From Building to Buying: Economic Policy Uncertainty and Strategic Technological Sourcing

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Abstract

This paper investigates how Economic Policy Uncertainty (EPU) reshapes corporate innovation boundaries by driving a strategic shift toward external technology sourcing. Leveraging a comprehensive panel of Chinese listed firms from 2006 to 2019, we find that heightened EPU significantly increases reliance on patent acquisitions over internal development. This shift is driven by two primary mechanisms: (i) a risk-mitigation channel,where the substitution toward acquisition is more pronounced among financially constrained or risk-averse firms and is characterized by a narrowing of innovation scope toward 'near-distance' technologies; (ii) a financial reporting channel, where managers substitute expensed R&D with capitalized acquisitions to enhance reported earnings; this flexibility is particularly utilized during the first three quarters to optimize annual financial performance. Heterogeneity analysis reveals that market liquidity, high-tech industry status, and patent quality moderate this behavior. Furthermore, geopolitical risk similarly catalyzes patent trading as a buffer against technological isolation. Our findings suggest that systemic uncertainty fundamentally alters how firms source and compose innovation.

1 Introduction

Innovation is a fundamental engine of firm competitiveness, productivity, and long-run economic growth (Porter, 1990; Solow, 1957).However, the stability of the global

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environment necessary to sustain such innovation has become increasingly fragile. In recent years, the global economic landscape has been characterized by a marked escalation in external uncertainty. From shifting trade regimes and geopolitical tensions to abrupt transitions in domestic regulatory frameworks, firms are operating in an environment where the 'rules of the game' are increasingly volatile. This rising tide of systemic uncertainty necessitates a re-evaluation of how firms commit to high-stakes, long-term innovative projects.

While market incentives remain a core driver, the political and regulatory environment plays an increasingly critical role in shaping firms' innovation strategies. Among these institutional factors, Economic Policy Uncertainty (EPU), defined as the unpredictability surrounding government actions in fiscal, monetary, and regulatory policy, has emerged as a salient constraint on corporate investment decisions, especially since the 2008 financial crisis (Baker et al., 2016). The amplification of EPU in the current era creates a 'wait-and-see' friction that challenges the traditional paradigm of internal R&D.

A substantial body of literature finds that elevated EPU depresses firm investment, with the effects being most pronounced for projects that are irreversible, long-term, or characterized by high information asymmetry (Bernanke, 1983; Gulen and Ion, 2016; Julio and Yook, 2012). Among such investments, R&D activities are especially susceptible to policy-induced uncertainty due to their high sunk costs, intangible outputs, and extended payoff horizons. Consistent with Real Options Theory, firms often delay in-house innovation when uncertainty rises, reflecting the increased value of waiting for more information (Pindyck, 1991).Prior studies confirm that EPU negatively affects both R&D intensity and new patent applications (Bhattacharya et al., 2017).

However, despite the growing strategic relevance of external innovation sourcing, much less is known about how firms adjust their behavior in the secondary innovation market—particularly through patent acquisitions and transfers—when facing heightened EPU. This is a critical omission, as patent trading offers an alternative mechanism for accessing technology with lower organizational and financial commitments, thus providing strategic flexibility under uncertainty (Hall and Ziedonis, 2001). Such acquisitions allow firms to adjust their innovation portfolios while mitigating the long-term risks associated with internal development. To address this gap, our study investigates whether heightened EPU leads firms to increase their reliance on external patent acquisitions. The preference for

patent acquisition during periods of high EPU can be powerfully explained by managerial incentives related to both risk mitigation and financial reporting flexibility. We argue that these pressures transform patent acquisition into a more appealing strategic tool than traditional expensed R&D, which is highly vulnerable to sunk costs (Pindyck, 1991).

Focusing on China offers a compelling empirical setting to examine how firms adjust their innovation strategies under EPU. As an emerging economy characterized by rapid growth, frequent regulatory shifts, and strong state involvement in innovation policy, China presents a unique institutional environment that significantly shapes firms' strategic behavior (He et al., 2020; Huang and Luk, 2020).The dynamic regulatory landscape and evolving policy priorities amplify the salience of uncertainty, prompting firms to actively recalibrate their innovation portfolios. In this context, understanding whether and how firms reallocate efforts from internal R&D to external patent acquisition enriches the broader debate on innovation under uncertainty.

This paper studies whether heightened EPU is associated with greater external patent acquisition in China and through which mechanisms such a shift may occur. Conceptually, we emphasize two complementary channels. First, when uncertainty rises, firms may treat patent acquisitions as a lower-commitment alternative to in-house R&D that preserves strategic flexibility, reduces exposure to long gestation risk, and allows for faster capability adjustment (Dixit and Pindyck, 1994; Teece, 1986). Second, uncertainty can intensify managerial pressure to avoid losses, meet benchmarks, and smooth earnings (Healy and Wahlen, 1999; Roychowdhury, 2006). Because internal R&D is typically expensed immediately while acquired patents are capitalized and amortized, external patent acquisition can also serve as a reporting-friendly innovation instrument, especially when managers value near-term performance presentation and disclosure control (Bushee, 1998; Bhattacharyya and Nain, 2011). These forces jointly imply that the response of innovation *sourcing* to EPU may differ from the widely documented response of innovation *intensity*.

Leveraging a large firm-level panel that links Chinese patent transactions to annual EPU, we find a robust positive association between policy uncertainty and firms' external innovation activity.The final sample consists of 25,586 firm-year observations, covering Chinese A-share listed companies over the period from 2006 to 2019. Across these observations, EPU is positively related to a firm's likelihood of buying patents and the scale of purchases, including the ratio of purchased patents to subsequent granted

applications. The positive relation is economically meaningful and survives a battery of robustness checks, including alternative EPU proxies and specifications. Addressing endogeneity concerns using a two-stage approach instrumented by U.S. EPU, we continue to find a positive second-stage effect on both the log number of patents bought and the bought ratio. We further show that uncertainty beyond domestic policy—captured by geopolitical risk—also predicts stronger patent acquisition, consistent with a broader uncertainty-driven reallocation toward external technology sourcing.

