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WHETHER ECONOMIC POLICY UNCERTAINTY INSTIGATES AN INCREASE IN THE CASH HOLDINGS OF SINGAPOREAN-LISTED FIRMS?

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ABSTRACT

Our paper investigates how economic policy uncertainty (EPU) affects Singaporean-listed firms' corporate cash holdings after the global financial crisis. We apply various technical analyses for panel models of 4,253 yearly observations. Our results indicate that the Singaporean-listed firms' cash holdings ratio (CHR) decreases when Singapore's EPU increases in the period 2009–2018. Further, either global EPU or U.S. EPU indicators are correlated negatively with Singaporean-listed firms' cash reserves. The corporate managers' precautionary motive was not urged by the rise of EPU in the Singapore market. On the other hand, our empirical evidence suggests that Singapore's corporate managers have an explicit speculative incentive in the context of the increased EPU in the post-financial crisis period. This research provides evidence that is at odds with the corporate managers' classical view on precautionary cash savings in the context of the increased uncertainty of economic policy.

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Keywords: Economic policy uncertainty (EPU), Corporate cash holdings, Singaporean-listed firms, Precautionary cash savings, Speculative incentive

INTRODUCTION

Cash and equivalent cash are evaluated as the most liquid assets in firms. Typically, firms reserve cash to assure liquidity and precautionary motives in unexpected circumstances (Vuong et al., 2022). However, Opler et al. (1999) argue that more cash in firms can ignore higher profits from other asset forms. Bargeron et al. (2010) indicate that the visible rise of cash holdings reduces capital expenditures in firms. This means storing more cash restricts more speculative activities.

Gulen and Ion (2016) insist that when the risks arise in changing macroeconomic policies that exceed the predicted ability of the related participants, this leads to varying macroeconomic conditions. Economic policy uncertainty (hereafter EPU) in a country also significantly influences corporate managerial decisions (Demir & Ersan, 2017). Moreover, its impact on corporate aspects is found across different markets. In other words, the sign of EPU's effect on the firm's aspects is more likely to be significantly controlled by specific markets. For instance, Iqbal et al. (2020) indicate that an increase in the United States' EPU index leads to obviously lessened corporate performance in the U.S. market. Conversely, the firm value of Chinese firms is significantly driven by higher EPU (Feng et al., 2022). Regarding the impact of EPU on corporate leverage, Schwarz and Dalmácio's (2020) findings are consistent with the equity market supply issues hypothesis (a positive effect), while the results of Zhang et al. (2015) are consistent with the debt market supply issues hypothesis (a negative impact). In another field, Wu et al. (2020) point out a positive nexus between corporate investment decisions and the Australian EPU index, whereas Chen et al. (2019) indicate the negative effect of the U.S.' EPU index on the investment operations of the U.S. firms.

Most of the prior evidence related to the effect of EPU on corporate cash holdings points out vigorous approval for a positive relationship that is consistent with a precautionary view of corporate managers (Xu et al., 2016; Demir & Ersan, 2017; Phan et al., 2019; Li, 2019). Additionally, Choi and Min (2015) provide strong evidence that the precautionary incentives largely encourage Korean firms to reserve more cash after the global financial crisis in 2008. The speculative motive is also a crucial determinant of the firm's cash holdings, which degrades cash balances in the firm (Keynes, 1936). Scarcity of the empirical evidence shows an inverse linkage between EPU and corporate cash holdings. Wang (2019) demonstrates an inverse nexus between corporate cash holdings and the

Chinese EPU index in the recession stage, but the cash reserves are positively associated with the Chinese EPU index in the flourishing period. Then Su et al. (2020) prove that the linkage between EPU and Chinese firms' cash holdings is U-shaped given the discretionary existence of both precautionary and speculative incentives in managerial strategies. Schwarz and Dalmácio (2020) indicate that the growth of EPU has the likelihood to considerably debase the Brazilian equity market. Thus, Brazilian firms tend to use more debts than equities. Accordingly, cash balance ratios in firms can be diminished because of the substitute effect. Comprehensively, the influence of EPU on corporate liquidity relies on both internal factors and macro conditions (Phan et al., 2019), e.g., managerial motives, financial constraints, government policies, business cycles, or even politics. Thus, the impact of EPU on corporate cash reserves in a specific market, considered in separate periods, might vary, let alone in various markets.

Singapore is a solely developed market of the ASEAN economic community (Vuong et al., 2022). It is also the only country in Southeast Asia to have had an EPU index since 2003. In this paper, we aim to shed light on Singapore's corporate manager motives when they face an increased EPU after the global financial crisis, whether Singaporean managers increase their cash reserves for precautionary purposes or use more cash for investment activities. To achieve this goal, we employ a panel sample of 4,253 firm-yearly observations covering the 2009–2018 period. The empirical results indicate that an increase in Singapore's EPU index is negatively associated with firms' cash holdings in the post-crisis period, implying that when Singapore's EPU grows, Singaporean managers tend to reserve less cash in their total assets. This result is in line with a speculative motive of corporate managers. Furthermore, we show apparent evidence that global EPU and the U.S. EPU indicators negatively influence the cash reserves of Singaporean firms. These findings confirm that Singapore's corporate managers tend to take advantage of the uncertainty of economic policy to speculate instead of saving cash for precautionary purposes. Our research succeeds in providing new literature related to corporate cash holdings in the context of the increased EPU in a specific advanced country in Southeast Asia.

THEORETICAL BASICS AND RESEARCH HYPOTHESES

Economic Policy Uncertainty and Corporate Cash Holdings

Zeng et al. (2020) comment that economic policy is an effective tool for the government to shape the business environment for each country. Moreover, continuous changes in the international environment and economic downturn

lead to uncertainty about economic policy, which further affects the strategic development of companies (Jens, 2017). On the other hand, EPU is likely to create new markets with promising investment opportunities. Hence, it could lead companies to grow (Bloom, 2009). Corporate managers have both parallel precautionary incentives and speculative motives (Su et al., 2020) that lead firms to make flexible investments, maintain cash holdings, and manage risks depending on dissimilar macro factors (Bolton et al., 2013). Hence, firms could make different decisions based on their cash reserve when they encounter different economic policies.

