in corrupt countries had a significantly higher liquid asset ratio by examining data from 47 countries. He argued that corruption harmed corporate governance and aggravated agency issues, resulting in an increase in cash holdings at the company. However, Smith (2016) found that corporates had an intention to hold less cash in more corrupt regions when examining the U.S. Department of Justice data. Orlova and Sun (2018) concluded that the development of political and legal systems and investor rights protections supported managers to maintain cash reserves closer to optimal (target) cash holdings level. These findings imply that the business environment also plays an important role in determining corporates' cash needs. Hence, we set the following hypothesis in our paper to be tested:

> H3: The quality of the business environment has an adverse effect on firms' cash holdings.

DATA, MODELS AND METHODS

This section will discuss the research hypotheses designed in our paper, the data, and methodology used in our study.

Data

The data of 3,069 observations on Vietnam stock markets are obtained from 341 firms listed on the Ho Chi Minh City Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX) period from 2011 to 2019. The period is marked by a significant equitization process of SOEs. Although more than 95% of SOEs have been equitised, the total amount of sold states' shares is only about 8% (Van

& Hai, 2020). Thus, the prime minister issued the 1232/QD-TTG decision to boost the SOEs restructuring from 2017 to 2020 enormously. Thus, the selected period is reliable and meaningful in our study. All data are taken from Thomson Reuters Eikon. We note that we follow recommendations from literature (Kusnadi et al., 2015; Al-Najjar, 2013), our sample does not include financial institutions and security-defense firms into our sample to enhance our study's consistency. The reason given is that financial institutions have a specific business and accounting system, while the government's special regulations monitor security-defense firms. This outlines the separation of these organisations from the rest (Jiraporn et al., 2008).

Variables

Dependent variable

This study measures cash ratio (*CASH*), which is determined by total cash and the equivalents on total assets to investigate the corporate cash holdings (Al-Najjar, 2013). We use the book value of cash and the equivalents to calculate the cash holdings. The ratio of the book value of cash and the equivalents is a good representation of the corporate cash holdings because it reflects the number of liquid assets transforming to cash quickly. A corporate that prefers to hold more cash will have a high value of the ratio and vice versa. Moreover, the ratio can be used to compare the level of cash holdings for any corporate of different sizes.

Independent variables

Meanwhile, state ownership can be captured by the ratio of shares that are controlled by the authorities and total shares (Abramov et al., 2017). Thus, we calculate the variable (*STATE*) as the percentage of shares owned by the state institutions in each corporate.

The Provincial Competitiveness Index (PCI) represents the effectiveness of economic governance and development of the business environment in 63 provinces in Vietnam, published annually since 2005. PCI index is conducted and announced by the Chamber of Commerce and Industry of Vietnam (VCCI) and the U.S. Agency for International Development (USAID). PCI assesses the favourable level of the business environment and quality of local governance, including the following 10 sub-indices: (i) the regulatory costs of firms to enter a business, (ii) firms' cost to access to land, (iii) transparency and access to information, (iv) time costs of regulatory compliance, (v) informal expenditure, (vi) proactivity of provincial leadership, (vii) business support services, (viii) the bias of policy toward state-owned enterprises, (ix) labour training, and (x) legal

institutions. PCI index is based on annual surveys of the perceptions of over 8,000 existing domestic private firms, 2,000 newly established enterprises and 1,500 foreign-invested enterprises. Then, the PCI index is calibrated as the weighted mean of 10 standardised sub-indices with a maximum score of 100 points. The PCI index has been used in many studies, including Nguyen et al. (2019), Tran et al. (2018), and Huong and Cuong (2018).

Control variables

On the basis of the previous study, this study adds other variables to control firm-specific characteristics that are likely to be correlated with corporate cash holdings. Thus, our regression models include some control variables following below:

Fixed asset (*PPE*) is the ratio between net properties, plants, equipment, and total assets at year-end (Drobetz & Grüninger, 2007; Dittmar et al., 2003). Tangible assets usually are considered as a precaution for cash demand, which can be transformed. Thus, according to Drobetz and Grüninger (2007), we expect that cash holdings decrease with the fixed-asset size.

Firm size (*SIZE*) is the natural logarithm of the book value of total assets at year-end. According to the pecking order theory, cash holdings increase with firm size. Bigger firms, which are expected as a signal of success, face the pressure of past profitability, so it is necessary to accumulate more money for more investment activities (Al-Najjar, 2013; Dittmar et al., 2003; Opler et al., 1999).

Firm performance (*ROA*) is the net income divided by lagged total assets at year-end (Al-Najjar & Clark, 2017). Based on the pecking order theory, we suggest a positive relationship between a firm's performance and cash holdings because firms with higher profitability have more chances to accumulate cash flow.

Cash flow from operating activities at the year-end (*CFO*). Opler et al. (1999) and Bates et al. (2009) argued a positive relationship between volatile cash flows and cash holdings. It is explained that volatile cash relates strongly to profits fluctuation. It is possible to lead firms to forgo some profitable investment projects. Thus, to prevent potential risks from the fluctuations, the corporates want to hold more money.