The findings regarding mechanisms and heterogeneity patterns support a strategic reallocation interpretation of corporate innovation. Consistent with the risk-mitigation channel, the impact of policy uncertainty on patent acquisition is significantly moderated by firm-level financial constraints and managerial risk preferences, where the shift toward external technology is less pronounced among firms with CEO overconfidence.

Furthermore, uncertainty drives systematic compositional shifts rather than uniform changes, as firms strategically narrow their innovation boundaries by prioritizing "near-distance" technologies that align with their core competencies to mitigate boundary-crossing risks. Second, we provide evidence for the earnings management channel, finding that the interaction between policy uncertainty and reporting proxies is positive, which indicates that firms with stronger incentives to smooth earnings are more likely to substitute expensed internal R&D with capitalized patent acquisitions. To further tie our findings to reporting considerations, we show that this effect concentrates in earlier fiscal quarters rather than the final quarter, reflecting a proactive approach to financial planning intended to meet performance benchmarks during volatile periods.

This paper contributes to three interrelated bodies of literature. First, we contribute to the literature on innovation under uncertainty by identifying a strategic reallocation mechanism through which firms adapt their innovation activities in response to EPU. Rather than focusing solely on the quantity of innovation or the functioning of patent markets, we highlight how EPU triggers a qualitative shift in innovation strategy, from internal, resource-intensive R&D toward more flexible, externally sourced innovation. Drawing on real options theory (Dixit and Pindyck, 1994), we argue that firms treat patent acquisitions as a lower-commitment alternative to in-house innovation, enabling them to preserve strategic optionality while minimizing exposure to long-term risk. Our empirical evidence supports this perspective: in high-EPU environments, firms tend

to acquire both technologically similar patents and invention patents, reflecting two distinct strategic logics. First, acquiring invention patents aligns with the established positive correlation between technological quality and market tradability. Second, the preference for technologically similar patents stems from risk aversion, with the aim of reducing uncertainty. This finding moves beyond the conventional view that uncertainty merely inhibits innovation (Bloom et al., 2007; Julio and Yook, 2012) and instead reveals how firms proactively restructure their innovation portfolios to retain dynamism under adverse conditions. In doing so, we enrich the theoretical understanding of adaptive innovation behavior and demonstrate how firms manage the composition and direction of innovation—not just its intensity—in uncertain policy environments (Teece, 2007; Atanassov et al., 2024).

Second, we expand the limited empirical research on the secondary patent market and patent acquisitions. While prior work has examined patent acquisition as a strategic tool for innovation(Higgins and Rodriguez, 2006; Phillips and Zhdanov, 2013), and documented that firms acquire patents to complement internal R&D pipelines or access external technological capabilities(Bena and Li, 2014;(Frésard et al., 2020)), empirical studies exploring the market-level drivers of such transactions remain scarce. This work adds a new dimension to the understanding of factors influencing patent acquisitions (Figueroa and Serrano, 2019; Phillips and Zhdanov, 2013), offering insights into how patent transactions vary across different periods of policy uncertainty. Moreover, recent studies such as MAO et al. (2025) show that access to information (e.g., via patent libraries) significantly reduces frictions in technological M&A, but little is known about how uncertainty amplifies or dampens these acquisition decisions, particularly in emerging economies like China. By using firm-level Chinese patent transaction data, we not only deepen our understanding of how firms operate in the secondary patent market but also generate implications for U.S. and global firms that are increasingly relying on external innovation pathways amid rising policy volatility.

Third, our study contributes to the literature on the real effects of EPU by connecting strategic innovation activities with financial reporting incentives. Prior research has established that EPU dampens capital expenditures and in-house patenting (Baker et al., 2016; Gulen and Ion, 2016; Jens, 2017; Julio and Yook, 2012). We extend this by showing that firms reallocate efforts toward patent acquisitions to mitigate sunk-cost

risks and utilize accounting flexibility. Because internal R&D is expensed immediately while acquired patents are capitalized, patent trading serves as an earnings management channel during volatile periods (Bushee, 1998; Healy and Wahlen, 1999). By focusing on China's distinct institutional context—characterized by high policy dynamism and administrative discretion—we bridge the gap between policy risk literature and strategic innovation management in emerging economies (Bonaime et al., 2018; Chen and Rees, 2016; Pástor and Veronesi, 2013).

The paper is organized as follows: Section 2 discusses related literature and develops hypotheses. Section 3 describes the data and sample, variable definitions, baseline model, and descriptive statistics. Section 4 reports the empirical results regarding the effect of economic policy uncertainty on the substitution effect of patent applications and patent trading. It also explores the mechanisms of how economic policy uncertainty affects patent trading for patent acquisitions. Section 5 describes the heterogeneity across the dimensions of trading liquidity, industry characteristics, and patent categories, followed by the results of endogeneity tests. Section 6 includes robustness checks and a discussion of the impact of geopolitical risk (GPR) on firms' patent acquisition strategies. We conclude in Section 7.

2 Literature Review and Hypothesis Development

The relationship between economic uncertainty and corporate behavior is a cornerstone of financial economics. A central insight in corporate finance is that uncertainty shapes investment primarily through irreversibility and timing. Real Options Theory (ROT) formalizes this mechanism by emphasizing that when investment is largely irreversible and outcomes are uncertain, managers rationally value the option to delay commitment until additional information arrives (Myers and Majluf, 1984; Bernanke, 1983; Pindyck, 1991). This logic applies directly to both physical capital and innovation investment because many projects involve sunk costs and limited redeployability. As uncertainty increases, the payoff distribution becomes wider, the cost of mistaken commitment rises, and the option value of waiting increases, implying a tendency to postpone or scale down long-horizon investments.