Thus, before any new economic policy is to be formally implemented, the government could conduct a survey to determine whether their implemented policy is efficient using one or some "pilot" samples. This process helps to avoid risks before scaling up. Additionally, a new economic policy has not immediately impacted the applying subjects. In turn, this might create favourable opportunities for firms to align their operations and investment strategies. Cash holdings for precautionary motives are rather essential in this period because firms need to reserve cash for snapping investment opportunities in the next period. In the first stage of the economic policy implementation, firms could reduce their cash holdings and increase the search for favourable investment projects from the advantages of a newly generated policy. The firm's choices regarding cash reserves depend on corporate liquidity and operational strategies to respond to new economic policies.

Applying a new policy also creates more instability for businesses when they convert from the old economic policy to new regulations. According to Bloom et al. (2007), as the uncertainty exceeds corporate expectations, companies tend to expose cautious attitudes. As a result, firms would postpone their investment plans and enhance cash reserves (Gulen & Ion, 2016; Doshi et al., 2017). Demir and Ersan (2017) indicate that the rise of EPU leads to a significant increase in corporate cash holdings in BRIC markets. In addition, they emphasise that raising EPU is closely associated with reducing both economic growth and investment opportunities; in this situation, both individuals and corporations exhibit precautionary behaviours to reserve more cash at higher degrees. Furthermore, Zhang et al. (2015) have shown that an adverse nexus between the growth rate, represented by the GDP, and EPU in the Chinese market indirectly causes Chinese firms' debt ratio to decline. Perhaps Chinese enterprises will increase cash reserves for distress defaults. Then Feng et al. (2022) demonstrate that Chinese firms increase cash holdings during high EPU periods. They explain that more cash holdings will help Chinese companies to avoid negative shocks and experience fewer investment problems with high EPU. Normally, monetary policy uncertainty negatively

influences economic growth (Friedman, 1968). Following the traditional theory, larger expected cash flows affect positive corporate investments, while larger free cash flow uncertainty affects negative corporate investments. Companies are likely to postpone making capital investments or hiring employees when faced with increased uncertainty; thus, economic growth lessens (Bhagat et al., 2016). We can detect that EPU usually has a negative relationship with the economic growth rate given the deferring capital expenditures of companies. This is the major reason for an increase in the ratio of cash reserves in the company. A positive nexus between EPU and corporate cash holdings is not only found in developing markets but also shown in developed markets, such as the United States (Gao & Grinstein, 2014) and Australia (Trinh et al., 2022).

Jin et al. (2016) argue that slight variations in economic policy insignificantly influence corporate cash holdings. EPU at low levels is not likely to make precautionary incentives for corporate managers. This leads to raising the manager's estimated obstacle for corporate decisions and external financing constraints. In this situation, firms are likely to face both opportunities and difficulties owing to EPU. Su et al. (2010) contend that when the speculative motive is activated, firms tend to pursue higher returns from policy change and investment. Additionally, firms might take up new investment activities by exploiting inherent cash savings in the first implementing stage of a new economic policy. The precautionary and speculative motives appear quite flexibly across the various implementing stages of economic policy as well as different markets. The impact of EPU on corporate cash holdings depends on the various efficient levels of economic policies, corporate adaptation, and corporate investment strategies in either the long term or the short term. Thus, the nexus between corporate cash holdings and EPU is likely to be U-shaped (Su et al., 2020).

Background of Singapore Market and Research Hypotheses

While most of the Southeast Asian countries are classified as developing markets or even frontier markets, Singapore outstands its neighbour countries to be a developed market and is the only Southeast Asian country using the EPU index among its neighbour countries. Singapore's EPU index has been pinpointed by a weighted mean of EPU indices of 21 countries since 2003. It is not surprising that few studies have examined the effect of EPU on corporate finance issues in either the ASEAN or Singapore market. Our research could be the first study on EPU's impact on corporate finance concerns in the Singapore market, developed on relevant theories and previous empirical evidence of similar research themes.

Regarding the legal-specific characteristics, Porta et al. (1998) indicate that both Singapore's shareholders and bondholders are protected by the highest rights, implying that the companies operating in the Singapore market have less asymmetric information and lower agency costs. Consequently, Singapore's corporate managers are likely to have fewer precautionary motives and reserve cash at lower levels (Dittmar et al., 2003). Not only Singapore's economy but also the international market had to undergo numerous challenges, owing to the terrible influence of the global financial crisis in 2008 (Wilson, 2011). In the post-crisis period, Singapore's government has focused on restructuring the economy with a variety of new drastic policies, e.g., educational incentives, improving labour skills, trade liberalisation, and open investment. Now Singapore's economy has been ranked as one of the most open markets, with the third lowest corruption degree in the world. Singapore holds a critical position as one of four "golden dragons" in the Asia market. In 2018, the total GDP of Singapore reached SGD364.2 billion,[1] ranked 14th in the Asia sector. Thereby, we could not deny that Singapore's new economic policies had been effectively implemented in reviving Singapore's economy after the global financial crisis of 2008. At present, this country has the largest FDI outward investment scaled by its GDP in the world. Moreover, Singapore's government constantly promotes activities to invest abroad. Figure 1 shows that Singapore's direct investment abroad[2] (in S$ millions) continuously rose from 2003 to 2018. It is clear that outward direct investment activities in the Singapore market have always been strongly encouraged by Singapore's government over the past 16 years, especially in the post-crisis period.