Leverage (*LEV*) is the proportion of total debt to total assets at the year-end. Al-Najjar (2013) argued that firms with high cash holdings often borrow fewer loans from financial institutions. Moreover, firms with high leverage will prioritize retained earnings instead of increasing their leverage to avoid high-interest costs when they expand their business. This, therefore, reduces their cash holdings, as findings of Bates et al. (2009).

The growth opportunity (*GRW*) is the proportion of the difference between current operating revenue and prior operating revenue (Al-Najjar, 2013; Gill & Shah, 2011; Drobetz & Grüninger, 2007). The firms, which have high growth opportunities, will maintain high cash holdings to capture investment opportunities and precaution for financial distress (Bates et al., 2009).

Models

One of the most common methods to assess corporate cash holdings is employing estimations. In this paper, we first extend the model used by Opler et al. (1999) and others to use the following linear and non-linear models to examine the influence of state ownership on corporate cash holdings:

$$CASH_{it} = \beta_{01} + \beta_{11}STATE_{it} + \beta_{21}PPE_{it} + \beta_{31}SIZE_{it} + \beta_{41}ROA_{it} + \\ \beta_{51}CFO_{it} + \beta_{61}LEV_{it} + \beta_{71}GRW_{it} + \varepsilon_{it} \tag{1}$$

$$CASH_{it} = \beta_{02} + \beta_{12}STATE_{it} + \beta_{22}STATE^2_{it} + \beta_{32}PPE_{it} + \beta_{42}SIZE_{it} + \\ \beta_{52}ROA_{it} + \beta_{62}CFO_{it} + \beta_{72}LEV_{it} + \beta_{82}GRW_{it} + \varepsilon_{it'} \tag{2}$$

Where $CASH_{it}$ is the independent variable which is measured by total cash and the equivalents on total assets to investigate the corporate cash holdings (Al-Najjar, 2013), $STATE_{it}$ reflects the state ownership which is captured by the percentage of shares owned by the state institutions in each corporate (Abramov et al., 2017), and *i* and *t* are sub-indicators of firm *i* at time *t*, and the β_{mn} is the coefficient of variable *m* of equation *n*. Other variables of Equations (1) and (2) have been defined under section *Control variables*.

In order to obtain the optimum level of state ownership, we use Equation (2) in which the cash holdings in firm *i* at time *t* depend on state ownership and its square. We note that if β_{12} is significantly positive and β_{22} is significantly negative, then there is an inverted U-shaped relationship between cash holdings and state ownership. On the other hand, if β_{12} is significantly negative and β_{22} is significantly positive, then there is a U-shaped relationship between cash holdings and state ownership. Taking the first derivative of both sides with respect to

STATE, we get: $STATE' = \beta_{12} + 2\,\beta_{22}STATE$. We set $STATE' = 0$ and solve the Equation to obtain the maximum value of *STATE*. We obtain a threshold value of STATE (λ) such that $\lambda = \dfrac{\beta_{13}}{-2\beta_{22}}$. From the value λ of the *STATE* variable, we extend the models further by using the following threshold regression model:

$$
CASH_{it} = \begin{cases}
\beta_{02a} + \beta_{12a}STATE_{it} + \beta_{22a}HIGHSTATE_{it} + \beta_{32a}PPE_{it} + \beta_{42a}SIZE_{it} \\
\quad + \beta_{52a}ROA_{it} + \beta_{62a}CFO_{it} + \beta_{72a}LEV_{it} + \beta_{82a}GRW_{it} + (\gamma_i + \varepsilon_{it}), \qquad (2a) \\
\qquad\qquad\qquad if\ STATE \geq \lambda, \\
\beta_{02b} + \beta_{12b}STATE_{it} + \beta_{22b}LOWSTATE_{it} + \beta_{32b}PPE_{it} + \beta_{42b}SIZE_{it} \\
\quad + \beta_{52b}ROA_{it} + \beta_{62b}CFO_{it} + \beta_{72b}LEV_{it} + \beta_{82b}GRW_{it} + (\gamma_i + \varepsilon_{it}), \qquad (2b) \\
\qquad\qquad\qquad if\ STATE < \lambda,
\end{cases}
$$

Where $HIGHSTATE_{it}$ is the level of *STATE* in case of $STATE \geq \lambda$, while $LOWSTATE_{it}$ is the level of *STATE* in case of $STATE < \lambda$ of firm i at t time. Other variables have been defined in Equation (2).

In addition, to investigate the effects of both state ownership and business environment on corporate cash holdings and examine the joint influence of the business environment on corporate cash holdings, we extend the models by employing the following models:

$$
CASH_{it} = \beta_{03} + \beta_{13}PCI_{it} + \beta_{23}STATE_{it} + \beta_{33}PPE_{it} + \beta_{43}SIZE_{it} + \\
\beta_{53}ROA_{it} + \beta_{63}CFO_{it} + \beta_{73}LEV_{it} + \beta_{83}GRW_{it} + \varepsilon_{it} \tag{3}
$$

