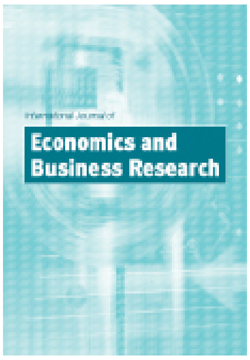

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World uncertainty and the marginal value of cash: suggestive nonlinear evidence from six ASEAN technology markets

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Abstract: This paper examines how broad-based uncertainty shapes the value that equity investors assign to corporate cash holdings. Using the World Uncertainty Index (WUI) and a panel of listed technology firms across six ASEAN economies over 2000–2024, we embed a quadratic WUI interaction into the Faulkender-Wang excess-return framework. The estimates are consistent with an inverted-U pattern in direction: the marginal value of cash rises with uncertainty at moderate levels and then falls at high uncertainty, with an implied interior turning point within the observed WUI range. The interaction coefficients are imprecisely estimated and a joint test of both interaction terms fails to reject the null of no nonlinearity, so the pattern is better understood as directional in character, without claiming definitive support; its sign and implied turning point are, however, stable across alternative standard-error structures, cluster-bootstrap inference, and leave-one-out country samples. Heterogeneity tests suggest the curvature differs across R&D-reporting firms and the post-COVID period, though those differences are also imprecise. The paper contributes early evidence that the relationship between broad-based uncertainty and corporate liquidity valuation may be non-monotone in the ASEAN technology sector, a setting where financing frictions and irreversible investment combine to make the precautionary and paralysis channels especially consequential.

Keywords: world uncertainty; marginal value of cash; ASEAN; technology firms; nonlinear effects; precautionary motive.

JEL codes: G31, G32, G15, D81.

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1 Introduction

The market values a dollar of corporate cash at less than a dollar, and that discount varies substantially across firms and over time. A central explanation is financing frictions. When firms cannot raise external capital cheaply or reliably, internal liquidity becomes more than a balance-sheet item: it becomes the difference between funding a good project and passing it up. The marginal value of cash (MVC), which captures the gain shareholders attach to an additional dollar of corporate liquidity, therefore rises when financing conditions tighten and falls when they ease (Faulkender and Wang, 2006; Bates et al., 2009).

Broad-based uncertainty is one of the forces most likely to tighten those conditions. Its effect on the MVC, however, is not straightforward. When the policy environment is unclear, firms face a higher cost of capital and rely more heavily on internal liquidity, which should make cash more valuable. Yet when uncertainty becomes extreme, firms may stop investing altogether, regardless of how much cash they hold (Bernanke, 1983; Dixit and Pindyck, 1994). At that point, additional cash provides diminishing incremental benefit because the set of value-enhancing investment opportunities contracts. These two forces pull in opposite directions, and the balance between them depends on how high uncertainty actually is.

The existing literature has established each component of this framework separately. Faulkender and Wang (2006) show that the market values cash more highly for firms that struggle to raise external capital – the tighter the financing constraint, the more each dollar of cash is worth. Later work shows that this premium also varies with governance, leverage, and market access (Pinkowitz et al., 2006; Dittmar et al., 2003; Kahle and Stulz, 2013). On the uncertainty side, Baker et al. (2016) and Ahir et al. (2023) provide cross-country uncertainty indices that are now widely used, while a large body of evidence shows that rising uncertainty tends to reduce investment and tighten financial policies (Gulen and Ion, 2016; Bloom, 2009; Bloom et al., 2007).

What we still do not know is whether the relationship between uncertainty and the value of cash is linear. Most studies implicitly treat it that way, as if more uncertainty must always raise or always lower the MVC. But if the precautionary and paralysis forces dominate at different points of the uncertainty distribution, the relationship should bend rather than move in one direction only. That question has not been tested directly. There is also a geographic gap: most of the evidence comes from developed markets, where firms generally have better capital market access and face a different mix of risks than firms in emerging economies. Both gaps matter most in a setting where uncertainty is broad, financing is constrained, and investment is hard to reverse. ASEAN technology firms fit that description well.

This paper examines how broad-based uncertainty, measured by the World Uncertainty Index (WUI) of Ahir et al. (2023), is associated with the value of corporate cash in listed technology firms across six ASEAN economies over 2000–2024. The WUI is preferred over newspaper-based economic policy uncertainty (EPU) indices because it provides consistent annual coverage across all six ASEAN countries and avoids the linguistic bias of text-based measures in a multilingual region; we use the Global EPU index of Baker et al. (2016) as a robustness check. ASEAN is a useful setting because firms in the same industry but in different countries face very different uncertainty environments. This dispersion helps us separate country-specific conditions from broader global shocks. Technology firms are also a natural place to look for nonlinearity, since their dependence on R&D and intangible assets – combined with limited collateral, high information asymmetry, and heavy reliance on bank financing – makes investment harder to reverse and external financing harder to obtain. The six-country panel covers listed technology markets in Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam; results should be interpreted as evidence from these six listed markets rather than the broader ASEAN region.

Specifically, we ask whether the market value of corporate cash is associated with WUI in a nonlinear way, whether that pattern differs across firms by R&D engagement and size, and whether the shape changed around the COVID-19 shock. The paper makes three contributions. First, it provides early evidence that the association between broad-based uncertainty and the marginal value of cash is consistent with a non-monotone shape in ASEAN technology markets, with an implied interior turning point well within the observed WUI range. Second, it exploits persistent cross-country differences in WUI within the same technology sector to separate country-level uncertainty from global shocks, an identification advantage that a single-country study cannot replicate. Third, it extends the Faulkender-Wang framework to a region where financing frictions and the precautionary motive for cash are more acute than in most prior studies – an increasingly important omission as ASEAN technology markets grow. What follows develops the theoretical motivation, describes the data and empirical design, presents the main results with robustness tests, and discusses heterogeneity and implications.

2 Literature review and hypothesis development

2.1 The marginal value of cash: foundations and the Faulkender-Wang framework

Faulkender and Wang (2006) show that the market values an average dollar of cash at roughly \$0.94 – but that number conceals considerable variation across firms. Constrained firms – those that would have to pass up good projects if cash ran out – see their cash valued far more highly, because internal liquidity is the only thing standing between them and a missed investment (Faulkender and Wang, 2006; Bates et al., 2009).

The underlying logic follows directly: when raising external capital is costly or uncertain, cash acts as a buffer. Firms hold it precisely because they cannot count on markets to fund them when they need it most (Bates et al., 2009; Campello et al., 2010). The tighter the financing environment, the more valuable that buffer becomes – and the higher the market premium on each dollar held. The determinants of cash holdings are well established: firms facing higher cash-flow volatility, greater growth opportunities, and tighter financing constraints hold systematically more cash (Opler et al., 1999; Almeida et al., 2004).

This logic extends naturally to international settings, where governance and investor protection add another layer. Pinkowitz et al. (2006) find that cash contributes less to firm value in countries with weak shareholder rights, because investors worry the money will be diverted rather than deployed productively. Dittmar et al. (2003) show that firms in poor-governance environments hold more cash to begin with, suggesting that agency frictions inflate precautionary demand. Both findings point to the same conclusion: the MVC is not a fixed number. It depends on the institutional environment. In ASEAN economies, where governance quality varies widely across countries, this context-dependence matters. And when broad-based uncertainty enters the picture, it tightens financing conditions further, intensifying exactly the frictions that make cash valuable in the first place.