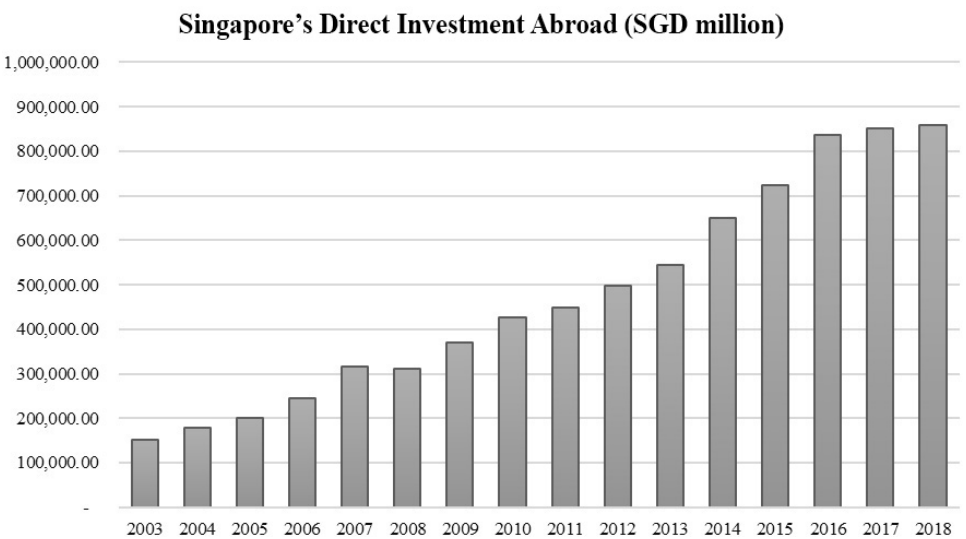

Figure 1: Singapore's direct investment abroad (SGD million) from 2003 to 2018

Figure 2 plots the quarterly EPU indicators[3] and the quarterly GDP growth rate[4] of Singapore (in percentage) from 2003 to 2018. In the post-crisis period, all three EPU indicators fluctuate sharply. Still, it is difficult to detect a discordant trend between Singapore's GDP growth rate and EPU indices from 2009 to 2018, akin to findings in the studies of Zhang et al. (2015) on the Chinese market, Bhagat et al. (2016) on the Indian market, and Demir and Ersan (2017) on the BRIC markets. According to Zhang et al. (2015), Gozgor et al. (2019), and Nguyen et al. (2020), the increased EPU negatively affects the GDP growth rate, bank credit supply, and bank credit demand. One of the primary causes of this negative effect is that firms are more cautious in raising the usage of debts and expanding investments (Zhang et al., 2015; Bhagat et al., 2016). Consequently, the ratio of cash balances in businesses tends to increase. As surveyed in Figure 2, it is significantly unlikely that the precautionary motives of Singaporean corporate managers will increase and that Singaporean firms' leverage will reduce after the financial crisis. In contrast, it is highly probable that the heightened uncertainty of economic policy post-crisis might lead to possible opportunities for firms in Singapore if the positive changes in the government's investment policy stimulate the corporate manager's speculative motives.

EPU influences firms' managerial and strategic choices by impacting their investments and financing sources (Su et al., 2020). The crucial question is how do businesses deal with the increase in EPU? From an investment standpoint, according to Abel (1983), at a certain degree of environmental uncertainty, firms tend to take a proactive attitude towards the trade-off between cash reserves and investments; thus, they expand the investment scale to achieve higher returns (O'Brien, 2003). On the other hand, when the environment is at high uncertainty, economic policy changes may continuously increase a firm's investment risks (Aghion et al., 2005); hence, the uncertainty of future profits also ascends. At the same time, business managers have difficulty accurately estimating the ability of their companies to cope with risk (Baum et al., 2006). Therefore, corporate managers are more likely to maintain a conservative investment attitude, resulting in increased precautionary cash holdings (Bloom et al., 2007). From a financial perspective, following Arellano et al. (2012), EPU will restrict the external financing of firms. EPU raises information asymmetry between firms and outsiders while aggravating operational risk. The result is that both the company's expected profits and external funding opportunities decrease in the future (Chen et al., 2017). To maintain effective investment activities, businesses can reduce cash holdings. Nonetheless, when uncertainty is at a high level beyond companies' control, corporate managers are more likely to constrain their budgets and reserve

more cash as an internal hedge to mitigate the effect of uncertainty on corporate funds (Chiu et al., 2016) and mitigate operational risks (Han & Qiu, 2007).

A positive relationship between EPU and corporate cash holdings is an effective way to reduce the negative impacts and operational risks. Furthermore, an adverse nexus between EPU and corporate cash holdings is an effective way to take the investment advantages and external financing as well as reach more earnings. The two mentioned relationships are respectively formed by two corporate managers' primary motives: precautionary saving and speculation. In essence, two motives always exist in the behavioural psychology of managers. Based on the given arguments and the specific context of the Singapore market, we predict the nexus between Singapore's EPU index and corporate cash holdings in Singapore, as follows:

H1: The influence of Singapore's EPU on cash –holdings in Singaporean firms is negative (positive) and in line with the prediction of speculative motives (precautionary incentives).

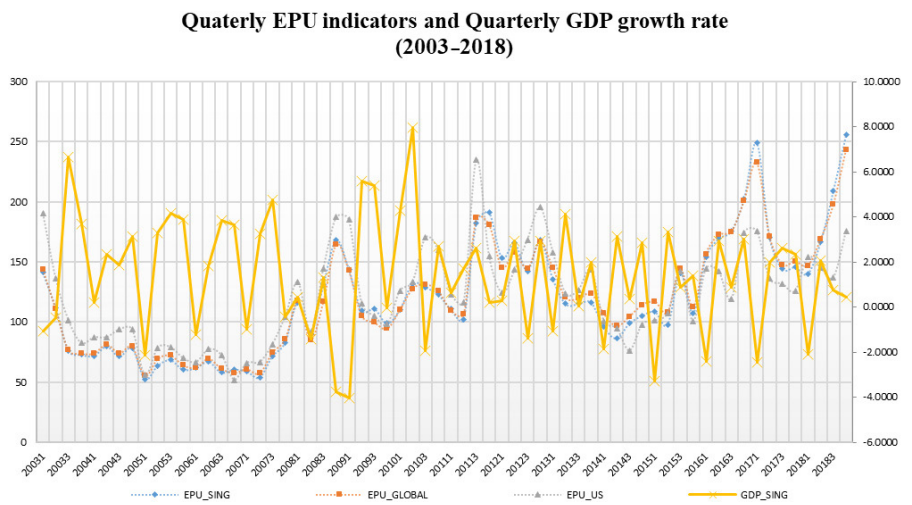

Figure 2. Quarterly economic policy uncertainty (EPU) indicators and quarterly GDP growth rate (%) of Singapore from 2003 to 2018

Additionally, different EPU indices in the international market have significantly interacted in the context of global liberalisation. Colombo (2013) indicates that the U.S.' EPU indicator substantially reacts to the fluctuations in Europe's macroeconomic policy. Demir and Ersan (2017) find that global EPU and U.S. EPU indicators positively affect corporate cash holdings in BRIC countries, suggesting that corporate managers in BRIC markets are inherently cautious of

increased uncertainty in economic policy. Figure 3 illustrates the monthly EPU indicators of the Singapore, global, and U.S. markets in the period 2003–2018. Overall, three indicators are similarly volatile in the observed period. Assuming that corporate managers' sentiment in the Singapore market is precautionary saving or speculation, the effects of different EPU indicators will not impact corporate cash holdings. In H2, we predict that the impact of global EPU and the U.S. EPU on the cash holdings of Singaporean firms has an analogic sign as the effect of Singapore's EPU on corporate cash reserves.