Where $CASH_{it}$ is measured by total cash and the equivalents on total assets to investigate the corporate cash holdings (Al-Najjar, 2013), $STATE_{it}$ is captured by the percentage of shares owned by the state institutions in each corporate (Abramov et al., 2017), and other variables have been defined in *Control variables*. Then, we consider the interaction effects of state ownership and quality of the business environment by using the mean value of the business environment variable. The regression model can be specified as follows:

$$
CASH_{it} = \beta_{04} + \beta_{14}PCI_{it} + \beta_{24}PCI * STATE_{it} + \beta_{34}PPE_{it} + \beta_{44}SIZE_{it} + \\
\beta_{54}ROA_{it} + \beta_{64}CFO_{it} + \beta_{74}LEV_{it} + \beta_{84}GRW_{it} + \varepsilon_{it} \tag{4}
$$

To check the robustness of our findings, we employ the dynamic models with two-step GMM regression to observe the change in cash holdings behaviour of firms. Because Equations (1)–(4) are non-dynamic models, it is assumed that the level of cash holdings is the optimal target. However, the firm's cash holdings

may be higher or lower than the target and will gradually adjust towards the cash target. It can be seen that firms' prompt adjustments in the attempt to stable their target cash holdings may face obstacles by adjustment costs in the fluctuating capital market. This pushes firms to a trade-off between adjustment costs and suboptimal cash levels. A basic "partial adjustment model" allows this adjustment towards the target level, which is given by:

$$CASH_{it} - CASH_{it-1} = \mu(CASH^*_{it} - CASH_{it-1}) + \varepsilon_{it} \tag{5}$$

According to Equation 5, if α receives 1 value, it means $CASH_{it}$ equals $CASH^*_{it}$. It implies firms have adjusted cash holdings towards the target level. Otherwise, if α equals 0, it means the firms do not have any adjustments for optimal ratio. This Equation shows that the firm would accept a gap of ρ percent between the actual level $CASH_{it}$ and the target level $CASH^*_{it}$ each year; μ presents the speed of adjustment (SOAC) with a value between 0 and 1. The existence of the target cash holdings has been proved both theoretically and empirically (Gryglewicz, 2011) and is determined by a vector of a firm's characteristics X_{it}:

$$CASH^*_{it} = X_{it}\hat{\beta} \tag{6}$$

Merging this target cash model into the basic model and rearranging it into the calculating model, the speed (a firm's returns to the target cash ratio) is measured by the following dynamic model. (Chang et al., 2015; Orlova & Sun, 2018):

$$CASH_{it} = (1 - \mu)CASH_{it-1} + \rho\theta X_{it} + r_i + \varepsilon_{it} \tag{7}$$

in which both $CASH_{it}$ and $CASH_{it-1}$ are real cash holdings of firm i in t and $t–1$, $Cash^*_{it}$ is optimal cash holdings, and $α$ is the adjusted coefficient, $r_i \sim iid(0,\sigma_r^2)$ and $\varepsilon_{it} \sim iid(0,\sigma_\varepsilon^2)$. We argue that optimal cash holding behaviour is also an equation that is determined by lagged cash (Chang et al., 2015; Orlova & Sun, 2018). Thus, we have dynamic models for optimal cash holdings by combining Equations (1) to (4) with Equation (7). Then, we have a dynamic model with lagged $CASH_{it}$ of firm i at $t–1$ time, and they are numbered from (8) to (11).

Methodology

This study employs both Fixed Effect Model (FEM) and Random Effect Model (REM) to examine both cross-sectional and time-series aspects for panel data and exhibit the results In Equations (1) to (4). This technique has been used in previous studies such as Jebran et al. (2019), Nguyen et al. (2019), and Potì et al.

(2020). However, OLS estimates will give ineffective estimators in the case of autocorrelation and heteroskedasticity. Thus, the feasible GLS estimation (FGLS) can overcome the autocorrelation in the error terms to get unbiased and effective results. Reed and Ye (2009) implied that FGLS was the overall best performer on efficiency reason but almost worst when estimating confidence intervals. Thus, we compare the findings, estimated by all of these above estimations, to find conclusive results.

In Equations (8) to (11), these equations have the lag of the dependent variable in dynamic models. These estimation models primarily indicate two uncertainties: the model uncertainty and the method uncertainty. The latter emerged from dynamic panel data prevents the consistency of the speed of adjustment. It may cause an endogenous problem in estimations due to the correlation between the dependent and independent variables. Ullah et al. (2018) also emphasised that endogeneity could cause inconsistent and biased results. Therefore, the GMM method gives better estimations to solve potential endogenous problems, heteroscedasticity, and serial correlations due to its weighted matrix of internal instruments (Arellano & Bond, 1991). This is because the GMM estimator for dynamic panel data brings two fundamental advantages: controlling potential endogenous problems and capturing cash holdings' dynamic traits.

Moreover, the two-step system GMM uses a suboptimal weighting matrix, and it is more asymptotically efficient than the one-step estimator. However, it is ensured that the number of instruments should be less than or approximate that of individual dimension (n) (Roodman, 2009). In other words, GMM is used to test the sustainability of the models. The Hausman test indicates the proper estimation between FEM and REM, while the Wald test shows the group-wise heteroskedasticity in the FEM. In GMM, the Arellano-Bond test for AR(2) is used for checking whether or not the autocorrelation for residuals, while the Hansen test is applied to check the valid instruments.