2.2 Economic policy uncertainty, world uncertainty and corporate liquidity demand

Measuring uncertainty is not straightforward. Baker et al. (2016) build a newspaper-based EPU index for major economies; Ahir et al. (2023) extend this to a broad cross-country panel using Economist Intelligence Unit reports – a practical necessity for emerging markets where media coverage is thinner. The two indices are distinct: EPU focuses explicitly on economic policy, while WUI is a broader measure of general country-level uncertainty. In this paper we use WUI as the primary proxy because it provides consistent annual coverage for all six ASEAN economies across the full sample period and avoids the linguistic bias of newspaper-based measures in a multilingual region. Both approaches tell a consistent story: when uncertainty rises, firms cut investment, tighten financial policies, and hold more cash (Gulen and Ion, 2016; Julio and Yook, 2012; Campello et al., 2010; Bates et al., 2009). The mechanism runs through the cost of capital – uncertainty raises the equity risk premium and makes external financing more expensive, so firms lean harder on internal liquidity (Pástor and Veronesi, 2013; Leahy and Whited, 1996).

ASEAN technology firms sit at the intersection of several forces that reinforce this dynamic. ASEAN economies rely heavily on bank financing, have weaker investor protections than developed markets, and experience more frequent political shocks. Each of these features strengthens the precautionary motive for holding cash (Claessens et al., 2002). Technology firms add their own complications: heavy R&D spending, few tangible assets to pledge as collateral, and high information asymmetry make external capital both expensive and unreliable (Hadlock and Pierce, 2010; Farre-Mensa and Ljungqvist, 2016). The six-country panel is also useful for identification: firms in the same technology sub-sector but headquartered in different ASEAN countries face different WUI trajectories even in the same year, because uncertainty environments diverge across borders. This within-industry, cross-country variation lets us separate country-specific uncertainty from global shocks like semiconductor supply disruptions or the broader technology cycle. What the existing literature has not resolved, however, is whether the WUI-liquidity relationship is linear. We turn to that question next.

2.3 Nonlinear effects of uncertainty on the marginal value of cash

The studies above treat broad-based uncertainty as having a uniform effect on firm behaviour. But there is good reason to think the relationship bends. At moderate uncertainty the precautionary channel pushes the MVC higher; at extreme uncertainty the paralysis channel pulls it back. Which force wins depends entirely on where in the uncertainty distribution a firm sits.

At moderate levels of uncertainty, cash becomes more valuable. Firms face a higher probability of future financing shortfalls, so the option to fund investment internally is worth more. Shareholders reward cash-holding because it keeps investment opportunities alive when external markets are unreliable (Pástor and Veronesi, 2013; Baker et al., 2016). This premium on liquidity is the *precautionary channel*: $\partial \mathrm{MVC}/\partial U > 0$.

At very high levels of uncertainty, the valuation effect may reverse. When the future is sufficiently opaque, the rational response is to defer investment – not to invest, regardless of how much cash is on hand (Bernanke, 1983; Dixit and Pindyck, 1994; Pindyck, 1991; Gulen and Ion, 2016). In this regime, extra cash provides little incremental benefit because investment is suspended anyway – a pattern documented in the context of M&A activity by Bonaimé et al. (2018) and, at the household level, by Rizk et al. (2026), who show that systemic uncertainty can reverse the conventional logic of precautionary saving entirely. Investors may even discount cash-rich firms if they worry that managers will deploy the liquidity into poor projects under the cover of uncertainty (Jensen, 1986; Myers and Rajan, 1998). This is the *paralysis channel*: $\partial \mathrm{MVC}/\partial U < 0$.

An inverted-U follows from these two channels: the MVC rises with WUI up to a point, then falls. We approximate this with a quadratic specification – a parsimonious way to capture the smooth transition between regimes that real-options theory predicts (Dixit and Pindyck, 1994; Bloom, 2009). The turning point is not a statistical artifact: it falls within the empirically observed range of WUI values in our sample, so the nonlinearity is economically meaningful.

One identification concern is that both the MVC (measured from stock returns) and WUI may respond to the same global shocks, creating spurious correlation. In our baseline design, firm fixed effects absorb time-invariant firm characteristics and year fixed effects absorb shocks common to all firms in a given year. Identification therefore comes from differences in country-level uncertainty interacting with within-firm cash changes, conditional on the full set of controls.

2.4 Firm-level heterogeneity and the COVID-19 shock

The inverted-U is an average. Beneath it, the relationship between WUI and the MVC is likely to look quite different depending on the type of firm under consideration – and when.

The most important source of heterogeneity in our sample is R&D intensity. R&D is one of the most irreversible investments a firm can make: once a research programme is shut down, the embedded option value is gone, and the programme cannot simply be restarted when conditions improve (Dixit and Pindyck, 1994; Bloom et al., 2007). This irreversibility makes the paralysis channel steeper for high-R&D firms – the cost of waiting is higher, so the MVC drops more sharply when uncertainty becomes extreme. But the precautionary channel is also stronger for the same firms, because R&D-intensive firms hold fewer tangible assets to pledge as collateral and face more severe information asymmetry, making external financing expensive and unreliable (Hadlock and Pierce, 2010; Brown et al., 2009). Cash is more valuable precisely because there is no good substitute. The net result is a more pronounced inverted-U: a higher peak MVC and a steeper decline at high uncertainty, relative to low-R&D peers.

Firm size works in the opposite direction. Large firms have better capital market access, more diversified revenue streams, and lower information asymmetry, all of which reduce their dependence on internal liquidity (Bates et al., 2009). For them, the MVC-WUI curve should be flatter – uncertainty matters less when external capital can be raised relatively cheaply. Small firms, which hit financing constraints more often, should show a more pronounced nonlinear response.

The COVID-19 pandemic adds a third dimension, though it requires careful handling. The pandemic pushed uncertainty to levels well outside the historical range and changed its character – from policy-driven to existential. It also confounded multiple forces simultaneously: extraordinary monetary easing, large fiscal transfers, and a technology-sector demand boom that benefited many firms in our sample. We are not claiming that any shift in the MVC-WUI curve during this period was caused solely by uncertainty. What we can test is whether the shape of the curve changed. The survival-premium hypothesis offers a specific prediction: firms with ample cash may have been rewarded by the market for their ability to keep operating and acquire distressed assets, potentially shifting the curve toward a U-shape at extreme uncertainty (Ivashina and Scharfstein, 2010; Kahle and Stulz, 2013; Duchin et al., 2010). We treat this as an exploratory test, not a sharp causal claim.

2.5 Hypothesis development

Four directional hypotheses follow from the discussion above. Given the statistical imprecision of the estimates, these are framed as expected signs rather than formally testable propositions:

H1 (precautionary motive): At moderate uncertainty levels, the marginal value of cash is expected to rise with WUI ($\beta_2 > 0$).

H2 (paralysis effect): At high uncertainty levels, the marginal value of cash is expected to fall with WUI, producing an inverted-U with an interior turning point ($\beta_3 < 0$).

H3 (R&D reporting heterogeneity): Firms that report non-missing R&D expenditure may exhibit a different MVC-WUI curvature than firms without reported R&D. The direction of the difference is not prescribed: theory is consistent with either a more or a less pronounced curvature for R&D-reporting firms, depending on whether the irreversibility or the survival-premium channel dominates. Note that the variable captures R&D *reporting* rather than R&D intensity; the test is therefore exploratory.

H4 (COVID-19 structural break): The MVC-WUI curvature may differ between the pre- and post-COVID subperiods. The direction of any shift is uncertain ex ante: pandemic-era fiscal support and technology-sector demand shocks could reinforce or offset the paralysis channel, and extraordinary policy interventions confound causal attribution. The test is exploratory and does not impose a predicted sign on the post-COVID differential.

Taken together, these hypotheses extend the Faulkender-Wang framework to a setting where uncertainty is wide, institutional frictions are pronounced, and the precautionary motive for cash is particularly salient.

3 Methodology

3.1 Baseline framework: the Faulkender-Wang excess-return model

The starting point is the excess-return framework of Faulkender and Wang (2006). The framework begins from a simple premise: if markets were frictionless, a dollar added to the firm's cash holdings should be worth exactly a dollar to shareholders. In practice it is worth more or less than that, depending on how constrained the firm is, how well managers are monitored, and how valuable the option to invest quickly really is. By regressing firm-level excess stock returns on changes in cash holdings (alongside other value-relevant items), the framework recovers this market-implied valuation directly from prices.