H2: The impact of global EPU and U.S. EPU on the cash holdings of Singaporean firms exposes a similar sign relative to the influence of Singapore's EPU.

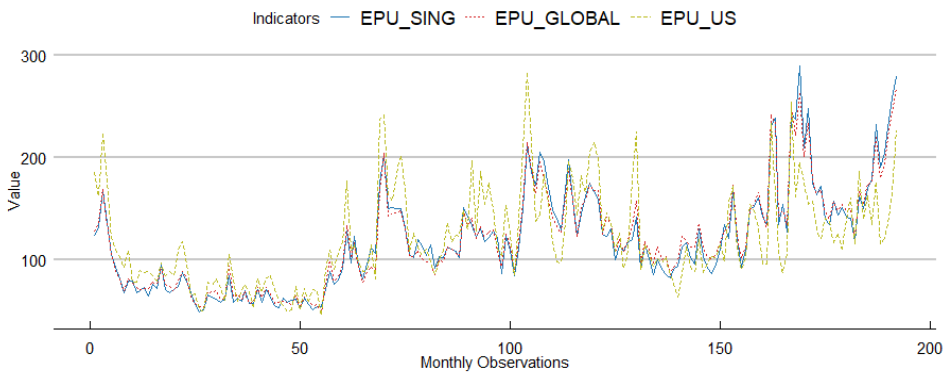

Figure 3. Monthly EPU indicators of Singapore market, global market and the U.S. market from 2003 to 2018

DATA AND RESEARCH METHODOLOGY

Data and Variables

We collect yearly accounting data for the period 2009–2018 from the Worldscope/ Thomson Reuters Eikon database to calculate firm-specific factors in our main models as the quarterly financial reports are not available for many companies. We remove Singaporean financial firms from our dataset if the firms do not report some or all of their market capitalisations. As a result, our final sample contains 543 non-financial Singaporean-listed firms with 4,253 yearly observations from 2009 to 2018. In addition, we use the monthly data of Singapore EPU (EPU_ SING), global EPU (EPU_GLOBAL), and U.S. EPU (EPU_US) indicators (Baker et al., 2016) obtained from the website www.policyuncertainty.com in our study.

Empirical Models and Methodology

From the initial inference about the effect of EPU on Singapore's GDP growth rate in Figure 2, we first examine the relationship between Singapore's GDP growth rate and three quarterly EPU indicators—respectively Singapore's EPU index, the global EPU index, and the United States' EPU index from 2003: Q1 to 2018: Q4—by utilising bivariate VAR models with two lags of Singapore's GDP growth rate, as follows:

$$\begin{aligned} \text{GDPgrowth}_t = {} & \alpha_0 + \beta_0 * \text{GDPgrowth}_{t-1} + \beta_1 * \text{GDPgrowth}_{t-2} \\ & + \kappa_1 * \text{EPU}_{y,t} + \varepsilon_t \end{aligned} \tag{1}$$

Where GDPgrowth_t is Singapore's quarterly GDP growth rate at the quarter (t) and the quarterly EPU index ($\text{EPU}_{y,t}$) in Equation 1 is determined by a weighted average of three monthly values of the EPU index in the quarter (t) for the market (y). We calculate the magnitude of $\text{EPU}_{y,t}$ in Equation 1 via the logarithm of the quarterly EPU index (t) for the market (y). We employ three EPU variables (EPU_SING, EPU_GLOBAL, EPU_US) in Equation 1, for the Singapore, global and the U.S. markets, respectively. To investigate whether the uncertainty of economic policy after the global financial crisis in 2008 has a destructive effect on the GDP of Singapore, we regress Model 1 using two sub-samples: the pre-crisis period (2003: Q1–2008: Q4) and the post-crisis period (2009: Q1–2018: Q4). We expect that if the adverse effect of EPU indices on Singapore's GDP growth rate is significant, Singaporean corporate managers tend to increase precautionary motives than speculative motives when EPU rises. Contrarily, if the impact of EPU on Singapore's GDP growth rate is insignificant or significantly positive, Singaporean corporate managers may increase speculative motives more than precautionary motives when EPU rises.

Towards the central target, we use Models 2 and 3 to examine the influence of EPU on the cash holdings of Singaporean-listed firms in the post-crisis period (2009–2018). In Model 2, we apply the pooled OLS estimation with the fixed effect for a panel model in the following form:

$$\text{CHR}_{i,t} = \alpha + \beta * \text{FIRM}_{i,t} + \gamma * \text{EPU}_{y,t} + \varepsilon_{i,t} \tag{2}$$

where the cash holding ratio ($\text{CHR}_{i,t}$) is the cash and equivalents scaled by total assets for the firm (i) at the year (t). According to Demir and Ersan (2017), we determine the annual EPU index ($\text{EPU}_{y,t}$) in Equation 2 as a mean value of all monthly EPU values in the year (t) for the market (y). Then the value of $\text{EPU}_{y,t}$ in Equation 2 is the logarithm of an annual EPU index for the market (y) at the year (t). We use three EPU variables (EPU_SING, EPU_GLOBAL, EPU_US) in

Equation 2, for the Singapore, global, and the U.S. markets, respectively. A list of firm-characteristic ($FIRM_{i,t}$) variables for the firm (i) at the year (t) are employed for controlling corporate cash holdings: the firm size (SIZE) variable, which is measured by the natural logarithm of the firm's total assets; the return on asset (ROA) variable, which is the ratio of net income to the firm's total assets; the capital expenditure (CAP) variable, which is the ratio of capital expenditure to the firm's total assets; the growth opportunities (GROW) variable, which is the asset growth rate; and the dividend paid (DIV) variable, which is the ratio of the cash dividend paid to the firm's total assets. We use both book leverage (BLEV) and market leverage (MLEV) to check the effect of financial leverage on corporate cash holdings (Schwarz & Dalmácio, 2020). $\varepsilon_{i,t}$ represents the error term for the firm (i) at the year (t).