EMPIRICAL ANALYSIS

Descriptive Statistics

Table 1 shows the mean, standard deviation, minimum, median, and maximum value of variables over the period 2011 to 2019. The means of CASH and STATE are 10.42% and 24.35%, while their standard deviation is 11.47% and 24.70%, respectively. In this sample, the min and the max of CASH are 0.01% (SCI E&C Joint Stock Company in 2018) and 96.12% (PGT Holdings in 2014), respectively.

SCI is a construction and investment company, while PGT Holdings operates in transportation and taxi service. We also observe the min, and the max value of state ownership concentration fluctuates approximately from 0.00 to 0.96 (Petro Vietnam Gas Joint Stock Corporation from 2011 to 2015) in our sample. Of the sample, the overall weighted average index of PCI is 62.15 points, and the standard deviation is 3.32 points. Statistic description of control variables include PPE (mean 0.25 with SD 0.22), SIZE (mean 27.12 with SD 1.55), ROA (mean 0.06 with SD 0.07), CFO (mean 0.06 with SD 0.14), LEV (mean 0.21 with SD 0.18) and GRW (mean 0.19 with SD 3.11) (for details see Table 1).

Table 1

Descriptive statistics for variables

Variable	Mean	SD	Min	Max
CASH	0.104228	0.114788	0.0001	0.96124
STATE	0.243598	0.247054	0	0.967
PCI	62.15509	3.329541	50.4548	73.3965
PPE	0.252402	0.22785	0	0.96612
SIZE	27.12105	1.558447	23.3304	32.485
ROA	0.060226	0.076222	–0.64551	0.71683
CFO	0.064853	0.140666	–1.33499	1.90268
LEV	0.215289	0.189743	0	0.79806
GRW	0.195863	3.111216	–24.1617	127.458

Note: Obs = 3,069 (Source: Ho Chi Minh City Stock exchange and Hanoi Stock Exchange).

Correlation Analysis

Gujarati et al. (2017) suggest that if the correlation's coefficient is more significant than 0.80, there is a severe multicollinearity problem. Table 2 shows the coefficients range from –0.005 to 0.360; it means there is no severe multicollinearity problem in these variables. It is noted that GRW does not correlate with any variable with a significant statistic.

Table 2
Correlation matrix among variables

	CASH	STATE	PCI	PPE	SIZE	ROA	CFO	LEV	GRW
CASH	1								
STATE	−0.053***	1							
PCI	−0.092***	0.149***	1						
PPE	−0.191***	0.067***	−0.020	1					
SIZE	−0.170***	0.134***	0.018	0.108***	1				
ROA	0.295***	0.018	−0.046**	0.023	−0.069***	1			
CFO	0.178***	0.057***	−0.005	0.213***	−0.056***	0.360***	1		
LEV	−0.380***	0.0059***	0.031*	0.311***	0.305***	−0.334***	−0.178***	1	
GRW	−0.022	−0.017	0.001	−0.027	−0.027	0.003	−0.029	0.005	1

Note: ***, **, * represent the level of significance at 1%, 5%, and 10%, respectively.

State Ownership and Cash Holdings

Table 3 shows the association between state ownership and corporate cash holdings in two models: linear models and non-linear models. In Equation (1), we experiment with both FEM, REM and GLS estimations. The Hausman test shows that FEM estimation is better than REM estimation. However, one limitation of these estimations is that they can not be effective due to autocorrelation and heteroscedasticity (Roodman, 2009). Therefore, the study uses the GLS estimation to compare these results. We find that state ownership, in the linear model, negatively influences enterprise cash holdings with coefficients from –0.0158 to –0.0549, and they have a statistically significant one percent. It implies that a high level of state ownership will reduce the company's desire to hold cash. It satisfies our first hypothesis; firms tend to transfer liquid assets to a long-term asset in order to avoid extractions (Smith, 2016; Caprio et al., 2013). Previous investigations also suggest that SOEs will reduce their transaction costs and interest expenses when they require to access business capital (Chen et al., 2018) because state-owned enterprises usually borrow capital from state-owned banks. In addition, business executives pursue goals that are outlined by the state and are under less competitive pressure than private firms. SOEs also have more advantages in the cost of capital, labour resources, tax incentives. Therefore, these businesses end up with a lower cash proportion. However, as the above argument, SOEs with close ties to the state tend to increase cash to meet political goals than maximise shareholder value (Abramov et al., 2017). It is proved by the empirical results of the non-linear relationship between state ownership and cash holdings in Equation (2).

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Table 3

The relationship between cash holdings and state ownership: linear and non-linear models.