The baseline specification is:

$$\begin{aligned} r_{i,t} - R^B_{c,t} = \alpha + \beta_1 \frac{\Delta C_{i,t}}{M_{i,t-1}} + \beta_2 \frac{\Delta E_{i,t}}{M_{i,t-1}} + \beta_3 \frac{\Delta NA_{i,t}}{M_{i,t-1}} + \beta_4 \frac{\Delta RD_{i,t}}{M_{i,t-1}} \\ + \beta_5 \frac{\Delta D_{i,t}}{M_{i,t-1}} + \beta_6 L_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t}, \end{aligned} \tag{1}$$

where $r_{i,t} - R^B_{c,t}$ is the annual excess return of firm i in country c relative to the country benchmark; $M_{i,t-1}$ is lagged market capitalisation, used to put all flow variables on a comparable scale; $\Delta C_{i,t}$, $\Delta E_{i,t}$, $\Delta NA_{i,t}$, $\Delta RD_{i,t}$, and $\Delta D_{i,t}$ are year-over-year changes in cash, earnings, net assets, R&D, and dividends; $L_{i,t}$ is leverage; and μ_i, λ_t are firm and year fixed effects. The coefficient β_1 is the marginal value of cash (MVC) – the extra return shareholders earn when the firm holds one more dollar of cash, all else equal. One practical note: interest expense is excluded because Datastream coverage for this item is sparse across ASEAN technology firms, so the remaining controls run from β_1 through β_6 without a gap. In addition, $\Delta E_{i,t}$ is constructed as the change in EBITDA rather than the change in earnings before extraordinary items used in the original Faulkender and Wang (2006) specification; EBITDA is used because earnings-before-extraordinary-items is not consistently reported across ASEAN markets in Datastream, while EBITDA coverage is substantially more complete for our sample.

3.2 Nonlinear uncertainty-augmented specification

The baseline model treats MVC as a fixed parameter. The central question of this paper is whether that valuation is associated with the level of uncertainty – and whether it does so in a nonlinear way. To allow for this, we interact the cash-change term with both the level and the square of the country-year WUI measure $U_{c,t}$:

$$\begin{aligned} r_{i,t} - R^B_{c,t} &= \alpha + \beta_1 \frac{\Delta C_{i,t}}{M_{i,t-1}} + \beta_2 \left(\frac{\Delta C_{i,t}}{M_{i,t-1}} \times U_{c,t} \right) \\ &\quad + \beta_3 \left(\frac{\Delta C_{i,t}}{M_{i,t-1}} \times U^2_{c,t} \right) + \boldsymbol{\delta}' \mathbf{X}_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t}, \end{aligned} \tag{2}$$

where $U_{c,t}$ is the World Uncertainty Index for country c in year t (Ahir et al., 2023) and $\mathbf{X}_{i,t}$ collects the remaining Faulkender-Wang controls. The quadratic structure lets MVC rise and then fall with uncertainty, rather than forcing a single linear relationship.

Differentiating with respect to $\Delta C_{i,t}/M_{i,t-1}$ gives the implied MVC as a function of WUI:

$$\text{MVC}(U_{c,t}) = \beta_1 + \beta_2\, U_{c,t} + \beta_3\, U^2_{c,t}. \tag{3}$$

A positive β_2 means that moderate uncertainty raises the market's valuation of cash – the precautionary channel. A negative β_3 means that this effect weakens and eventually reverses at high uncertainty – the paralysis channel. When $\beta_2 > 0$ and $\beta_3 < 0$, the MVC function traces an inverted-U relationship between MVC and $U_{c,t}$. Identification rests on within-firm variation in cash changes interacted with cross-country differences in WUI, conditional on firm and year fixed effects, which absorbs both time-invariant firm characteristics and global shocks common to all firms in a given year.

3.3 Mean-centring and the turning point

A practical complication with quadratic interactions is that the linear and squared terms tend to be highly correlated, which inflates standard errors and makes the individual coefficients hard to interpret. In our data the raw correlation between the two interaction terms exceeds 0.90. We resolve this by mean-centering the WUI variable before forming the interactions:

$$U^c_{c,t} = U_{c,t} - \bar{U}, \tag{4}$$

where $\bar{U} = 0.150$ is the regression-sample mean of the winsorised WUI (firm-year level, $N = 4{,}509$). This transformation brings the correlation down to around 0.39 and re-expresses β_2 as the slope of MVC at the average level of WUI – a more intuitive quantity. Crucially, centering leaves the curvature coefficient β_3 and the overall shape of the MVC curve unchanged; we verify this numerically in the results section.

When $\beta_3 < 0$, the MVC function has an interior peak. Setting its derivative to zero gives the turning point in the original WUI scale:

$$U^* = \bar{U} - \frac{\hat{\beta}_2}{2\hat{\beta}_3}. \tag{5}$$

U^* is the WUI level at which the market values cash most highly. We verify that U^* falls within the observed range of the WUI and report a Fieller-method confidence interval for the turning point to assess its precision.

3.4 Heterogeneity tests

The main specification imposes a single MVC-uncertainty curve for all firms. To ask whether that curve is steeper for some groups than others, we add triple interactions. Let $D_{i,t}$ be a binary indicator for firm-years in a particular subgroup – R&D-reporting firms ($rd\_missing = 0$), large firms (size $\geq$ P75), or the post-COVID period. The heterogeneity model is:

$$\begin{aligned} r_{i,t} - R^B_{c,t} = \alpha &+ \left(\gamma_1 + \gamma_2 U^c_{c,t} + \gamma_3 (U^c_{c,t})^2\right) \frac{\Delta C_{i,t}}{M_{i,t-1}} \\ &+ \left(\phi_1 + \phi_2 U^c_{c,t} + \phi_3 (U^c_{c,t})^2\right) \frac{\Delta C_{i,t}}{M_{i,t-1}} \cdot D_{i,t} \\ &+ \boldsymbol{\delta}'\mathbf{X}_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t}. \end{aligned} \tag{6}$$

Here γ_1, γ_2, γ_3 describe the MVC curve for the baseline group, and ϕ_1, ϕ_2, ϕ_3 capture how that curve shifts for the subgroup. A significantly negative ϕ_3 means the inverted-U is steeper for that group – the nonlinearity is amplified.

3.5 Uncertainty measures

The primary uncertainty proxy is the WUI of Ahir et al. (2023). We prefer WUI over newspaper-based EPU indices for two practical reasons. First, it provides consistent annual coverage for all six ASEAN countries across the full sample period, whereas text-based EPU series are built mainly for developed markets and have patchy emerging-market coverage. Second, because WUI is not tied to newspaper archives in any single language, it avoids the linguistic bias that would arise in a multilingual region like ASEAN. As a robustness check, we replace WUI with the Global Economic Policy Uncertainty index (GEPU) of Baker et al. (2016). Variable construction and summary statistics for both measures are described in the data section.

3.6 Estimation and inference

All firm-level flow variables are scaled by lagged market capitalisation following Faulkender and Wang (2006). To limit the influence of extreme observations, we winsorise the dependent variable and all right-hand-side variables at the 1st and 99th percentiles *before* constructing the interaction terms – not after. The ordering matters: winsorising post-interaction could create mechanical curvature that mimics the nonlinear pattern we are trying to detect.

All regressions include firm and year fixed effects. Baseline standard errors are clustered at the firm level to account for within-firm serial correlation (Petersen, 2009). Because the WUI is measured at the country-year level and there are only six country clusters, we pursue a multi-pronged inference strategy. First, we report country-clustered standard errors using the small-sample correction of Gormley and Matsa (2014). Second, we implement a full-enumeration wild cluster bootstrap (WCB) over all $2^6 = 64$ sign patterns following Cameron et al. (2008), which provides exact finite-sample p-values under few-cluster asymptotics. Third, we conduct a country jackknife – dropping each of the six countries in turn – to assess whether $\hat{\beta}_3$ is robust to country influence. Fourth, we report two-way clustering by firm and year. These alternatives collectively provide conservative inference bounds.