The VIF test is used for multi-collinearity diagnosis, along with the Breusch–Pagan test for heteroskedasticity (pooled OLS vs. pooled OLS with the random effect). The robust Hausman test is exploited for the choice between pooled OLS with the random effect and pooled OLS with the fixed effect in Model (2).

Following Venkiteshwaran (2011), we apply the generalised method of moments (GMM) estimator to analyse the dynamic Model 3, which permits us to understand how Singaporean firms adjust their cash reserves' degrees over time:

$$CHR_{i,t} = \alpha * CHR_{i,t-1} + \beta * FIRM_{i,t} + \gamma * EPU_{y,t} + \pi_{i,t} \quad (3)$$

where the magnitude of $(1 - \alpha)$ shows an adjustment speed to the target cash reserves ratio in Singaporean firms ($0 < \alpha < 1$). $CHR_{i,t-1}$ represents one-year lagged corporate cash holdings. $\pi_{i,t}$ denotes the error term for the firm (i) at the year (t). The remaining variables in Equation 3 are similar to those in Equation 2. Arellano and Bond (1991) introduce a GMM estimator for a dynamic panel model with a large number of observations in a short time to minimise the endogenous issues. The valid instrument variables are robustly tested by the Sargan test, the absence of autocorrelations at lag (1) − AR (1), and the presence of autocorrelations at lag (2) − AR (2).

DESCRIPTIVE VARIABLES

The descriptive statistics of all variables employed in Models 2 and 3 are summarised in Table 1. From the basic statistics in Panel A, it is evident that the spread of cash reserves ratio is quite wide among Singaporean firms (0%–99.85%). The CHR has an average of 20.11%, which suggests that Singaporean

firms have high liquidity in the post-2008 period. Most likely, Singaporean firms tend to make use of these available financing sources to seize gainful investment opportunities. Meanwhile, book leverage and market leverage have an approximate mean of 20.22% and 31.54%, respectively. Singaporean companies spend an average of more than 2% of their assets to pay dividends per year. Whereas profitability accounts for 0.41% of the average total assets, a mean capital expenditure comprises 4.37% of Singaporean firms' total assets. It can be seen clearly that Singaporean firms concentrated a large part of their assets on investment activities in the post-crisis period.

Panel B reports the correlation matrix among all variables. An essential point in Panel B is the negative correlations between the CHR of Singaporean firms and three EPU indicators (EPU_SING, EPU_GLOBAL, EPU_US). It is worth noting that Singapore's EPU index has a positive association with the global EPU and U.S. EPU indices, suggesting that the volatility of Singapore's EPU is markedly dominated by the volatility of either the global EPU index or the U.S. EPU index. Nonetheless, the correlation between Singapore's EPU and the global EPU is tighter than relative to the U.S. EPU. Thus, surveying the impact of both global EPU and the U.S. EPU on the cash reserves of Singaporean firms in H2 is essential to endorse the findings in H1.

Table 1
Descriptive statistics and correlation matrix

Panel A: Summarise statistics

Variable	Obs.	Mean	S.D.	Min	Max
CHR	4,253	0.2011	0.1689	0.0000	0.9985
ROA	4,253	0.0041	0.1607	–0.9742	1.8069
GROW	4,253	0.1090	0.5112	–0.9908	9.2610
DIV	4,253	0.0212	0.0629	0.0000	1.7657
CAPTA	4,253	0.0437	0.0650	0.0000	0.8125
SIZE	4,253	19.2860	2.2820	13.7260	30.6120
BLEV	4,253	0.2022	0.1837	0.0000	0.9934
MLEV	4,253	0.3154	0.2830	0.0000	0.9999
EPU_SING	4,253	4.9118	0.2129	4.5671	5.2318
EPU_GLOBAL	4,253	4.8961	0.1911	4.6249	5.1877
EPU_US	4,253	4.8761	0.1587	4.5165	5.0301

(*Continued on next page*)

Table 1 (*Continued*)

Panel B: Correlation matrix

	CHR	ROA	GROW	DIV	CAPTA	SIZE	BLEV	MLEV	EPU_SING	EPU_GLOBAL	EPU_US
CHR	1.0000										
ROA	0.1255	1.0000									
GROW	–0.0001	0.1594	1.0000								
DIV	0.2180	0.2187	–0.0737	1.0000							
CAPTA	–0.0716	0.0329	0.0963	0.0320	1.0000						
SIZE	–0.2267	0.2034	0.0288	0.0019	0.0397	1.0000					
BLEV	–0.4406	–0.1262	0.0247	–0.1617	0.0326	0.2803	1.0000				
MLEV	–0.4521	–0.0603	–0.0078	–0.1991	0.0102	0.4550	0.7794	1.0000			
EPU_SING	–0.0465	–0.0212	–0.0431	–0.0233	–0.0423	0.0204	0.0252	0.0281	1.0000		
EPU_GLOBAL	–0.0540	–0.0245	–0.0403	–0.0203	–0.0494	0.0325	0.0365	0.0279	0.9859	1.0000	
EPU_US	–0.0076	0.0169	–0.0133	–0.0374	–0.0096	–0.0166	–0.0222	–0.0204	0.7875	0.7200	1.0000

Note: Table 1 shows the descriptive statistics of all variables in Panel A and the correlation matrix between variables in Panel B. Cash holdings ($CHR_{i,t}$) variable is the cash and equivalents scaled by total assets for the firm (*i*) at the year (*t*). Firm-characteristic ($FIRM_{i,t}$) variables for the firm (*i*) at the year (*t*) are used for controlling corporate cash holdings, consisting of firm size (SIZE) variable is measured by the logarithm of the firm's total assets; Return on asset (ROA) variable is the ratio of net income to firms' total assets. The capital expenditure (CAP) variable is the ratio of capital expenditure to the firm's total assets. The growth opportunities (GROW) variable is the firm's asset growth rate. Following Schwarz and Dalmácio (2020), we use both book leverage (BLEV) and market leverage (MLEV) to examine whether financial leverages impact cash holdings. Dividend paid (DIV) is the ratio of cash dividends paid to the firm's total assets. Corporate financial reports are taken from the World Scope source/Thomson Reuters Eikon database. The magnitude of annual $EPU_{y,t}$ is calculated as the logarithm of an average of all monthly EPU indicators in the year (*t*) for the market (*y*). EPU index includes Singapore's EPU indicator (EPU_SING), Global EPU indicator (EPU_GLOBAL), US'S EPU indicator (EPU_US), which are introduced by Baker et al. (2016).