Empirically, a broad literature links EPU to subdued corporate activity: higher EPU

predicts lower capital expenditures (Gulen and Ion, 2016), reduced M&A (Bonaime et al., 2018), weaker financing activity such as IPO/SEO (Jens, 2017), and diminished innovation inputs and outputs (Bloom et al., 2007; Bhattacharya et al., 2017; Baker et al., 2016). These patterns are consistent with the view that policy uncertainty is a hard-to-hedge, economy-wide risk that raises discount rates and discourages irreversible commitments, with particularly strong effects when information frictions are severe and payoffs are distant (Gulen and Ion, 2016; Julio and Yook, 2012).

However, the ROT prediction of delayed innovation is not mechanically decisive because innovation is also governed by strategic interaction and competitive urgency. Waiting can be costly when technologies are race-like, when learning is path-dependent, or when market shares are contested, so delaying investment may forfeit growth opportunities (Heblich et al., 2020). Moreover, the innovation-uncertainty relationship is not universally negative: some studies argue that uncertainty can raise the value of exploratory investments when innovation resembles a call option on future growth, and recent evidence suggests that moderate levels of uncertainty may coincide with stronger innovation performance (Liang et al., 2024). This tension motivates a shift in perspective from whether firms innovate more or less to how they reallocate across innovation channels when uncertainty rises, especially when firms can substitute between internal development and market-based sourcing.

The innovation literature increasingly recognizes that firms do not rely solely on internal R&D but also participate in a market for technology where patents and related intangible assets are traded. Patent acquisition allows firms to access external technologies, complement internal research programs, and reconfigure their innovation portfolios without fully bearing the organizational frictions and long gestation periods associated with in-house development (Hall and Ziedonis, 2001; Holgersson and Granstrand, 2022). The corporate finance implication is that patent purchases can function as a flexible investment instrument: relative to internal R&D, acquisitions are more modular, property rights are clearer, and the commitment can be scaled discretely, potentially making them attractive when managers face heightened uncertainty about the policy environment (Dixit and Pindyck, 1994; Hagedoorn and Duysters, 2002).

The impact of EPU on patent acquisition is theoretically ambiguous, presenting two competing mechanisms: a substitution effect driven by the demand for strategic flexibility

and an obstruction effect driven by heightened market frictions.On one hand, EPU may catalyze patent acquisitions as firms seek to mitigate the risks inherent in internal innovation. According to Real Options Theory, uncertainty increases the value of waiting and discourages irreversible, long-horizon commitments like internal R&D (Bernanke, 1983; Pindyck, 1991).

There are two primary non-mutually exclusive channels through which heightened EPU catalyzes a strategic shift from internal R&D to external patent acquisition. They are: The Risk-Mitigation and Flexibility Channel and The Financial Reporting and Earnings Management Channel. The positive association between EPU and patent trading is fundamentally rooted in the firm's demand for strategic flexibility. Internal R&D represents a highly irreversible investment with significant sunk costs, making it vulnerable to the "option value of waiting" during periods of policy volatility (Myers and Majluf, 1984; Bernanke, 1983). In contrast, patent acquisition functions as a modular investment instrument with shorter lead times and clearer property rights (Hagedoorn and Duysters, 2002; Dixit and Pindyck, 1994).

As institutional volatility rises, external finance becomes more costly, collateral constraints bind more tightly, and firms with limited financial slack become particularly sensitive in their investment decisions (Gilchrist et al., 2014; Alfaro et al., 2024), particularly those with high financial constraints (Hadlock and Pierce, 2010) and limited cash buffers (Denis, 2011)—are incentivized to "buy" rather than "build" to minimize long-term commitment risks. Moreover, as technology markets are characterized by heterogeneous patent quality and opaque valuations, in response to EPU, managers strategically prioritize the acquisition of technologically proximate patents (low tech-distance) to ensure more predictable integration outcomes and reduce the valuation opacity typically found in unfamiliar technological domains (Seru, 2014; Frésard et al., 2020).

Beyond real-option considerations, the accounting asymmetry between internal and external innovation provides a distinct reporting incentive for patent trading. Under prevailing standards, internal R&D is generally expensed as incurred, directly depressing contemporaneous earnings and increasing income volatility (Bushee, 1998). In contrast, purchased patents are capitalized as identifiable intangible assets and amortized over time, allowing for deferred expense recognition and smoother earnings profiles (Bhattacharya et al., 2012; Curtis et al., 2020; Resutek, 2022).

Elevated EPU amplifies external scrutiny and increases the volatility of operating results, intensifying managerial pressure to avoid losses and meet performance benchmarks (Healy and Wahlen, 1999; Roychowdhury, 2006). Because patent acquisitions are lumpy and discretionary in timing and size, they offer managers a flexible real-activity channel to influence reported performance under heightened uncertainty (Ali and Hirshleifer, 2015). If these incentives are important, uncertainty should strengthen the propensity to substitute toward patent purchases particularly among firms with stronger earnings-management incentives, and managerial timing considerations should be reflected in when within the fiscal year such acquisitions are undertaken.

In this context, patent acquisitions offer a "modular" alternative to in-house development. Unlike the sunk costs and organizational inertia associated with internal labs, external technology sourcing allows firms to reconfigure their portfolios with shorter lead times and discrete commitment levels (Hagedoorn and Duysters, 2002; Holgersson and Granstrand, 2022). By substituting rigid internal processes with flexible market-based acquisitions, firms can preserve the option to pivot as policy clarity emerges. Therefore, we posit:

Hypothesis 1 a(H1a): *Economic policy uncertainty is positively associated with patent acquisition activity, as firms utilize the secondary market to maintain technological momentum while minimizing irreversible investment.*

Conversely, EPU may suppress the market for technology by intensifying informational and financial frictions. Patent transactions are uniquely sensitive to information asymmetry and the "lemons problem" (Bhattacharya and Ritter, 1983). When the macro-institutional environment is volatile, the difficulty of valuing intangible assets increases, potentially leading to a breakdown in the secondary market (Povel and Singh, 2006; Seru, 2014). Furthermore, heightened uncertainty often triggers precautionary savings and tightens financing constraints. Since patents are relatively illiquid assets compared to cash, risk-averse managers may slash discretionary spending—including external technology purchases—to preserve liquidity during periods of high EPU (Bernstein et al., 2016; Han et al., 2025).