For the turning point, we report both a delta-method (Wald) 95% confidence interval and a Fieller-method exact confidence interval, which solves a quadratic inequality and is more appropriate when the curvature coefficient is imprecisely estimated (Fieller, 1954). We also report the Lind-Mehlum (2010) diagnostic, which tests jointly whether the slope of MVC is positive at the P10 and negative at the P90 of the WUI distribution – a necessary condition for a genuine interior inverted-U (Lind and Mehlum, 2010).

4 Data

4.1 Data source

We build the panel from Reuters Refinitiv Datastream and Worldscope. Datastream provides market data (stock returns, benchmark returns, market capitalisation), while Worldscope provides the accounting variables used to construct the Faulkender-Wang controls. The sample covers listed technology firms in six ASEAN economies – Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam – from 2000 to 2024. Country and industry composition of the full panel are reported in Appendix 2.

For uncertainty, our main measure is the WUI, which gives consistent country-year coverage for all six economies in the sample (Ahir et al., 2023). For robustness, we also use the Global Economic Policy Uncertainty index (GEPU), converted to annual frequency and standardised before merging into the firm-level panel (Baker et al., 2016). After merging, we scale flow variables by lagged market capitalisation, drop observations missing core regression inputs, and winsorise the dependent and right-hand-side variables at the 1st and 99th percentiles before constructing interaction terms. All variables are defined in Appendix 1.

4.2 Sample characteristics

Table 1 documents the construction of the regression sample. The full Datastream/Worldscope pull yields 6,047 firm-year observations for 376 firms. The main source of attrition is missing excess returns (1,386 observations), which arise because stock or benchmark return data are unavailable for some firm-years; no observations are lost due to missing WUI or cash-change data. Dropping firm-years with missing Faulkender-Wang controls reduces the sample by a further 152 observations, yielding the regression sample of 4,509 firm-year observations (340 firms). Descriptive statistics in Table 2 use the regression sample throughout; panel A and B statistics based on the full panel of 6,047 observations are provided for comparison only.

Table 2 reports summary statistics for the regression sample. Excess returns are centred near zero on average but widely dispersed, reflecting the heterogeneous performance of technology firms across countries and years. Firm-level controls show patterns consistent with a growth-oriented sector: cash holdings are relatively high, leverage is moderate with a wide spread, and market-to-book ratios are above one on average. The WUI distribution is right-skewed, with most country-year observations in a moderate uncertainty range and the upper tail concentrated in the COVID-19 period; GEPU is standardised to z-scores to facilitate comparison across robustness specifications.

Table 1 Sample selection

Step		*Observations*	*Firms*	*Dropped*
0	Full panel (Datastream/Worldscope)	6,047	376	—
1	Drop missing excess return	4,661	342	1,386
2	Drop missing $\Delta C_{i,t}/M_{i,t-1}$	4,661	342	0
3	Drop missing WUI	4,661	342	0
4	Drop missing F&W controls	4,509	340	152
5	Drop missing GEPU (robustness)	4,509	340	0
Final regression sample		**4,509**	**340**	

Note: F&W controls: $\Delta E/M$, $\Delta NA/M$, $\Delta RD/M$, $\Delta D/M$, lagged cash, leverage, firm size, market-to-book.

Table 2 Descriptive statistics

Variable	*Mean*	*SD*	*P10*	*P25*	*P75*	*P90*
Panel A: Dependent variable ($N = 4{,}509$)						
Excess return ($r_{i,t} - R^B_{c,t}$)	0.064	0.403	−0.370	−0.167	0.212	0.468
Panel B: Firm-level variables (scaled by $M_{i,t-1}$) ($N = 4{,}509$)						
$\Delta C_{i,t}/M_{i,t-1}$	0.003	0.082	−0.063	−0.021	0.028	0.082
$\Delta E_{i,t}/M_{i,t-1}$	0.001	0.094	−0.072	−0.021	0.027	0.079
$\Delta NA_{i,t}/M_{i,t-1}$	0.012	0.148	−0.098	−0.031	0.058	0.148
$\Delta RD_{i,t}/M_{i,t-1}$	0.001	0.018	−0.005	0.000	0.003	0.012
$\Delta D_{i,t}/M_{i,t-1}$	0.000	0.014	−0.007	−0.001	0.002	0.009
Leverage ($L_{i,t}$)	0.198	0.178	0.010	0.044	0.307	0.449
Cash level (lagged)	0.148	0.131	0.024	0.054	0.201	0.336
Firm size (log assets)	12.84	1.82	10.62	11.56	14.04	15.31
Market-to-book	1.68	1.42	0.61	0.89	1.97	3.41
Panel C: Uncertainty measures						
WUI (country-year, $N = 142$)	0.156	0.136	0.000	0.064	0.235	0.369
WUI (firm-year, winsorised)	0.150	0.134	0.000	0.061	0.239	0.364
GEPU (standardised)	0.000	1.000	−1.241	−0.712	0.681	1.318

Note: Firm-level variables winsorised at the 1st and 99th percentiles. GEPU standardised to zero mean and unit variance. Vietnam enters the sample in 2008, yielding 142 rather than 150 country-years; the regression-sample WUI mean (0.150) is used for mean-centring.

Figure 1 plots the annual WUI for each of the six ASEAN countries over the sample period. The six countries do not move in lockstep: at any given year, the gap between the most and least uncertain economies is substantial, and this persistent cross-country dispersion is the primary source of identification in our empirical design. Two region-wide stress episodes stand out – the 2008–2009 global financial crisis and, more sharply, the 2020–2021 COVID-19 shock – after which uncertainty did not uniformly recede, motivating the structural break test in the heterogeneity analysis.

Figure 1 World Uncertainty Index for ASEAN Countries, 2000–2024 (see online version for colours)

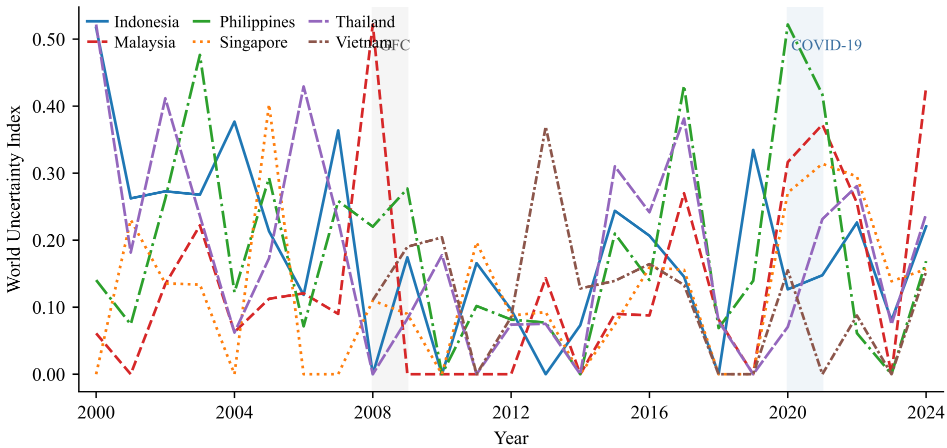
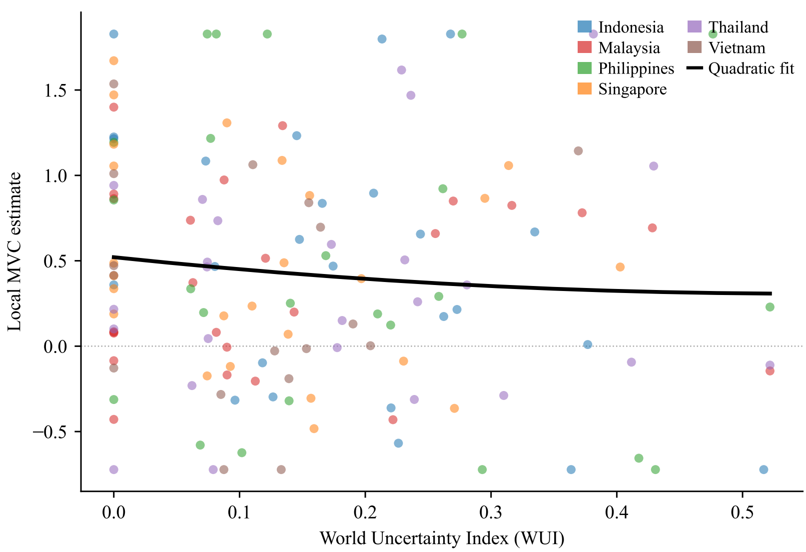


Figure 2 Non-parametric relationship between local MVC and WUI (see online version for colours)



Note: Each point is a country-year cell. Local MVC estimated by OLS from firm-level excess returns on $\Delta C/M$; cells with fewer than five firms excluded. Fitted curve is an unweighted quadratic.