ANALYSING THE RESULTS

Impact of Singapore's Economic Policy Uncertainty on its GDP Growth Rate

First, we test the effect of EPU indices on Singapore's GDP growth rate. Our basic aim is to clarify the predictions from Figure 2. Table 2 reports the estimated results from Equation 1. The nexus between three EPU indicators and Singapore's GDP growth rate is regressed by the bivariate VAR models with quarterly observations. We realise that the quarterly GDP growth rate is impacted negatively and significantly by different quarterly EPU indicators covering the whole sample. Still, using sub-samples corresponding to two periods (pre-crisis and post-crisis), we find that the negative and significant effect of three EPU indices on the economic growth of Singapore solely appears in the pre-crisis period (2003–2008). These results imply that increased EPU in the Singapore, global, and the U.S. markets influences insignificantly the economic growth of Singapore after the global financial crisis (2009–2018).

In the period of 2003–2008, an adverse nexus between EPU indicators and GDP growth rate is significant at 1% and 5%. According to the arguments of Zhang et al. (2015), Bhagat et al. (2016), and Demir and Ersan (2017), the rising EPU makes Singaporean corporate managers more precautionary in capital expenditure activities, so economic growth tends to go down. Especially, the lightly enhanced EPU probably makes the adverse nexus between EPU and the GDP growth rate more pronounced during the recession period (Sahinoz & Erdogan Cosar, 2018; Ren et al., 2020). Nonetheless, EPU has an insignificant effect on Singapore's economic growth after the global financial crisis. It is most likely that the uncertainty of new economic policy in the recovery phase might not negatively intervene in Singapore's economic growth. This finding can be explained by the fact that most governments will aggressively issue a lot of new economic policies to restore their damaged economies after the financial crisis. The common aim of these new policies is to promote the production and investment of enterprises and stimulate the consumption of the population toward economic growth. Therefore, companies can accept a reduction in cash reserves to capture advantages from the government's new policies to stimulate investment and production. The overall result is that economic growth has breakthrough signals.

Table 2
Impact of economic policy uncertainty (EPU) on Singapore's economic growth (2003: Q1–2018: Q4)

Sample	Whole sample (2003: Q1-2018:Q4)			Pre-crisis (2003: Q1-2008:Q4)			Post-crisis (2009: Q1-2018:Q4)		
	GDPgrowth is a dependent variable								
GDPgrowth(-1)	–0.2611**	–0.2686**	–0.2615**	–0.2706	–0.2651	–0.2469	–0.2717*	–0.2786*	–0.2714*
	(–2.0433)	(–2.1054)	(–2.0231)	(–1.1726)	(–1.1264)	(–0.9787)	(–1.7261)	(–1.7858)	(–1.7292)
GDPgrowth(-2)	–0.1754	–0.1770	–0.1525	–0.4276*	–0.4224*	–0.4013*	–0.0901	–0.0922	–0.0663
	(–1.3828)	(–1.4039)	(–1.2092)	(–1.9357)	(–1.8766)	(–1.6767)	(–0.5709)	(–0.5912)	(–0.4193)
Constant	9.8494**	10.8424**	10.3521**	22.1462**	22.9631**	16.5951*	6.8678	10.7041	8.4158
	(2.5223)	(2.6434)	(2.2431)	(2.5891)	(2.3847)	(1.7937)	(0.9355)	(1.3313)	(1.0286)
EPU_SING	–1.6501**			–4.4324**			–1.0432		
	(–2.0398)			(–2.3110)			(–0.7035)		
EPU_GLOBAL		–1.8522**			–4.6051**			–1.8152	
		(–2.1841)			(–2.1365)			(–1.1201)	
EPU_US			–1.7523*			–3.0715*			–1.3709
			(–1.8326)			(–1.6711)			(–0.8206)
R^2	0.1136	0.1222	0.1020	0.2895	0.2651	0.1852	0.0863	0.1049	0.0907

Notes: Table 2 reports empirical results of Model (1): $GDPgrowth_t = \alpha_0 + \beta_0 * GDPgrowth_{t-1} + \beta_1 * GDPgrowth_{t-1} + \kappa_1 * EPU_{y,t} + \varepsilon_t$ by using the bivariate VAR models for quarterly observations. $GDPgrowth_t$ is quarterly Singapore's GDP growth rate at the quarter (t); $EPU_{y,t}$ is the logarithm of quarterly EPU indicator at the quarter (t) for the market (y); Three EPU variables (EPU_SING, EPU_GLOBAL, EPU_US) are employed respectively for Singapore, Global and US markets; *Significance at 10% level, **Significance at 5% level, ***Significance at 1% level; t-statistic is shown in parentheses ().

Impact of Economic Policy Uncertainty on the Cash Holdings of Singaporean Firms

To clarify the predictions from the experimental results in Table 2, we examine the influence of EPU on the cash holdings of Singaporean firms in panel models with different econometric techniques. More specifically, Tables 3 and 4 report empirical results from the pooled OLS estimation of Model 2 with the fixed effect and the GMM estimation of Model 3, respectively, where the dependent variable is the CHR. An important control variable (EPU) is a proxy for EPU, which is represented by the EPU_SING variable in Columns 1 and 2, the EPU_GLOBAL variable in Columns 3 and 4, and the EPU_US variable in Columns 5 and 6.