In addition, policy uncertainty significantly exacerbates the information asymmetry between managers and investors, evidenced by widened bid-ask spreads and dampened

market reactions to earnings surprises, which complicates the external valuation of firm assets (Nagar et al., 2019). To mitigate these severe information frictions and agency conflicts during volatile periods, firms often shift toward more conservative accounting practices to facilitate contracting efficiency and reassure risk-averse stakeholders (Dai and Ngo, 2021). Simultaneously, the increased cost of capital drives managers to improve accounting quality as a mechanism to reduce financing constraints and signal creditworthiness to wary capital markets (El Ghoul et al., 2021). Furthermore, to buffer against policy-induced valuation shocks and stabilize market perceptions, managers increasingly resort to discretionary accruals to smooth earnings, prioritizing short-term stability over long-term capital allocation (Chauhan and Jaiswall, 2023).

Under this view, the "friction effect" outweighs the "flexibility benefit." Thus, we offer an alternative hypothesis:

Hypothesis 1 b(H1b): *Economic policy uncertainty is negatively associated with patent acquisition activity due to increased valuation risks and heightened financing constraints.*

3 Data and Sample

3.1 Data and Sample

The sample consists of A-share listed companies, excluding those in the financial industry and observations with missing data, covering the period from 2006 to 2019. The dataset primarily integrates patent acquisition records, patent application filings, and corporate financial data. Specifically, the patent acquisition data contains information such as the identity of the acquirer and the transaction date; the patent application data includes details on the applicants, application and grant dates, and IPC (International Patent Classification) codes.

By matching the names of listed companies with the patent acquirers, we identify the patent acquisition activities of each firm. Similarly, matching company names with patent applicants allows us to track their internal patent filings. This process results in a comprehensive sample of listed companies that merges patent acquisitions, patent applications, and financial information. The patent-related data is sourced from the China

National Intellectual Property Administration (CNIPA), while the corporate financial data is obtained from the CSMAR database.

3.2 Variable Definitions

Our main independent variable is Economic Policy Uncertainty (EPU). Following Baker et al. (2016), we use the news-based EPU index for China constructed from the *South China Morning Post* (SCMP). We calculate the annual average of the monthly index to measure the macro-level policy uncertainty environment. For robustness, we also employ an alternative EPU index based on mainland Chinese newspapers. To capture the lagged effect of uncertainty on firm behavior, we measure EPU at time t and examine its impact on firm outcomes at time $t+1$.

We construct three measures of patent acquisition activity to capture both the extensive and intensive margins of external innovation. First, $Buyer_Dummy$ is an indicator variable that equals 1 if a firm acquired any patents in year $t+1$, and 0 otherwise. Second, $\ln(1+Patents)$ is the natural logarithm of one plus the number of acquired patents. Third, $Bought_Ratio$ is the ratio of acquired patents to the number of internally developed patents granted to the firm in year $t+1$. This variable measures the relative importance of external technology sourcing in a firm's innovation portfolio.

Following Zhang and Han (2025), we include a set of firm-level controls to account for differences in firm characteristics. These variables include firm size ($\ln Assets$), R&D intensity ($RD\ ratio$), market-to-book ratio ($Tobin's\ Q$), and profitability (ROA). We also control for financial leverage ($Leverage$), asset tangibility ($PPE\ ratio$), and investment level ($Capex\ ratio$). To mitigate the influence of outliers, all continuous variables are winsorized at the 1% and 99% percentiles. Appendix Table A1 provides detailed definitions and data sources for all variables.

3.3 Baseline Specification

To examine whether economic policy uncertainty affects firms' external innovation sourcing, we estimate the following baseline specification:

$$Y_{i,t+1} = \alpha + \beta\, EPU_t + \gamma \mathbf{X}_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t}, \tag{1}$$

where $Y_{i,t+1}$ denotes firm i's patent acquisition activity in year $t+1$. We consider three alternative dependent variables to capture both the extensive and intensive margins of external innovation sourcing. Specifically, *Buyer_Dummy* is an indicator variable equal to one if the firm acquires any patents in year $t+1$ and zero otherwise; $\ln(1 + Patents)$ is the natural logarithm of one plus the number of patents acquired; and *Bought_Ratio* is defined as the ratio of acquired patents to the total number of patents granted to the firm in year $t+1$.

The key explanatory variable, EPU_t, measures economic policy uncertainty in year t, constructed as the annual average of the news-based economic policy uncertainty index. The vector $\mathbf{X}_{i,t}$ includes a standard set of firm-level control variables that may affect innovation and acquisition decisions, such as firm size, R&D intensity, growth opportunities, profitability, leverage, asset tangibility, and capital expenditures. All control variables are measured at year t and are defined in detail in Appendix Table A1.

Firm fixed effects μ_i are included to control for time-invariant unobserved firm characteristics. Table 2 reports the estimation results based on Equation (1).

3.4 Descriptive Statistics

Table 1 provides the summary statistics for the key variables used in this study, based on a total of 25,586 firm-year observations.

Patent acquisition activity exhibits a highly skewed distribution. On average, firms acquire 0.616 patents per year (*Patents Bought*), but the 99th percentile reaches 18, indicating that a small group of firms is very active in the secondary market. The *Buyer_Dummy* reveals that 13.4% of the firm-year observations involve at least one patent purchase. Finally, the *Bought_Ratio* averages 0.0811, suggesting that for the average firm, acquired patents represent about 8% of their total new patent additions, though this intensity varies significantly (P99 = 3).

When aggregated over the entire sample period, the total number of patents bought per firm averages 7.331, yet the distribution remains extremely right-skewed with the top 1% of firms (P99) acquiring 144 or more patents. Furthermore, while yearly activity is infrequent, the firm-level *Buyer_Dummy* shows that 57.0% of the firms in our sample participated in the secondary market at least once during the period. Overall, these statistics highlight substantial diversity in firms' strategic responses to policy-induced

uncertainty.