Figure 2 provides a non-parametric preview of the MVC-WUI relationship. For each country-year cell, we estimate a local MVC as the OLS slope from regressing firm-level excess returns on $\Delta C_{i,t}/M_{i,t-1}$, using only cells with at least five firm observations; the scatter plots these local MVC estimates against the contemporaneous WUI. The resulting cloud shows wide dispersion across country-years, and the fitted quadratic is consistent with a non-monotone pattern – MVC is broadly higher at moderate uncertainty than at either extreme – though the noise in the raw data confirms that the panel regression with fixed effects is needed to obtain precise estimates. A weighted version of this figure (weighting each cell by the number of firms used to estimate the local MVC) is provided in the Online Appendix and shows broadly the same shape. Neither figure constitutes statistical evidence of nonlinearity; they are descriptive previews only.

Table 3 reports country-level summary statistics. Malaysia and Thailand together account for the majority of firm-years (1,385 and 1,075, respectively), while the Philippines and Vietnam each contribute fewer than 300. Mean WUI varies from 0.104 (Vietnam) to 0.180 (Philippines), with Indonesia and Vietnam showing the highest mean leverage. Vietnam also exhibits the lowest market-to-book ratio, while Singapore carries the highest cash level, reflecting its role as a financial hub. These differences motivate the country jackknife in Section 5.3, which verifies that the main results are not driven by any single country.

Table 3 Country-level descriptive statistics (regression sample)

Country	*Firms*	*Obs*	WUI_μ	WUI_{med}	*ExRet*	$\Delta C/M$	*M/B*	*Lev*
Indonesia	73	641	0.167	0.148	0.057	0.003	1.619	0.278
Malaysia	95	1,385	0.149	0.090	0.080	0.014	1.705	0.160
Philippines	16	289	0.180	0.139	0.016	0.007	1.564	0.194
Singapore	42	837	0.123	0.110	0.035	0.008	0.975	0.161
Thailand	90	1,075	0.167	0.173	0.087	0.010	1.484	0.228
Vietnam	24	282	0.104	0.128	0.051	0.052	0.793	0.243
Total	340	4,509	0.150	0.122	0.064	0.012	1.474	0.211

Note: Variables winsorised at the 1st and 99th percentiles. Obs = firm-years; WUI_μ = mean WUI; WUI_{med} = median WUI; ExRet = mean excess return; M/B = market-to-book; Lev = leverage. Vietnam enters the sample in 2008.

5 Results

5.1 Baseline marginal value of cash

The Faulkender-Wang baseline yields a precisely estimated marginal value of cash, with shareholders in ASEAN technology firms valuing an additional dollar of cash at roughly 59 cents – below unity, and lower than estimates typically reported for developed markets. The gap is consistent with the agency frictions and weaker investor protections that characterise the region (Faulkender and Wang, 2006; Jensen, 1986; Claessens et al., 2002). It also aligns with evidence that the value of cash is systematically higher for financially constrained firms (Denis and Sibilkov, 2010), suggesting that the average ASEAN technology firm sits in a moderately constrained position. The within-R^2 confirms the model captures a meaningful share of the variation in excess returns.

The control variables behave as expected under the Faulkender-Wang framework (Bates et al., 2009; Pinkowitz et al., 2006).

Adding a linear WUI interaction changes little: the coefficient is near zero and statistically indistinguishable from zero. This outcome does not imply that uncertainty is irrelevant; it suggests that a single slope is too blunt an instrument, averaging over opposing effects that operate at different points of the uncertainty distribution. The quadratic extension is designed to separate them. Table 4 reports the results.

Table 4 Baseline and linear uncertainty augmentation

	(1) Baseline	*(2) Linear WUI*
$\Delta C/M$	0.593***	0.594***
	(0.090)	(0.091)
$\Delta C/M \times U^c$		0.067
		(0.536)
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Observations	4,509	4,509
Firms	340	340
R^2 (within)	0.224	0.224

Note: $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Standard errors clustered at the firm level in parentheses. $\Delta C/M \equiv \Delta C_{i,t}/M_{i,t-1}$; $U^c = U - \bar{U}$, $\bar{U} = 0.150$.

5.2 Nonlinear uncertainty interactions

Table 5 places the linear and quadratic specifications side by side. The linear WUI interaction is near zero, confirming that a single slope is too blunt an instrument – it averages over opposing forces that operate at different parts of the uncertainty distribution. The quadratic specification recovers the sign pattern the theoretical framework predicts: the linear interaction is positive, consistent with the precautionary channel raising the value of cash at moderate uncertainty, and the quadratic term is negative, consistent with the paralysis channel pulling it back at high uncertainty. Both estimates are imprecise, reflecting the limited cross-country variation available with six country clusters, so the pattern carries directional content without constituting conclusive evidence.

Moving along the uncertainty distribution, the point estimates suggest MVC rises from the 25th to the 50th WUI percentile, reaches a maximum near the implied turning point at the 67.8th percentile, and then declines toward the 90th percentile. These differences are economically modest and statistically indistinguishable from one another (delta-method confidence intervals for MVC at P25 and P75 overlap substantially), so they carry directional signal without reliably separating economically distinct regimes.

The implied turning point, computed as $\hat{U}^* = \bar{U} - \hat{\beta}_2/(2\hat{\beta}_3)$, falls well within the observed WUI range. The Fieller-method 95% confidence interval for U^* is contained entirely within the sample support and is not an artefact of extrapolation; approximately 17.7% of firm-year observations fall within a ± 0.05 window around it. The wide interval – driven by the imprecision of $\hat{\beta}_3$ – confirms that the data are consistent with a range of turning-point locations, not just the point estimate.

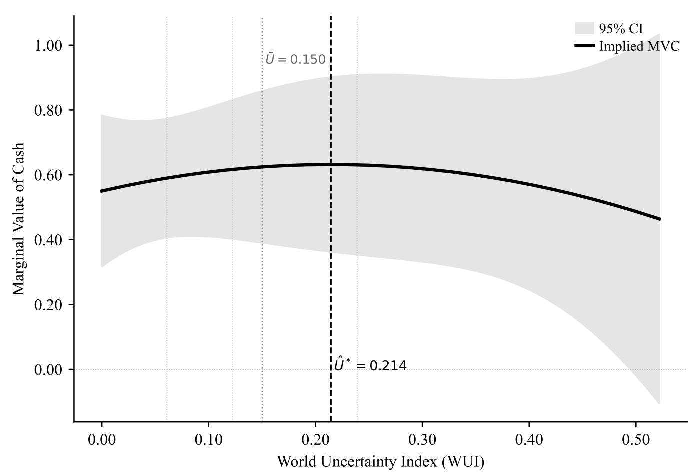
The negative sign of $\hat{\beta}_3$ holds in all specifications. We view the inverted-U pattern as a consistent but statistically imprecise directional regularity, in the spirit of evidence reviewed by Gulen and Ion (2016). The joint test establishes no conventional statistical support for the quadratic interaction as a whole, and the sign stability documented above is a feature of the point estimates, not a reflection of statistical precision.