Our results show that the coefficients of the EPU variable are significantly and negatively associated with the CHR variable in most columns of both Tables 3 and 4. Unfortunately, the inverse relationship between the U.S. EPU and the cash holdings of Singaporean firms is insignificant in Columns 5 and 6 of Table 4. Our results indicate that the increased EPU indices are related to fewer cash holdings in Singaporean firms. To sum up, most empirical evidence points out an inverse nexus between the EPU and corporate cash holdings in the Singapore market. This means that when new economic policies become more uncertain, Singaporean firms tend to reserve less cash in their total assets. On the other hand, these estimated results suggest that Singapore's corporate managers prefer to speculate than save cash for precaution when EPU tends to ascend. Our findings are robust to both global EPU and U.S. EPU indicators.

Uncovering the negative linkage between EPU and corporate cash holdings in the Singapore market might be explained by the following justifiable reasons. The increased EPU first drives the deterioration in the equity market following the equity market supply issues hypothesis. Thus, listed firms prefer to use debts and increase financial leverage (Schwarz & Dalmácio, 2020). Singaporean-listed firms are most likely to reserve less cash and enhance debt usage in this case. Second, the characteristics of the legal environment might also affect corporate cash holdings, such as shareholder rights (Guney et al., 2007). In a market, higher protection for shareholders makes corporate managers less likely to use precautionary purposes. Therefore, cautious cash savings in Singaporean firms are likely to be less sensitive to the rising uncertainty of economic policy. Third, Singaporean firms inherently reach high liquidity (as reported in Table 1). Keeping cash balances at higher levels in Singaporean companies is more likely to create instability than precaution when EPU increases (Calcagnini et al., 2020). Finally, in reality, most governments speedily propose several new economic policies to encourage investment and recover the gap economy after

the global financial crisis. Instead of precautionary cash holdings, Singapore's corporate managers in this context tend promptly to take advantage of EPU to carry out their speculative activities for profitable purposes from other assets. Plus, firms occasionally tend to pursue higher profits from the new changes in investment policy. Hence, they accept a lower cash ratio after being vigorously activated by speculative motives for lucrative projects (Su et al., 2010). Most essentially, Singapore's EPU directly generated more beneficial opportunities than obstacles for Singaporean enterprises in the post-crisis period, especially in opening economic and investment policies abroad. In reality, EPU did not negatively affect Singapore's economic growth after the global crisis. Contrarily, it is capable of providing Singapore's corporate managers with lucrative investment opportunities and requires Singaporean firms to catch up promptly.

Another outstanding control variable is the CAP variable, which is negatively related to the CHR variable at a 1% significance level in all columns of Tables 3 and 4. The capital expenditure significantly declines the corporate cash balances because of the cash outflow to speculative activities (Venkiteshwaran, 2011). For other independent variables, the negative coefficients of the SIZE variable are significant at a 1% level, implicating that large Singaporean firms reserve a lower cash ratio than smaller Singaporean firms (Dittmar et al., 2003). These firms may have higher expenditures or more investment projects. The ROA variable is positively associated with the CHR variable at a 1% significance level. This relation is in line with our prediction that firms with higher profits have more potential to get profitable investment projects and cash inflow, leading to higher cash balances. While market leverage (MLEV) has an inverse and significant relationship with the CHR variable in both Table 3 and Table 4, the negative nexus between book leverage and cash holdings is significant in Table 3. These results imply that while encountering higher debt ratios, Singaporean firms tend to reserve a lower cash ratio, which is consistent with Al-Najjar's (2013) finding on the alternative linkage between capital structure and the cash reserves ratio. Moreover, the negative impact of financial leverage on corporate liquidity is more pronounced for market leverage, proving that the cash holdings are more sensitive to the Singapore equity market than the debt market. The positive effect of dividend paid (DIV) on corporate cash holdings in Table 3 is in line with prior findings in BRIC countries (Boubakri et al., 2013; Demir & Ersan, 2017). Paying higher dividends is positively related to corporate performance, which could result in larger cash reserves in firms. Firms with higher growth opportunities (GROW) have more capacity to increase cash flow. The positive impact of the GROW variable on the CHR variable in Table 3 is consistent with both theory and empirical evidence (Dittmar et al., 2003).

Table 3
Impact of economic policy uncertainty (EPU) on corporate cash holdings of Singaporean firms using the pooled OLS estimation with the fixed effect (2009–2018)

Variable	CHR is the dependent variable					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	1.2704***	1.1614***	1.2689***	1.1676***	1.3031***	1.2130***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
ROA	0.0795***	0.0851***	0.0793***	0.0847***	0.0811***	0.0864***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
SIZE	–0.0486***	–0.0435***	–0.0483***	–0.0431***	–0.0497***	–0.0443***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
GROW	0.0075**	0.0068**	0.0075**	0.0067**	0.0080**	0.0071**
	(0.0272)	(0.0467)	(0.0276)	(0.0495)	(0.0185)	(0.0363)
CAPTA	–0.1994***	–0.1993***	–0.2000***	–0.2003***	–0.1958***	–0.1968***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
DIV	0.2038***	0.1872***	0.2044***	0.1873***	0.2032***	0.1856***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
BLEV	–0.2113***		–0.2114***		–0.2115***	
	(0.0000)		(0.0000)		(0.0000)	
MLEV		–0.1637***		–0.1641***		–0.1647***
		(0.0000)		(0.0000)		(0.0000)
EPU_SING	–0.0174**	–0.0133*				
	(0.0172)	(0.0675)				
EPU_GLOBAL			–0.0184**	–0.0161**		
			(0.0257)	(0.0496)		
EPU_US					–0.0201**	–0.0208**
					(0.0345)	(0.0284)

(*Continued on next page*)

Table 3 (*Continued*)

Variable	CHR is the dependent variable					
	(1)	(2)	(3)	(4)	(5)	(6)
R^2	0.71	0.72	0.71	0.72	0.71	0.72
Adjusted R^2	0.67	0.67	0.67	0.67	0.67	0.67
F-statistic	16.87	16.97	16.87	16.97	16.86	16.98
Prob.(F-statistic)	0.00	0.00	0.00	0.00	0.00	0.00
VIF test	1.15	1.20	1.15	1.20	1.15	1.20
Breusch-Pagan test (*p*-value)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Hausman test (*p*-value)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Notes: Table 3 reports empirical results of Model 2: $CHR_{i,r} = \alpha + \beta * FIRM_{it} + \gamma * EPU_{y,tb} + \rho_{i,t} + \varepsilon_{i,t}$ using the pooled OLS estimation with the fixed effect for yearly observations. *Significance at 10% level, **Significance at 5% level, ***Significance at 1% level. *P*-value is shown in parentheses (). VIF test for multi-collinearity. Breusch-Pagan test for the heteroskedasticity (pooled OLS vs pooled OLS with random effect). Hausman test is used for choice between pooled OLS with the random effect and pooled OLS with the fixed effect.