The primary independent variable, the economic policy uncertainty index (EPU_SCMP), shows a mean of 2.310 and a standard deviation of 1.285. Its value ranges from 0.733 to 4.605 during the sample period, providing sufficient temporal variation to identify its impact on firm behavior.

Finally, we introduce control variables related to firm characteristics and financial performance. The natural logarithm of total assets ($lnAssets$) has a mean value of 21.92 and a standard deviation of 1.293, with values ranging from 19.32 at the 1st percentile to 25.97 at the 99th percentile, suggesting moderate variation in firm size across the sample.

The *RD ratio*, which captures the intensity of research and development investment relative to total assets, averages 1.545% with a standard deviation of 1.731, indicating considerable heterogeneity in the investment in internal innovation. $Tobin's\ Q$, a proxy for firm valuation and growth opportunities, exhibits a mean of 1.876 and a standard deviation of 1.372.

Regarding financial structure and performance, the *leverage* ratio has a mean of 0.433, while the $PPE\ ratio$ (fixed assets) and $Capex\ ratio$ average 0.231 and 0.0543, respectively. The return on assets (ROA) shows a mean of 3.85%, but displays a significant downside risk, as evidenced by a 1st percentile value of -24.9%.

4 Empirical Results

4.1 Baseline Results

Table 2 reports the baseline results for the impact of economic policy uncertainty (EPU) on corporate innovation sourcing. To mitigate omitted variable bias, all specifications include firm fixed effects to absorb time-invariant heterogeneity and aggregate shocks. In Column (2), which includes a full set of firm-level controls and firm fixed effects, the coefficient on EPU is 0.020. We find consistent results when using the volume of acquisitions, $\ln(1 + Patents)$, in Column (4) and the strategic intensity of external sourcing, $Bought_Ratio$, in Column (6). These results suggest that firms respond to heightened policy uncertainty by increasing both the likelihood and the scale of their patent acquisition activities.

The estimated effect is also economically significant. Based on the coefficient in

Table 1: Descriptive Statistics

This table reports the descriptive statistics for the main variables used in our empirical analysis. The sample consists of 25,586 firm-year observations. The variables include firm-level characteristics (size, R&D intensity, Tobin's Q, leverage, PPE ratio, Capex ratio, and ROA), the economic policy uncertainty index (EPU_SCMP), and measures of patent acquisition activity (Patents Bought, Bought_Ratio, and Buyer_Dummy). All continuous variables are winsorized at the 1% and 99% percentiles to mitigate the influence of outliers. Detailed variable definitions and data sources are provided in Appendix Table A1.

VARIABLES	Mean	SD	P1	P50	P99	N
lnAssets	21.92	1.293	19.32	21.75	25.97	25,586
RD ratio	1.545	1.731	0	1.135	8.535	25,586
Tobin's Q	1.876	1.372	0.546	1.441	8.783	25,586
Leverage	0.433	0.216	0.0483	0.425	0.983	25,586
PPE ratio	0.231	0.163	0.00302	0.198	0.714	25,586
Capex ratio	0.0543	0.0502	0.000366	0.0394	0.242	25,586
ROA	0.0385	0.0608	-0.249	0.0381	0.198	25,586
EPU_SCMP	2.310	1.285	0.733	1.813	4.605	25,586
Patents Bought	0.616	2.436	0	0	18	25,586
Bought_Ratio	0.0811	0.382	0	0	3	25,586
Buyer_Dummy	0.134	0.340	0	0	1	25,586
Total patents bought	7.331	19.57	0	1	144	3,107
Buyer dummy	0.5700	0.4952	0	1	1	3,107

Column (2), a one-standard-deviation increase in EPU (1.285) is associated with a 2.57 percentage point increase in the probability of a firm acquiring patents. Given that the sample mean of $Buyer_Dummy$ is 13.4%, this represents a 19.2% increase relative to the mean.

These findings lend support to the real options channel, which posits that internal R&D is characterized by high irreversibility and significant sunk costs. Under elevated policy uncertainty, the "option value of waiting" to commit to long-gestation, in-house projects increases. Consequently, firms strategically substitute internal R&D with external patent acquisitions, which offer a more flexible and modular approach to technological adjustment.

The coefficients on the control variables are generally consistent with prior literature on innovation. Larger firms ($\ln Assets$), firms with higher R&D intensity ($RD\ ratio$), and firms with stronger growth prospects ($Tobin's\ Q$) are more likely to engage in patent acquisitions. The inclusion of firm fixed effects ensures that the results are not driven by time-invariant firm-specific characteristics. Overall, the findings in Table 2 provide robust support for Hypothesis 1, indicating that policy uncertainty is a significant determinant

of firms' innovation sourcing strategies.

Table 2: Impact of Economic Policy Uncertainty on Corporate Patent Acquisition

*This table reports the baseline regression estimates of the impact of economic policy uncertainty (EPU) on firms' patent acquisition behavior. The dependent variables are the Buyer_Dummy (an indicator for whether any patents were acquired) in columns (1)–(2), ln(1+Patents) (the natural logarithm of one plus the number of patents acquired) in columns (3)–(4), and the Bought_Ratio (the ratio of acquired patents to total granted patents) in columns (5)–(6). The key independent variable is EPU, measured as the annual average of the news-based economic policy uncertainty index. Controls include firm size (lnAssets), R&D intensity (RD ratio), growth opportunities (Tobin's Q), profitability (ROA), leverage, asset tangibility (PPE ratio), and capital expenditures (Capex ratio). All regressions include firm fixed effects to control for time-invariant firm heterogeneity and common macroeconomic shocks. Detailed variable definitions are provided in Appendix Table A1. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.*