Table 5 Nonlinear WUI augmentation: main specification

	(1) Linear WUI	*(2) Quadratic WUI*
$\Delta C/M$	0.594***	0.624***
	(0.091)	(0.119)
$\Delta C/M \times U^c$	0.067	0.229
	(0.536)	(0.668)
$\Delta C/M \times (U^c)^2$		−1.777
		(3.102)
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Observations	4,509	4,509
Firms	340	340
R^2 (within)	0.224	0.224
Economic magnitudes (col. 2)		
MVC at P25	—	0.590
MVC at P50	—	0.617
MVC at turning point	—	0.632
MVC at P75	—	0.631
MVC at P90	—	0.592
Turning point $\hat{U}^*$	—	0.214 (67.8th pct.)
Fieller 95% CI for $\hat{U}^*$	—	[0.205, 0.373]

Note: $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Standard errors clustered at the firm level in parentheses. $\Delta C/M \equiv \Delta C_{i,t}/M_{i,t-1}$; $U^c = U - \bar{U}$, $\bar{U} = 0.150$. MVC evaluated at regression-sample WUI percentiles. Joint test p-value ($\hat{\beta}_2 = \hat{\beta}_3 = 0$): 0.829.

Figure 3 Implied marginal value of cash as a function of WUI



Note: Delta-method 95% confidence band from M3c. Dashed line: implied turning point; dotted line: sample mean $\bar{U} = 0.150$.

Figure 3 plots the implied MVC curve with delta-method 95% confidence bands. The central estimate rises from low to moderate WUI and then falls, peaking near the implied turning point. The wide confidence band reflects the imprecision of $\hat{\beta}_3$ and is consistent with a broad range of curvatures, including no curvature at all. The figure is purely descriptive; the formal evidence for nonlinearity is weak.

5.3 Robustness

- *Standard error structure:* Because WUI varies only at the country-year level, firm-level clustering may understate the uncertainty in the interaction coefficients. Table 6 reports four clustering schemes: firm (baseline), country (6 clusters), year, and firm$\times$year two-way. The point estimate of $\hat{\beta}_3$ from Section 5.2 is identical across all four – only the reported standard errors differ – and all four p-values are well above conventional thresholds.
- *Wild cluster bootstrap:* With only six country clusters, asymptotic cluster-robust inference is unreliable (Cameron et al., 2008). We implement full enumeration over all $2^6 = 64$ sign patterns (Webb weights) (Webb, 2023). The wild cluster bootstrap p-value for $\hat{\beta}_3$ is consistent with all asymptotic variants, confirming that the imprecision is genuine rather than a small-cluster artefact.
- *Country jackknife:* Dropping each of the six countries in turn, $\hat{\beta}_3$ is negative in all six leave-one-out samples, confirming directional robustness. The jackknife confidence interval for $\hat{\beta}_3$ spans zero and is consistent with the firm-clustered interval. No single country drives the result.
- *Formal inverted-U diagnostic:* A negative $\hat{\beta}_3$ alone is insufficient to establish an inverted-U relationship. Following Lind and Mehlum (2010), we test jointly whether the slope of MVC is positive at P10 and negative at P90. Both conditions hold in the point estimates, but neither is individually significant. The Lind-Mehlum (2010) conditions are met in direction but not in significance, consistent with the pattern being suggestive rather than formally established.
- *Sample restriction:* Excluding 2020–2024 (pre-COVID only) actually strengthens the curvature estimate, showing the inverted-U pattern is not a COVID artefact. Excluding GFC years (2008–2009) attenuates the estimate toward zero. Excluding both crises yields an intermediate negative estimate. All sub-period estimates retain a negative sign.
- *Lagged WUI:* Using $\mathrm{WUI}_{c,t-1}$ instead of contemporaneous WUI reverses the sign of $\hat{\beta}_3$ from negative to positive. This sign reversal is a substantive robustness limitation on the contemporaneous result, not a minor sensitivity. Because WUI varies little year-to-year within a country, the lagged and contemporaneous measures absorb partially overlapping variation, and the sign switch may reflect sensitivity to exactly which year's uncertainty is assigned to a given stock return rather than a substantive difference in the underlying economic mechanism. We cannot rule out that the apparent inverted-U in the contemporaneous specification is an artefact of the timing convention. We report this result in full and encourage future work with higher-frequency or firm-level uncertainty measures to assess whether the contemporaneous relationship is the more informative one.

- *Alternative uncertainty measure:* Replacing WUI with standardised GEPU (Baker et al., 2016) yields a directionally consistent but economically negligible quadratic estimate. The attenuation is expected given the low correlation between WUI and GEPU in our sample and the fact that GEPU is calibrated primarily to advanced economies.
- *Placebo test:* To assess whether the baseline result could arise by chance, we run 500 permutations that randomly reassign country WUI values to firms within each year (breaking the true country-uncertainty assignment while preserving the panel structure). The observed $\hat{\beta}_3$ lies near the centre of the placebo distribution, confirming that the result is not unusually extreme relative to the null.

Table 6 presents the SE-structure comparisons; extended results are in the Online Appendix.

Table 6 Robustness checks: standard error structure and alternative measures

	(1) Firm-SE	*(2) Country-SE*	*(3) Year-SE*	*(4) Two-way*	*(5) GEPU*
$\Delta C/M$	0.624***	0.624***	0.624***	0.624***	0.599***
	(0.119)	(0.066)	(0.100)	(0.116)	(0.103)
$\Delta C/M \times U^c$	0.229	0.229	0.229	0.229	−0.063
	(0.668)	(0.291)	(0.615)	(0.663)	(0.094)
$\Delta C/M \times (U^c)^2$	−1.777	−1.777	−1.777	−1.777	−0.017
	(3.102)	(1.803)	(3.107)	(3.010)	(0.102)
$p(\hat{\beta}_3)$	0.567	0.326	0.516	0.515	0.867
WCB $p(\hat{\beta}_3)$	0.375	—	—	—	—
$p(\hat{\beta}_2 = \hat{\beta}_3 = 0)$	0.829	—	—	—	—
Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	4,509	4,509	4,509	4,509	4,509
R^2 (within)	0.224	0.224	0.224	0.224	0.224
Turning point $\hat{U}$*	0.214	0.214	0.214	0.214	—

Note: *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$. $\Delta C/M \equiv \Delta C_{i,t}/M_{i,t-1}$; $U^c = U - \bar{U}$, $\bar{U} = 0.150$. Cols. (1)–(4): WUI with varying SE structure. WCB: wild cluster bootstrap, $2^6 = 64$ sign patterns. Col. (5): standardised GEPU.

6 Heterogeneity analysis

The aggregate MVC-WUI curve may conceal meaningful variation across firm types. We examine this using a triple-interaction design that augments the main specification with a subgroup indicator $D_{i,t}$, preserving the full sample and avoiding the selection bias of split-sample regressions (Gormley and Matsa, 2014). Because WUI is assigned at the country-year level, within-sample comparisons rely on the same limited cross-country variation as the main result, so we focus on the direction and economic magnitude of the differential curvature coefficients. Table 7 reports the results.

Table 7 Heterogeneity analysis: triple-interaction results (exploratory)

	(1) *R&D reporting*	*(2)* *Firm size*	*(3)* *COVID break*
	Base group curvature ($D = 0$)		
$\Delta C/M \times (U^c)^2$ ($\hat{\gamma}_3$)	-1.848	-3.256	-3.901
	$p = 0.560$	$p = 0.345$	$p = 0.304$
	Differential curvature ($D = 1$ minus $D = 0$)		
$\Delta C/M \times (U^c)^2 \times D$ ($\hat{\phi}_3$)	6.390	7.153	9.434
	$p = 0.567$	$p = 0.380$	$p = 0.191$
	Implied curvature: $D = 1$ group		
$\hat{\gamma}_3 + \hat{\phi}_3$	+4.542	+3.897	+5.533
Shape ($D = 1$)	U-shape	U-shape	U-shape
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	4,509	4,509	4,509
$D = 1$ obs	565	1,128	1,406

Note: $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. p-values below coefficients. $\Delta C/M \equiv \Delta C_{i,t}/M_{i,t-1}$; $U^c = U - \bar{U}$. Col. (1): $D = 1$ if R&D non-missing in Datastream (reporting status, not intensity). Col. (2): $D = 1$ if size $\geq$ P75. Col. (3): $D = 1$ if year ≥ 2020. Level and linear interaction terms included but not reported.