Table 4
Impact of economic policy uncertainty (EPU) on corporate cash holdings of Singaporean firms using the GMM estimation (2009–2018)

Variable	CHR is a dependent variable					
	(1)	(2)	(3)	(4)	(5)	(6)
CHR (–1)	0.3961*** (0.0000)	0.3862*** (0.0000)	0.3956*** (0.0000)	0.3862*** (0.0000)	0.4191*** (0.0000)	0.4031*** (0.0000)
ROA	0.0768*** (0.0004)	0.0786*** (0.0003)	0.0765*** (0.0004)	0.0783*** (0.0004)	0.0790*** (0.0003)	0.0800*** (0.0003)
SIZE	–0.0722*** (0.0000)	–0.0701*** (0.0000)	–0.0719*** (0.0000)	–0.0699*** (0.0000)	–0.0733*** (0.0000)	–0.0708*** (0.0000)
GROW	0.0100 (0.1290)	0.0105 (0.1072)	0.0101 (0.1270)	0.0106 (0.1059)	0.0105 (0.1183)	0.0111* (0.0948)
CAPTA	–0.2743*** (0.0000)	–0.2695*** (0.0000)	–0.2754*** (0.0000)	–0.2705*** (0.0000)	–0.2760*** (0.0000)	–0.2701*** (0.0000)
DIV	0.1428 (0.1409)	0.1362 (0.1612)	0.1418 (0.1430)	0.1351 (0.1640)	0.1470 (0.1338)	0.1400 (0.1539)
BLEV	–0.0533 (0.1180)		–0.0521 (0.1265)		–0.0528 (0.1252)	
MLEV		–0.0454* (0.0979)		–0.0447* (0.0933)		–0.0490* (0.0847)
EPU_SING	–0.0218*** (0.0087)	–0.0197** (0.0185)				

(*Continued on next page*)

Table 4 (*Continued*)

Variable	CHR is a dependent variable					
	(1)	(2)	(3)	(4)	(5)	(6)
EPU_GLOBAL			–0.0250** (0.0110)	–0.0225** (0.0231)		
EPU_US					–0.0169 (0.1549)	–0.0160 (0.1763)
J-statistic	35.70	34.82	35.67	34.83	38.21	36.95
Prob.(J-statistic)	0.44	0.48	0.44	0.48	0.33	0.38
AR(1)	–7.19***	–7.15***	–7.19***	–7.16***	–7.24***	–7.15***
Prob.(m-statistic)	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	–0.10	–0.08	–0.10	–0.08	0.04	0.03
Prob.(m-statistic)	0.92	0.94	0.92	0.94	0.96	0.97

Notes: Table 4 reports empirical results of Model 3: $CHR_{i,t} = \alpha * CHR_{i,t-1} + \beta * FIRM_{i,t} + \gamma * EPU_{i,t} + \pi_{i,t}$ by using the GMM estimation for yearly observations. *Significance at 10% level, **Significance at 5% level, ***Significance at 1% level. *p*-value is shown in parentheses (). The Sargan tests and tests for autocorrelations at lag (1) – AR (1) and lag (2) – AR (2) are used for examining the valid instrument variables.

All values of VIF tests in the last row of Table 3 are smaller than 2, signifying the absence of the multi-collinearity issue in all pooled regressions of Model 2. The selection of pooled OLS estimation with the fixed effect for Model 2 is adamantly supported by the Breusch–Pagan and robust Hausman tests.

In six columns of Table 4, the lag of the CHR variable is positive at a 1% significance level, showing that our dynamic Model 3 is appropriate. The value of the α coefficient ranges from 0.4342 to 0.4711, meaning that given the effect of EPU as well as firm-specific characteristics, Singaporean firms take at least 1.89 years[5] to reach their target cash balance ratios covering the post-crisis period. This adjustment to the target cash reserves in Singapore firms is slower relative to Indian firms (Anand et al., 2018). This is most likely due to the high cash holding target of Singaporean companies. The results of the Sargan tests and autocorrelations at lag (1) − AR (1) and lag (2) – AR (2) are presented at the bottom rows in Table 4, which advocate the validity of the instrument variables.

CONCLUSION

This paper examines the link between EPU and corporate cash holdings in a country of the ASEAN economic community owning the EPU indicator. More specifically, we attempt to shed light on the query as to whether the increased EPU positively influences corporate cash holdings of Singaporean-listed firms in the post-crisis period. Applying a variety of econometric techniques for panel data, we indicate that the rise of EPU indicators relates to the cash reserves ratio of Singaporean firms at lower levels. Furthermore, this finding is homogenously identified by either global EPU or U.S. EPU indicators. The experimental results assert that corporate managers in the Singapore market explicitly have a speculative trend as EPU reaches higher levels. Our research contributes to the literature on the nexus between EPU and corporate cash holdings in the specific context of an advanced country in Southeast Asia after the global financial crisis. The results prove that the speculative behaviour of Singaporean corporate managers has been vigorously promoted as opposed to increasing cash savings as the EPU increases. Simultaneously, this paper hints at the efficiency of Singapore's new economic policies in the post-financial crisis, which largely overshadow their uncertainty.

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NOTES

1. World Bank Database.
2. Data is provided by the following website: https://data.gov.sg
3. Following Gulen and Ion (2016) as well as Demir and Ersan (2017), the quarterly EPU indicator of Singapore is determined by a weighted average of three monthly EPU indices in the quarter. To use a common value for all indicators in Figure 2, we apply the logarithm algorithm for three quarterly EPU indices (He et al., 2020).
4. The quarterly GDP growth rate of Singapore is based on the spread ratio between Singapore's GDP at the quarter (t) and Singapore's GDP at the quarter ($t-1$), which is taken from the website https://www.singstat.gov.sg
5. The number of years to adjust to the target cash holdings equals $1/(1-\alpha)$.

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