VARIABLES	(1) Buyer Dummy	(2) Buyer Dummy	(3) ln(1+ Patents)	(4) ln(1+ Patents)	(5) Bought Ratio	(6) Bought Ratio
EPU	0.038***	0.020***	0.063***	0.033***	0.044***	0.038***
	(19.00)	(10.00)	(15.75)	(8.25)	(14.67)	(12.67)
lnAssets		0.054***		0.089***		0.017***
		(10.80)		(9.89)		(3.40)
RD ratio		0.009***		0.015***		0.002
		(3.00)		(3.75)		(0.67)
Tobin's Q		0.009***		0.011***		−0.003
		(4.50)		(3.67)		(−1.50)
ROA		0.030		−0.005		−0.029
		(0.77)		(−0.07)		(−0.48)
Leverage		−0.040*		−0.058		0.010
		(−1.90)		(−1.61)		(0.31)
PPE ratio		0.007		0.018		0.014
		(0.29)		(0.43)		(0.41)
Capex ratio		0.019		−0.010		0.024
		(0.36)		(−0.12)		(0.40)
Observations	25,586	25,586	25,586	25,586	25,586	25,586
Adjusted R-squared	0.174	0.182	0.197	0.206	0.069	0.070
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

4.2 Why Firms Shift? Risk Mitigation Channel

To explore the underlying mechanisms, we examine how firm-level characteristics moderate the effect of EPU on patent acquisition. From a risk-reduction perspective, the impact of EPU is most pronounced among firms facing greater financial constraints or led by more risk-averse managers, and it is manifested in a contraction of innovation scope toward

more familiar technological domains.

A substantial body of corporate finance literature emphasizes the interaction between uncertainty and financing frictions: when macroeconomic uncertainty rises, firms with limited financial buffers exhibit heightened sensitivity in their investment decisions (Gilchrist et al., 2014;Alfaro et al., 2024). Under high-EPU conditions, internal R&D is vulnerable because it is difficult to collateralize, involves uncertain payoffs, and requires sustained commitment (Kothari et al., 2002). Patent acquisition, by contrast, can be scaled and targeted; it may therefore be more appealing for financially constrained firms seeking to preserve innovation capacity while limiting long-run exposure. During periods of institutional volatility, policy uncertainty has a disproportionately severe impact on high-risk firms, which face higher external financing costs and more acute valuation risks. Firms with limited risk-bearing capacity are more inclined to internalize external technology to hedge against R&D failures, so this shift from "building" to "buying" is most pronounced among financially constrained firms that prioritize risk control. Consequently, the shift from "building" to "buying" should be strongest among financially constrained firms that prioritize risk control during periods of institutional volatility.

As a result, if patent acquisition serves as a risk-mitigation strategy, its appeal should vary depending on a firm's financial capacity to bear risk and the managers' subjective perception of that risk. Therefore, we first examine whether the shift toward patent acquisition is driven by financial constraints. Following Hadlock and Pierce (2010), we use the SA index as a proxy for financial constraints (FC), which is calculated based on firm size and age to ensure its exogeneity to short-term financial decisions. Firms with higher FC scores face greater external financing costs and are more sensitive to the irreversibility of R&D investment under uncertainty. Conversely, cash holdings serve as a liquidity buffer that allows firms to withstand policy-induced shocks without downsizing long-term projects (Denis, 2011).

Table 3 reports the results. Columns (1) and (2) show that the coefficient on the interaction term between EPU and financial constraints (FC) is positive and statistically significant at the 1% and 5% levels, respectively. In contrast, as shown in Columns (3) and (4), the coefficient on the interaction between EPU and $Cash\ holdings$ is negative and statistically significant. These results suggest that when uncertainty rises, liquidity-constrained firms—who can least afford the "sunk cost" of failed internal R&D—are more

likely to substitute internal innovation with external patent purchases, which offer lower organizational commitment and faster technological integration.

Economically, these findings are consistent with the view that internal R&D represents an irreversible investment with a high "option value of waiting" under uncertainty. Patent acquisition, by contrast, involves shorter gestation periods and lower long-term commitments, allowing financially constrained firms to maintain innovation activities while minimizing risk exposure. The negative coefficient on the $Cash\ holdings$ interaction reinforces this interpretation, as liquidity reserves help firms mitigate policy-induced shocks.

However, even when faced with similar and objective financial pressures, whether a company ultimately chooses this risk mitigation channel depends on the subjective assessment of risk—that is, whether managers are willing to acknowledge and avoid risk. Overconfident managers may underestimate downside risks and have lower demand for hedging strategies, which could weaken acquisition behavior triggered by any uncertainty. Therefore, we further examine how managerial traits influence this strategic reallocation. Following Malmendier and Tate (2005), we proxy for $CEO\ Overconfidence$ using a dummy variable that captures whether the CEO's compensation or tenure-based behavior indicates an optimistic bias regarding firm performance. Overconfident managers tend to underestimate the risks of internal projects and the value of the "option to wait" (Hirshleifer et al., 2012). As shown in Columns (5) and (6), the interaction $EPU \times CEO\ Overconfidence$ is negative and significant. This suggests that while rational managers pivot toward flexible external sourcing to hedge against policy turbulence, overconfident managers remain committed to internal R&D, being less sensitive to the escalation of external uncertainty. Therefore,we find that overconfident managers, who tend to underestimate the risks of internal projects (Hirshleifer et al., 2012; Malmendier and Tate, 2005), are less sensitive to this policy-induced reallocation.