Dependent variable (CASH)	Linear model			Non-linear model		
	Equation 1	Equation 1	Equation 1	Equation 2	Equation 2a	Equation 2b
	FEM	REM	GLS	GLS	GLS	GLS
STATE	−0.0459***	−0.0387**	−0.0158***	−0.0549***	−0.0148***	−0.0337***
	(−5.47)	(−4.93)	(−3.95)	(−3.97)	(−3.68)	(−3.59)
STATE^2				0.0675***		
				(3.01)		
LOWSTATE					−0.0189**	
					(−2.15)	
HIGHSTATE						0.0189**
						(2.15)
PPE	−0.1564***	−0.1128***	−0.0662***	−0.0675***	−0.0669***	−0.0669***
	(−9.22)	(−8.75)	(−12.65)	(−13.17)	(−13.01)	(−13.01)
SIZE	−0.0195***	−0.0277***	−0.0021***	−0.0025***	−0.0023***	−0.0023***
	(−4.23)	(−3.30)	(−2.69)	(−3.35)	(−2.86)	(−2.86)
ROA	0.2345***	0.2500***	0.1812***	0.1820***	0.1822***	0.1822***
	(7.36)	(8.60)	(10.27)	(10.24)	(10.31)	(10.31)
CFO	0.1208***	0.1159***	0.0812***	0.0829***	0.0817***	0.0817***
	(10.25)	(9.94)	(12.66)	(13.00)	(12.76)	(12.76)
LEV	−0.0360**	−0.0805***	−0.0874***	−0.0852***	−0.0865***	−0.0865***
	(−2.06)	(−5.46)	(−12.40)	(−12.26)	(−12.28)	(−12.28)
GRW	−0.0004	−0.0005	−0.0004	−0.0004	−0.0004	−0.0004
	(−0.38)	(−1.09)	(−1.58)	(−1.50)	(−1.48)	(−1.48)
_cons	0.6695***	0.3468***	0.1700***	0.1800***	0.1755	0.1755
	(5.38)	(5.52)	(7.73)	(8.71)	(7.86)	(7.86)
Obs	3,069	3,069	3,069	3,069	3,069	3,069
Groups	341	341	341	341	341	341
Hausman test (*p*-value)				0.0000		
Wald test (*p*-value)				0.0000		
Wooldridge test (*p*-value)				0.0000		
Non-linear combinations of parameter estimates					0.4065*** (8.67)	

Notes: ***, **, * represent the level of significance at 1%, 5%, and 10%, respectively. ( ) is *t*-statistic or *z*-statistic.

In Equation (2), we perform the non-linear relationship between *STATE* and *CASH*. The non-linear results in Table 3 show that the p-value of non-linear combinations of parameter estimates is a significant statistic at 1%. It supports the significant existence of a non-linear value, which is found at 40.65% of *STATE*. Also, the GLS estimation results indicate that the coefficient of *STATE*

is negative, and the squared coefficient of *STATE* is positive, with a statistically significant 5%, respectively. To check the robustness, we perform the regression model with LOWSTATE (<40.65%) and HIGHSTATE (≥ 40.65%) and use the GLS regression again. The empirical results show that the coefficient of STATE is negative and statistically significant at 5% in the case of *STATE* < 40.65%. In contrast, the coefficient of state is adverse in the case of *STATE* ≥ 40.65%. It means there is a U-shaped relation between cash holdings and state ownership, whose threshold is estimated at 40.65%. It suggests that the cash holdings will increase when the level of state ownership overcomes 40.65% of equity. Our findings imply that in the case of high concentrations of state ownership, the relationship between businesses and politicians will become strong. Moreover, state shareholders often hold a dominant role in the operating decisions at over 40.65% ratio of state ownership. According to agency theory, state ownership directly influences the relationship between the owner and the manager. Because SOEs are owned by the political system, so few individuals can perform supervising. As a result, with the appointment of representatives, firms will prioritise their resources for political goals rather than others. Consequently, SOEs' managers appointed by the government tend to increase firms' cash holdings due to political targets and investments (Xu & Li, 2018).

State Ownership, Business Environment and Cash Holdings

From the results of Equation (3), we find a negative association between the business environment (presented by PCI index) and cash holdings in FEM, REM and GLS estimations. It suggests that cash holdings reduce in a good business environment reduced (coefficient is -0.0015 and -0.0030 with t-statistic of -6.47 and -6.06, respectively) (Table 4). These results support our hypothesis that strengthening the business environment takes part in reducing the cash holdings of corporates. A good business environment implies that corruption, transaction costs, and extraction will also decrease. Firms will expense different investments to maximise their profits instead of holding cash to minimise transaction costs.

Table 4

The relationship between cash holdings and business environment

Dependent variable (CASH)	Equation 3	Equation 3	Equation 3	Equation 4	Equation 4	Equation 4
	FEM	REM	GLS	FEM	REM	GLS
PCI	−0.0029***	−0.0030***	−0.0016***	−0.0027***	−0.0029***	−0.0015***
	(−5.52)	(−6.06)	(−6.76)	(−5.14)	(−5.73)	(−6.47)
STATE	−0.0332***	−0.0264***	−0.0144***			
	(−3.83)	(−3.28)	(−3.87)			
PCI*STATE				−0.0005***	−0.0004***	−0.0002***
				(−3.93)	(−3.36)	(−3.94)
PPE	−0.1607***	−0.1182***	−0.0635***	−0.1609***	−0.1182***	−0.0636***
	(−9.52)	(−9.19)	(−12.68)	(−9.53)	(−9.19)	(−12.72)
SIZE	−0.0117**	−0.0060**	−0.0020***	−0.0118**	−0.060***	−0.020***
	(−2.45)	(−2.55)	(−2.82)	(−2.47)	(−2.56)	(−2.83)
ROA	0.2218***	0.2391***	0.1790***	0.2216***	0.2390***	0.1789***
	(6.98)	(8.26)	(10.29)	(6.98)	(8.25)	(10.29)
CFO	0.1210***	0.1158***	0.0807***	0.1211***	0.1159***	0.0808***
	(10.32)	(10.00)	(12.62)	(10.33)	(10.01)	(12.64)
LEV	−0.0457***	−0.0827***	−0.0900***	−0.0454***	−0.0827***	−0.0901***
	(−2.61)	(−5.64)	(−13.46)	(−2.60)	(−5.63)	(−13.47)
GRW	−0.0005	0.0005	−0.0003	−0.0005	−0.0005	−0.0003
	(−1.03)	(−1.14)	(−1.41)	(−1.03)	(−1.15)	(−1.42)
_cons	0.6386***	0.4839***	0.2667***	0.6325***	0.4774***	0.2628***
	(5.16)	(7.26)	(10.48)	(5.10)	(−7.13)	(10.25)
Obs	3,069	3,069	3,069	3,069	3,069	3,069
Groups	341	341	341	341	341	341
Hausman test (*p*-value)				0.0000		
Wald test (*p*-value)				0.0000		
Wooldridge test (*p*-value)				0.0000		