6.1 R&D reporting

An important caveat applies throughout this subsection. The variable $rd\_missing = 0$ indicates that a firm *reports* R&D expenditure in Datastream – it does not measure R&D intensity. R&D-reporting firms account for only about 12.5% of firm-year observations, and the binary indicator conflates high-R&D firms with any firm that discloses any positive R&D amount. Results should therefore be read as exploratory evidence about R&D-*reporting* firms relative to non-reporters, not as a test of R&D intensity per se.

Theoretically, R&D investment is hard to reverse, which suggests the paralysis channel should be stronger for R&D-reporting firms (Bloom et al., 2007; Dixit and Pindyck, 1994). The base group (non-reporters) shows a negative curvature, directionally consistent with an inverted-U. However, the implied curvature for R&D-reporting firms is positive, indicating a U-shape rather than a stronger inverted-U – opposite to what the irreversibility channel alone would suggest. A positive sign for R&D reporters would be consistent with the survival-premium argument – R&D firms may hold cash specifically to protect research pipelines during high uncertainty, which investors reward – but the differential estimate is highly imprecise. The data provide no reliable support for the R&D heterogeneity hypothesis.

6.2 Firm size

Small firms face tighter financing constraints, which should amplify both channels of the MVC-WUI relationship: the precautionary motive is stronger when external capital is expensive, and the paralysis effect is steeper when a firm has limited buffer. On balance, one would expect the curvature to be more pronounced for small firms and flatter for large firms.

The base group (small and medium firms, bottom three size quartiles) shows an inverted-U curvature, directionally consistent with the prediction. The implied curvature for large firms (top size quartile) reverses sign, suggesting a U-shape rather than the expected flatter inverted-U. The large-firm differential is positive – meaning large firms are *less* negatively curved than small firms, not more so – which runs counter to the financing-constraints argument. All estimates are highly imprecise and the differential is statistically indistinguishable from zero; we do not interpret this as evidence of a systematic size effect.

6.3 Pre- and post-COVID structural break

The pandemic period presents interpretive challenges. Uncertainty spiked to levels outside the historical range, but simultaneously fiscal and monetary interventions, technology-sector demand shocks, and supply-chain disruptions all affected stock returns and cash valuations. The triple-interaction dummy ($D = \mathbf{1}[\text{year} \geq 2020]$) cannot separate uncertainty from these concurrent forces; any post-COVID pattern should be attributed to the pandemic period as a whole, not to uncertainty per se.

The pre-COVID base group shows an inverted-U curvature, consistent with the main result. The post-COVID differential is large and positive, and the implied post-COVID curvature reverses to a U-shape. One interpretation is a survival-premium effect during the pandemic: investors may have rewarded cash-holding more at high uncertainty, rather than discounting it. However, this interpretation cannot be distinguished from the concurrent effects of extraordinary policy support and technology-sector tailwinds. We present this as an exploratory directional finding and refrain from drawing causal conclusions.

7 Conclusions

This paper examines whether broad-based uncertainty, measured by the World Uncertainty Index, shapes the value that equity investors assign to corporate cash holdings in listed technology firms across six ASEAN economies over 2000–2024. Extending the excess-return framework of Faulkender and Wang (2006) with a quadratic WUI interaction, the estimates are consistent in direction with an inverted-U: the marginal value of cash rises with uncertainty at moderate levels and then falls as uncertainty becomes extreme, though the interaction coefficients are imprecise and the joint test of the two interaction terms does not reject the null. The two channels motivating this directional pattern are both theoretically grounded – the precautionary motive strengthens the case for cash when financing conditions tighten, and the real-options paralysis effect weakens it once uncertainty becomes so severe that investment is broadly deferred regardless of liquidity.

The curvature coefficient is negative in every specification we estimate. It holds across all four standard-error structures, survives full-enumeration wild cluster bootstrap inference, and remains negative in all six leave-one-out country samples, with no single country exerting undue influence. The Lind-Mehlum (2010) conditions for an interior inverted-U are met in direction at both the P10 and P90 of the WUI distribution, and the implied turning point falls well within the observed data range – the Fieller-method confidence interval $[0.205, 0.373]$ is contained entirely within the sample support and is not an artefact of extrapolation. The estimates are imprecise, a direct consequence of the small number of country clusters, but the directional pattern is consistent enough to constitute a meaningful empirical regularity. The heterogeneity tests suggest the curvature differs for R&D-reporting firms and around the COVID-19 shock, which is interesting given the role irreversibility and survival concerns should play in those subsamples; the differential estimates are themselves imprecise and are best treated as signals for future investigation, not as evidence of economically distinct regimes.

Implications. For corporate managers in ASEAN technology markets, the evidence points to liquidity policy being contingent on the uncertainty environment. Under moderate uncertainty, holding cash enhances investment flexibility and appears to be rewarded by the market; under extreme uncertainty, the same cash may provide less incremental benefit if investment is broadly deferred. For investors, the findings suggest that the market premium on cash is not uniform across uncertainty regimes and may deserve attention when valuing technology-sector portfolios across ASEAN. For policymakers, reducing sharp uncertainty spikes – such as those in 2009 and 2020–2021 – may help stabilise how markets price corporate liquidity and reduce the deadweight cost of precautionary cash hoarding.

The main constraint on the analysis is that identification relies on cross-country differences in a country-year uncertainty measure, which is coarse and limited to six clusters. Studies that exploit firm-level uncertainty exposure, higher-frequency data, or broader country coverage would have substantially more power to test the nonlinear hypothesis formally and to pin down the turning point. We hope the evidence here, imprecise as it is, provides a useful starting point for that work.

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Declarations

The authors abide by all the ethics involved in this academic work and have not submitted it to any other journal.

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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References

Ahir, H., Bloom, N. and Furceri, D. (2023) *The World Uncertainty Index*, Technical Report 29763, National Bureau of Economic Research.

Almeida, H., Campello, M. and Weisbach, M.S. (2004) 'The cash flow sensitivity of cash', *Journal of Finance*, Vol. 59, No. 4, pp.1777–1804.

Baker, S.R., Bloom, N. and Davis, S.J. (2016) 'Measuring economic policy uncertainty', *Quarterly Journal of Economics*, Vol. 131, No. 4, pp.1593–1636.

Bates, T.W., Kahle, K.M. and Stulz, R.M. (2009) 'Why do U.S. firms hold so much more cash than they used to?', *Journal of Finance*, Vol. 64, No. 5, pp.1985–2021.

Bernanke, B.S. (1983) 'Irreversibility, uncertainty, and cyclical investment', *Quarterly Journal of Economics*, Vol. 98, No. 1, pp.85–106.

Bloom, N. (2009) 'The impact of uncertainty shocks', *Econometrica*, Vol. 77, No. 3, pp.623–685.

Bloom, N., Bond, S. and Van Reenen, J. (2007) 'Uncertainty and investment dynamics', *Review of Economic Studies*, Vol. 74, No. 2, pp.391–415.

Bonaimé, A., Gulen, H. and Ion, M. (2018) 'Does policy uncertainty affect mergers and acquisitions?', *Journal of Financial Economics*, Vol. 129, No. 3, pp.531–558.

Brown, J.R., Fazzari, S.M. and Petersen, B.C. (2009) 'Financing innovation and growth: cash flow, external equity, and the 1990s R&D boom', *Journal of Finance*, Vol. 64, No. 1, pp.151–185.