4.3 Implications from the Innovation Acquisition Scope

To further validate the risk-mitigation channel, we test whether firms use the technology market to hedge against policy-induced risks by narrowing their innovation scope. Under elevated EPU, firms are incentivized to mitigate technological uncertainty by strategically selecting acquisitions with higher evaluability and integrability; given the patent market's

Table 3: Risk Mitigation Channel

*This table examines whether patent acquisition serves as a risk-mitigation mechanism under heightened economic policy uncertainty (EPU). The dependent variables are the logarithm of one plus the number of patents acquired, ln(1+Patents), and the ratio of acquired patents to total granted patents, BoughtRatio. The key explanatory variables are interaction terms between EPU and firm-level proxies for risk exposure and managerial attitudes, including financial constraints (FC), cash holdings, and CEO overconfidence. Financial constraints are measured using the SA index following (Hadlock and Pierce, 2010), while cash holdings, and overconfidence are defined based on firm-level indicators relative to the sample mean. All regressions include firm fixed effects and a standard set of control variables as defined in Appendix Table A1. Robust standard errors are reported in parentheses.*** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.*

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Financial constraint		Cash holdings		Attitude to risks	
	ln(1+ Patents)	Bought Ratio	ln(1+ Patents)	Bought Ratio	ln(1+ Patents)	Bought Ratio
EPU × FC	0.044***	0.013**				
	(0.007)	(0.006)				
EPU × Cash holdings			−0.024***	−0.013**		
			(0.007)	(0.006)		
EPU × Overconfidence					−0.032***	−0.010*
					(0.007)	(0.006)
EPU	0.013***	0.032***	0.043***	0.043	0.048***	0.043***
	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)
lnAssets	0.088***	0.017***	0.089***	0.017	0.090***	0.017***
	(0.009)	(0.005)	(0.009)	(0.005)	(0.009)	(0.005)
RD ratio	0.015***	0.002	0.014***	0.002	0.015***	0.002
	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)
Tobin's Q	0.012***	−0.003	0.011***	−0.003	0.011***	−0.003
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
ROA	−0.009	−0.031	−0.004	−0.029	−0.007	−0.030
	(0.067)	(0.062)	(0.067)	(0.062)	(0.067)	(0.061)
Leverage	−0.058	0.010	−0.046	0.017	−0.064*	0.008
	(0.036)	(0.032)	(0.036)	(0.032)	(0.036)	(0.032)
PPE ratio	0.002	0.009	0.023	0.017	0.009	0.011
	(0.042)	(0.034)	(0.041)	(0.034)	(0.041)	(0.034)
Capex ratio	0.012	0.031	−0.001	0.029	0.003	0.028
	(0.084)	(0.060)	(0.084)	(0.060)	(0.083)	(0.060)
Observations	25,586	25,586	25,586	25,586	25,586	25,586
Adj. R-squared	0.208	0.070	0.207	0.070	0.207	0.070
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

heterogeneous quality and valuation opacity, frictions amplified in technologically distant domains (Seru, 2014; Frésard et al., 2020), risk-averse firms logically tilt their acquisition portfolios toward technologically proximate targets, as patents aligned with existing expertise allow firms to leverage absorptive capacity to reduce integration risk and secure predictable innovation outcomes. If external patent acquisitions serve as a risk-mitigation tool, firms with limited financial buffers will prioritize patents with high evaluability, low integration risk, and technological proximity to existing domains to mitigate cross-domain risks and anchor operations in familiar knowledge areas. Accordingly, we empirically test the impact of EPU on the technological distance of firms' acquired patents.

predictable innovation outcomes.

Table 4 reports the results of quantile regressions, which we employ to investigate whether the impact of EPU is heterogeneous across the distribution of technological distance. We measure the scope of innovation using the technological distance metric developed by Akcigit et al. (2016) and further applied by Han et al. (2025).Specifically,we define Technological Distance as the degree of dissimilarity between the IPC classes of the acquired patent and the firm's pre-transaction patent portfolio.Through the lens of this metric, inventing in more closely related technological fields signals a more focused innovation scope and a higher degree of innovation specialization. Conversely, a shorter technological distance implies a reduction in boundary-crossing risks, as firms operate within familiar knowledge domains. Specifically, this analysis allows us to examine whether firms' responses to policy uncertainty vary depending on the relative technological distance between the acquired patent and the firm's existing portfolio.

At the lower end of the distribution (10th and 25th percentiles)-representing acquisitions closely aligned with the firm's expertise-the coefficients on EPU are positive and statistically significant at the 1% level. Conversely, at the higher quantiles (75th and 90th percentiles), which represent technologically distant and thus riskier acquisitions, the coefficients are negative and statistically significant. The coefficient at the median (50th percentile) is statistically insignificant.

These findings suggest a strategic reallocation of firms' innovation portfolios in response to policy uncertainty. The positive coefficients at the lower quantiles indicate that EPU encourages firms to shore up their core competencies by acquiring technologically proximate patents. The significant negative coefficients at the upper quantiles suggest that firms also

reduce their exposure to radical, technologically distant acquisitions when the regulatory environment is uncertain.

Economically, these results are consistent with the view that firms strategically narrow their innovation scope in response to policy-induced risks. Under elevated uncertainty, managers prioritize "near-distance" acquisitions that align closely with their existing technological portfolios. This strategic retreat to familiar domains—the "safe boundary", allows firms to focus on core issues and specialized technologies they thoroughly understand, thereby mitigating the information asymmetries and "boundary-crossing risks" that EPU amplifies. By specializing rather than diversifying, firms utilize the secondary market to maintain technological momentum while minimizing the potential for integration failure.

Table 4: Policy Uncertainty and Innovation Specialization: Quantile Regressions

*This table reports the estimated coefficients from quantile regressions at the 10th, 25th, 50th, 75th, and 90th percentiles. The dependent variable is the logarithm of one plus the number of patents acquired, where acquired patents are categorized by technological distance. Technological Distance is defined as the degree of dissimilarity between the IPC classes of the acquired patent and the firm's existing patent portfolio prior to the transaction following (Akcigit et al., 2016). The primary independent variable is EPU, the annual average Economic Policy Uncertainty index. All specifications include firm fixed effects and a standard set of control variables defined in Appendix Table A1. Robust standard errors are reported in parentheses. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.*

VARIABLES	(1) 10th Percentile	(2) 25th Percentile	(3) 50th Percentile	(4) 75th Percentile	(5) 90th Percentile
EPU	0.034***	0.035***	−0.001	−0.003**	−0.002***
	(0.009)	(0.012)	(0.004)	(0.001)	(0.001)
Observations	26,552	26,552	26,552	26,552	26,552
R-squared	0.004	0.003	0.000	0.001	0.002
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