Note: ***, **, * represent the level of significance at 1%, 5%, and 10%, respectively. ( ) is *t*-statistic or *z*-statistic.

In Equation (4), we use the value of PCI as the interactive variable for observing the impacts of the business environment on cash holdings. The empirical results confirm our hypothesis again. It can be seen that PCI has a significantly negative coefficient (coefficient is −0.0002 and −0.0005 with t-statistic of −3.94 and −3.93, respectively) (Table 4). Our findings are similar to the study of Caprio et al. (2013). The increase of cash holdings results from the depressed business environment in which the business operates; corporates with infirm financial health will demand to raise their cash reserves considerably. This

is to prevent business risks and political risks from arising, which implies the negative relationship between the business environment and cash holdings.

The results in Table 4 also show a significant effect of state ownership and the quality of the business environment on cash holdings. In an enhanced business environment, this interaction's effect is negative, implying that firms will tend to hold less cash in a relationship with state ownership. This result is consistent with the study of Dittmar et al. (2003) and Kusnadi et al. (2015), who argued that a weak institutional environment would compromise corporate governance and aggravate the agency's problems, leading to increased cash assets. Meanwhile, a good business environment will offer better protection for investors, limit cash holdings behaviour by managers as self-motivation as a suggestion of Xu and Li (2018).

From Tables 3 and 4, we find that firm performance and cash flow operating positively impact cash holdings at 1% significant statistic. Thus, firms with higher profitability have more chances to accumulate cash for reinvestment. With the higher operating cash flow, firms want to hold more money to meet the potential risks in the future, as the suggestions of (Bigelli & Sánchez-Vidal, 2012). By contrast, firm size, leverage, and fixed assets relate negatively with cash holdings at 1% significant statistic. According to Al-Najjar (2013), firm leverage can be inspected as a proxy for holding cash. A firm with the ability to reach external funds will be less in demand for cash to settle for investments, consistent with findings of Bates et al. (2009) and Bigelli and Sánchez-Vidal (2012). Similarly, the big firms with large sizes also get better opportunities to approach the financial resources due to the high insurance in their total assets. Thus, they do not need to keep much cash and push it into profitable investments. Meanwhile, the fixed asset can be explained by the fact that fixed-asset investment is often accounted for high value, leading to a depression in cash holdings. Firm growth, however, is not identified as the significant impact of cash holdings.

Cash Holdings Adjustment

In this section, we conduct the robustness check through cash holdings adjustment. We employ dynamic models with two-step GMM estimation to observe the change of speed in firms' cash holdings behaviour. Based on the above arguments, this section proposes the two-steps system GMM as an effective estimation for SOAC because it outperforms other estimations with the lowest RMSE during time intervals and different speeds (Chang et al., 2015). We argue that firms have adjusted cash holdings toward target cash holdings basing on lagged cash holdings.

By using the lag of *CASH* variable, we find that the effects of *STATE* and *PCI* are robust and statistically significant. According to Table 5, *STATE* and *PCI* have negative impacts on the cash holdings of firms. The testing results confirm again the existence of cash sheltering motivation under the government relations; affirm that the improvement of the business environment will reduce the opportunity cost of holding money, pushing the firms to decrease liquid assets and turn into investment forms. Also, the two-step system GMM results still indicate the existence of a U-shape relationship between state ownership and cash holdings. It suggests when *STATE* overcomes a certain threshold, the behaviour of cash holdings will change. Similarly, we realise that the relationship between state ownership and cash holdings is positive in a weak business environment and vice versa. Finally, the regression results of control variables stay consistent with the previous findings and support our above hypothesis. The AR (2) test and Hansen test show that the regression models are reliable.