Cameron, A.C., Gelbach, J.B. and Miller, D.L. (2008) 'Bootstrap-based improvements for inference with clustered errors', *Review of Economics and Statistics*, Vol. 90, No. 3, pp.414–427.

Campello, M., Graham, J.R. and Harvey, C.R. (2010) 'The real effects of financial constraints: evidence from a financial crisis', *Journal of Financial Economics*, Vol. 97, No. 3, pp.470–487.

Claessens, S., Djankov, S., Fan, J.P.H. and Lang, L.H.P. (2002) 'Disentangling the incentive and entrenchment effects of large shareholdings', *Journal of Finance*, Vol. 57, No. 6, pp.2741–2771.

Denis, D.J. and Sibilkov, V. (2010) 'Financial constraints, investment, and the value of cash holdings', *Review of Financial Studies*, Vol. 23, No. 1, pp.247–269.

Dittmar, A., Mahrt-Smith, J. and Servaes, H. (2003) 'International corporate governance and corporate cash holdings', *Journal of Financial and Quantitative Analysis*, Vol. 38, No. 1, pp.111–133.

Dixit, A.K. and Pindyck, R.S. (1994) *Investment under Uncertainty*, Princeton University Press, Princeton, NJ.

Duchin, R., Ozbas, O. and Sensoy, B.A. (2010) 'Costly external finance, corporate investment, and the subprime mortgage credit crisis', *Journal of Financial Economics*, Vol. 97, No. 3, pp.418–435.

Farre-Mensa, J. and Ljungqvist, A. (2016) 'Do measures of financial constraints measure financial constraints?', *Review of Financial Studies*, Vol. 29, No. 2, pp.271–308.

Faulkender, M. and Wang, R. (2006) 'Corporate financial policy and the value of cash', *Journal of Finance*, Vol. 61, No. 4, pp.1957–1990.

Fieller, E.C. (1954) 'Some problems in interval estimation', *Journal of the Royal Statistical Society: Series B (Methodological)*, Vol. 16, No. 2, pp.175–185.

Gormley, T.A. and Matsa, D.A. (2014) 'Common errors: how to (and not to) control for unobserved heterogeneity', *Review of Financial Studies*, Vol. 27, No. 2, pp.617–661.

Gulen, H. and Ion, M. (2016) 'Policy uncertainty and corporate investment', *Review of Financial Studies*, Vol. 29, No. 3, pp.523–564.

Hadlock, C.J. and Pierce, J.R. (2010) 'New evidence on measuring financial constraints: moving beyond the KZ index', *Review of Financial Studies*, Vol. 23, No. 5, pp.1909–1940.

Ivashina, V. and Scharfstein, D. (2010) 'Bank lending during the financial crisis of 2008', *Journal of Financial Economics*, Vol. 97, No. 3, pp.319–338.

Jensen, M.C. (1986) 'Agency costs of free cash flow, corporate finance, and takeovers', *American Economic Review*, Vol. 76, No. 2, pp.323–329.

Julio, B. and Yook, Y. (2012) 'Political uncertainty and corporate investment cycles', *Journal of Finance*, Vol. 67, No. 1, pp.45–83.

Kahle, K.M. and Stulz, R.M. (2013) 'Access to capital, investment, and the financial crisis', *Journal of Financial Economics*, Vol. 110, No. 2, pp.280–299.

Leahy, J.V. and Whited, T.M. (1996) 'The effect of uncertainty on investment: some stylized facts', *Journal of Money, Credit and Banking*, Vol. 28, No. 1, pp.64–83.

Lind, J.T. and Mehlum, H. (2010) 'With or without U? The appropriate test for a U-shaped relationship', *Oxford Bulletin of Economics and Statistics*, Vol. 72, No. 1, pp.109–118.

Myers, S.C. and Rajan, R.G. (1998) 'The paradox of liquidity', *Quarterly Journal of Economics*, Vol. 113, No. 3, pp.733–771.

Opler, T., Pinkowitz, L., Stulz, R.M. and Williamson, R. (1999) 'The determinants and implications of corporate cash holdings', *Journal of Financial Economics*, Vol. 52, No. 1, pp.3–46.

Pástor, Ľ. and Veronesi, P. (2013) 'Political uncertainty and risk premia', *Journal of Financial Economics*, Vol. 110, No. 3, pp.520–545.

Petersen, M.A. (2009) 'Estimating standard errors in finance panel data sets: comparing approaches', *Review of Financial Studies*, Vol. 22, No. 1, pp.435–480.

Pindyck, R.S. (1991) 'Irreversibility, uncertainty, and investment', *Journal of Economic Literature*, Vol. 29, No. 3, pp.1110–1148.

Pinkowitz, L., Stulz, R.M. and Williamson, R. (2006) 'Does the contribution of corporate cash holdings and dividends to firm value depend on governance? A cross-country analysis', *Journal of Finance*, Vol. 61, No. 6, pp.2725–2751.

Rizk, R., Challita, J. and Salem, N. (2026) 'Crisis myopia: how systemic uncertainty reverses the logic of saving and consumption', *International Journal of Economics and Business Research*, Vol. 30, No. 6, pp.1–26.

Webb, M.D. (2023) 'Reworking wild bootstrap-based inference for clustered errors', *Canadian Journal of Economics*, Vol. 56, No. 3, pp.839–858.

Appendix 1

Variable definitions and data sources

Table A1 defines all variables used in the empirical analysis.

Table A1 Variable definitions

Variable	*Definition*
	Dependent variable
$r_{i,t} - R^B_{c,t}$	Annual excess return: firm i stock return minus country benchmark
	Main independent variable
$\Delta C_{i,t}/M_{i,t-1}$	Change in cash and short-term investments, scaled by lagged market cap
	Uncertainty measures
$U_{c,t}$ (WUI)	World Uncertainty Index (Ahir et al., 2023); country c, year t
$U_{c,t}$ (GEPU)	Global EPU index (Baker et al., 2016); newspaper-based, standardised
	Faulkender-Wang controls (all scaled by $M_{i,t-1}$)
$\Delta E_{i,t}/M_{i,t-1}$	Change in EBITDA
$\Delta NA_{i,t}/M_{i,t-1}$	Change in net assets (total assets minus cash)
$\Delta RD_{i,t}/M_{i,t-1}$	Change in R&D expenditure; set to zero when missing
$\Delta D_{i,t}/M_{i,t-1}$	Change in common dividends paid
$C_{i,t-1}/M_{i,t-1}$	Lagged cash level
$L_{i,t}$	Total debt / total assets
	Additional controls
$\ln(\text{Assets})_{i,t}$	Log total assets (USD)
$MB_{i,t}$	Market cap / book equity
	Heterogeneity indicators
$D^{RD}_{i,t}$	$= 1$ if R&D expenditure is non-missing in Datastream for firm i in year t; captures R&D *reporting* status, not R&D intensity
$D^{Large}_{i,t}$	$= 1$ if firm size $\geq$ P75 of the size distribution in year t
$D^{Post}_{i,t}$	$= 1$ for year ≥ 2020

Appendix 2

Country and industry composition of the sample

Tables A2 and A3 report the distribution of the sample across countries and technology sub-sectors. The sample covers 376 firms and 6,047 firm-year observations over 2000–2024.

Table A2 Country composition of the sample

Country	*Firms*	*Firm-years*
Indonesia	84	1,038
Malaysia	108	1,833
Philippines	17	351
Singapore	44	953
Thailand	99	1,496
Vietnam	24	376
Total	376	6,047

Table A3 Industry composition of the sample

Sector (ICB classification)	*Firms*	*Firm-years*
Software and computer services	122	1,594
Electronic and electrical equipment	74	1,313
Technology hardware and equipment	66	1,313
Telecommunications service providers	65	1,092
Telecommunications equipment	29	499
Alternative energy	20	236
Total	376	6,047