Table 5

The relationship among cash holdings, state ownership and business environment: The robustness check

Dependent variable (CASH)	Equation 8	Equation 9	Equation 10	Equation 11
	GMM	GMM	GMM	GMM
L.CASH	0.6069*** (29.37)	0.5845*** (30.41)	0.5894*** (27.95)	0.5966*** (29.67)
STATE	–0.0171*** (–3.58)	–0.1326*** (–4.49)	–0.0135*** (–2.76)	
STATE2		0.1885*** (4.02)		
PCI			–0.0010*** (–3.93)	–0.0011*** (–3.91)
PCI*STATE				–0.0002*** (–2.75)
PPE	–0.0518*** (–7.99)	–0.0600*** (–9.51)	–0.0549*** (–8.08)	–0.0589** (–9.73)
SIZE	–0.0027*** (–2.63)	–0.0036*** (–3.44)	–0.0027*** (–2.61)	–0.0024*** (–2.57)
ROA	0.0895*** (3.10)	0.1166*** (4.53)	0.0916*** (3.23)	0.0733*** (2.80)
CFO	0.1750*** (6.23)	0.1686*** (7.46)	0.1680*** (6.00)	0.1997*** (15.75)
LEV	–0.0282** (–2.34)	–0.0132 (–1.17)	–0.0272** (–2.25)	–0.0239** (–2.00)

Table 5: (*continued*)

Dependent variable (CASH)	Equation 8	Equation 9	Equation 10	Equation 11
	GMM	GMM	GMM	GMM
GRW	−0.0010* (−1.65)	−0.0006 (−1.22)	−0.0011* (−1.95)	−0.0011*** (−6.22)
_cons	0.1150*** (4.13)	0.1466*** (5.08)	0.1851*** (5.58)	0.1767*** (5.58)
AR(2) test (*p*-value)	0.345	0.438	0.355	0.353
Hansen test (*p*-value)	0.336	0.378	0.366	0.435
Obs	3,069	3,069	3,069	3,069
Groups/IVs	341/97	341/119	341/98	341/100
Non-linear combinations of parameter estimates		0.3517*** (21.24)		

Notes: ***, **, * represent the level of significance at 1%, 5%, and 10%, respectively. ( ) is *t*-statistic or *z*-statistic

Table 5 reports the results of various SOAC estimations in different models, including the coefficient on delayed cash holdings $CASH_{it-1}$; thus SOAC is calculated by (1–μ). According to empirical results, this study can conclude that the adjustment ratio of cash holdings is from 0.3931 to 0.4155, with a 1% significant statistic. Comparing to SOAC estimation on developed countries, such as 54% from Japanese, French, and German sample, 60% from the U.K. sample proposed by Guney et al. (2007) and 56.7%, 60.1% from the U.S. sample proposed by Venkiteshwaran (2011), we conclude that the SOAC in Vietnamese SOEs is relatively slower than developed countries.

We would like to attribute the excessive adjustment for two main reasons: Firstly, SOEs have less of the independence needed to make decisions regarding holding cash. In other words, agency costs associated with holding cash are generated by regulators and controlling shareholders who can hold cash to pursue their own private goals. SOEs tend to accumulate cash to maximise funds under their control, to make investments, and serve specific goals assigned by the state. Our empirical results also support that, when the state holds the dominant ratio in enterprises, for example, 35.17% in our sample, the enterprises tend to hold higher cash with 18.85% at 1% significant statistic. Therefore, the adjustment of cash holding of Vietnamese SOEs is lower than in developed markets.

Secondly, the main benefit of slow cash adjustment in an imperfect capital market is to increase the corporate's ability to cope with external risks. As

suggested by La Porta et al. (2000) and Chang et al. (2015), legal and institutional characteristics, are important in understanding cash adjustment models in different countries. The main cause is poor shareholder protection and high transaction costs in countries with poor institutional environments, where companies tend to preserve a higher cash level. Our empirical results demonstrate that as the business environment gets better, companies tend to reduce their cash holdings by 0.11% at 1% significant statistic. Compared to the U.K. and the U.S., Vietnam has an institutional environment that needs to be improved on many fronts, so the pace of cash holding adjustment may be slower than in developed markets.

From Table 5, we also confirm that firm performance and cash flow operating have a positive impact on cash holdings, while firm size, leverage, and fixed assets relate negatively with cash holdings at 1% significant statistic. These findings are similar to our prior results in sections *State ownership and Cash holdings* and *State ownership, Business environment and Cash holdings*. Thus, we can conclude that our findings are robust and unbiased.

CONCLUSION

Corporates have been encountering a dramatic increase in unpredictable risks in many countries over the past few decades and taking the swelling role of government in economic activities. It prompts corporates to look into their business strategies, including cash holdings, to take care of the risks and get opportunities in recent contexts. This is important because cash plays a decisive role in investing activities and dealing with uncertain market conditions. Moreover, the state's dramatic intervention is considered to bring significant influences on firm strategies, resulting from the rescue efforts in financial crisis and economic reforms in the past (Megginson, 2017; Borisova et al., 2015). Similarly, it happens in Vietnam, where it is well-known to have a central planning economy with the dominance of state ownership in SOEs in the past decades, and it has transformed into a market-oriented economy through the SOEs privatisation and institutional reforms since 1986s.

However, though SOEs have been privatised, state ownership still strongly dominates the SOEs because it still holds the high stocks percentages in the privatised SOEs in Vietnam. Nonetheless, the opening market and reforming economy have been boosting the Vietnamese economy due to its high growth rate after the reform. This requires the corporates to devise their strategies, including holding more cash. Thus, it becomes necessary in an emerging economy where government roles, agency problems, and business regulations still cause many

controversies. Still, Vietnamese corporates' cash holdings are based mostly on individual corporate responses due to a lack of guidance and awareness on how corporate cash holdings and their relations can be coordinated. In addition, the unreported impacts of the business environment have also left unanswered questions when considering these relationships. Thus, this study will directly evaluate the relationship between state ownership and corporate cash holdings, taking into account the business environment's role to fill in the lacking evidence in emerging economies. This study contributes useful implications for corporates' managers and policymakers to develop cash holdings strategies and regulations based on state ownership and the development of the business environment.

The relationships between state ownership, cash holdings, and business environment are supported by many economic theories, including soft budget constraint, agency problem, political connection and institution. Different theories will look into different aspects in explaining the relationship between cash holdings and state ownership, cash holdings and business environment, some give positive and others give negative predictions. Furthermore, corporates' cash holdings are also influenced by the business environment's characteristics (Seifert & Gonenc, 2018). Our findings confirm that an increase in SOEs' state ownership leads to a decrease in cash holdings. Further, there is a U-shaped relation between corporate cash holdings and state ownership in non-linear models, in which the threshold is estimated at 35.17% or 40.65%. Interestingly, it can be explained that when the level of state-owned concentration is low, corporates tend to keep less cash to avoid corrupt officials and take advantage of the state relationship. However, once the concentration of state ownership increases, SOEs will be utilised as resources for more social and political goals, as prior studies of Abramov et al. (2017) and Chen et al. (2018). In this context, SOEs are often controlled, so not any individual shareholders have a strong incentive to reverse actively.

In expanding models, this study provides consistent evidence that state ownership causes the firms to lessen their cash holdings in a good business environment or enlarge it in an opposing case. In the weak business environment, the agency problem, self-privilege motivation, asymmetric information, and informal cost are the primary reasons for the increase of corporate cash holdings in relation to state ownership (Dittmar et al., 2003; Xu & Li, 2018). In other words, business environmental quality is a critical factor in the changes in cash holding behaviour. This is reflected in the model counting the speed of cash adjustment, which is relatively slower than developed countries due to the impacts of agency problems and the institutional environment. According to empirical results, this study can conclude that the adjustment ratio of cash holdings is from 39.31% to

41.55%, slower than Japanese, French, German, the U.K. and the U.S. samples proposed by Guney et al. (2007) and Venkiteshwaran (2011).

There are some implications for our findings, and the corporates, government, and policy-makers could benefit from the results. For example, policy-makers should focus on enhancing the business environment to diminish both information asymmetry and informal costs. An improved business environment also provides better investment opportunities, stronger protection of property rights, and better law enforcement. Hence, corporates have many opportunities to choose funding options instead of relying heavily on their cash. In terms of corporate governance, this study suggests that SOEs should be vigorously equitised to minimise the problem of representatives. Otherwise, the government is recommended to strengthen oversight and ensure the rightful investments of SOEs, in which state ownership plays a dominant role. The controlling of cash flow in SOEs is necessary because cash is a highly liquid asset. Besides, our study is one of few studies to investigate the dominance of state ownership in an emerging economy, especially in Vietnam. This study also highlights the critical role of the business environment in the relationship between state ownership and corporate cash holdings as appreciated contributions for financial theories.

This study also has some limitations. Firstly, the study focuses merely on the relationship between state ownership, business environment and cash ownership. This, therefore, ignores some potential determinants, for example, CEO characteristics, government policies and market uncertainties. Secondly, this study uses a limited sample of listed corporates in Vietnam, although we defined the scopes and gaps of the research in the above sections. However, the sample needs to be extended in both terms of cross-section and time-series to yield representative results. Therefore, there are some directions to extend our future studies. The following studies will monitor the extended factors, such as government policies and market uncertainties, which can influence the relationship between cash holdings and state ownership by expanding the studies of Dong et al. (2019) and Chow et al. (2017). Moreover, CEO characteristics, intermediary resources such as banks and financial institutions can function to monitor the effectiveness of the relationship between state ownership and cash holdings, using the interaction to corporate behaviour through developing the studies of Nguyen et al. (2020b) and Guo et al. (2020) or enriching the studies of Nguyen et al. (2020a), Chang et al. (2020), Guo and Wong (2019), and Stevenson and Pond (2016). These help to eliminate the information asymmetry between managers and shareholders. Besides, we only use the PCI index collected by VCCI Vietnam as a proxy of the business environment in our study. Thus, in order to have more

convincing evidence, future studies can include other indicators to measure the impact of the business environment on corporate cash holdings behaviour.

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APPENDIX

Mean values of variables by year

Variable	Mean								
	2011	2012	2013	2014	2015	2016	2017	2018	2019
CASH	0.113	0.114	0.118	0.118	0.117	0.099	0.094	0.086	0.080
CASH (SOEs)	0.103	0.102	0.113	0.112	0.109	0.100	0.098	0.086	0.082
STATE	0.164	0.178	0.174	0.169	0.165	0.357	0.343	0.326	0.317

Source: Ho Chi Minh City Stock Exchange and Hanoi Stock Exchange