4.4 Why Firms Shift? Financial Reporting Purpose

Beyond real-option and integration considerations, a distinctive mechanism arises from the accounting treatment of innovation inputs. Under prevailing standards, internal R&D is generally expensed as incurred, which directly reduces contemporaneous earnings and increases earnings volatility (Bushee, 1998). In contrast, purchased patents are recognized as identifiable intangible assets that are capitalized on the balance sheet and amortized over time, allowing firms to defer expense recognition and smooth the income impact relative to comparable internal innovation spending (Bhattacharya et al., 2012;Curtis

et al., 2020;Resutek, 2022). This accounting asymmetry can matter most precisely when uncertainty is high. Elevated EPU increases volatility in expected performance and amplifies external scrutiny, intensifying managerial incentives to avoid losses, meet benchmarks, and manage earnings through both real and accrual channels (Healy and Wahlen, 1999; Fields et al., 2001; Roychowdhury, 2006). Because patent acquisitions are discrete and managerially discretionary in timing and size, they can provide flexibility as a real-activity instrument for shaping reported performance in the short run (Ali and Hirshleifer, 2015). If these incentives are important, uncertainty should strengthen the propensity to substitute toward patent purchases, particularly among firms with stronger earnings-management incentives,and managerial timing considerations should be reflected in when within the fiscal year such acquisitions are undertaken (detailed in Section 4.5).

In this section, we examine an alternative, non-mutually exclusive mechanism related to financial reporting incentives. This channel is based on the differential accounting treatment of internal R&D and external patent acquisitions. Under current accounting standards, internal R&D expenditures are generally expensed as incurred, whereas purchased patents are capitalized as intangible assets and amortized over their useful lives. To test whether reporting considerations influence the shift toward external sourcing, we examine how the relationship between EPU and patent acquisition is moderated by firms' propensity for both real and accrual-based earnings management.

Table 5 reports the results. In Columns (1) and (2), the coefficient on the interaction term between EPU and real earnings management ($RealEM$) is positive and statistically significant at the 10% level. Similarly, in Columns (3) and (4), the interaction between EPU and accrual-based earnings management ($AccEM$) is positive and significant at the 5% level. Specifically, RealEM is a dummy variable that takes the value of 1 if the firm's real earnings management is higher than the sample average, and 0 otherwise; AccEM takes the value of 1 if the accounting earnings management is higher than the sample average, and 0 otherwise. The coefficient on the main effect of EPU remains positive and statistically significant across all specifications, suggesting that reporting incentives reinforce the baseline relationship.

These findings are consistent with the view that managers utilize the accounting flexibility afforded by external acquisitions to manage reported performance. Elevated policy uncertainty is often associated with increased volatility in operating results and

heightened pressure to meet earnings benchmarks. Because internal R&D expenditures reduce current-period earnings, they are more likely to be constrained when managers prioritize short-term financial targets. In contrast, patent acquisitions allow firms to acquire technological capabilities while capitalizing the acquisition cost on the balance sheet, thereby deferring expense recognition through long-term amortization.

Table 5: Mechanism Result: Earnings Management

*Motivated by the differential accounting treatment of internal RD expenditures and externally acquired patents, this table reports regression results that assess whether financial reporting incentives shape firms' reliance on patent acquisitions under heightened economic policy uncertainty (EPU). The dependent variables are the logarithm of one plus the number of patents acquired, ln(1+Patents), and the ratio of acquired patents to total granted patents, Bought Ratio. The key explanatory variables are interaction terms between EPU and firm-level indicators of earnings management. Columns (1) and (2) interact EPU with real earnings management (RealEM), while Columns (3) and (4) interact EPU with accrual-based earnings management (AccEM). All specifications include firm fixed effects and a standard set of control variables defined in Appendix Table A1. Robust standard errors are reported in parentheses. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.*

VARIABLES	(1)	(2)	(3)	(4)
	Real Earnings Management		Accounting Earnings Management	
	ln(1+Patents)	Bought Ratio	ln(1+Patents)	Bought Ratio
EPU × RealEM	0.0120*	0.0072*		
	(0.007)	(0.004)		
EPU × AccEM			0.0122**	0.0148**
			(0.005)	(0.006)
EPU	0.0272***	0.0346***	0.0281***	0.0320***
	(0.005)	(0.003)	(0.004)	(0.004)
lnAssets	0.0894***	0.0174***	0.0881***	0.0160***
	(0.009)	(0.005)	(0.006)	(0.005)
RD ratio	0.0150***	0.0020	0.0153***	0.0024
	(0.004)	(0.003)	(0.004)	(0.003)
Tobin's Q	0.0111***	−0.0032	0.0113***	−0.0030
	(0.003)	(0.002)	(0.003)	(0.002)
ROA	−0.0026	−0.0277	−0.0075	−0.0319
	(0.067)	(0.053)	(0.070)	(0.062)
Leverage	−0.0584	0.0101	−0.0598*	0.0083
	(0.036)	(0.023)	(0.031)	(0.032)
PPE ratio	0.0172	0.0137	0.0137	0.0092
	(0.042)	(0.030)	(0.040)	(0.034)
Capex ratio	−0.0080	0.0253	−0.0079	0.0265
	(0.084)	(0.062)	(0.083)	(0.060)
Observations	25,586	25,586	25,586	25,586
Adj. R-squared	0.206	0.070	0.206	0.070
Firm Fixed Effects	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

4.5 Timing of Earnings Management

To provide further evidence on the strategic timing of patent acquisitions — a key characteristic of the financial reporting channel — we examine whether the impact of EPU varies across fiscal quarters. If firms utilize the secondary market to manage reported performance, the sensitivity of acquisition to uncertainty should be more pronounced in quarters where managers have greater discretion over resource allocation and financial reporting.

Table 6 reports the results of the quarterly regressions. The dependent variable is the logarithmic number of patents acquired in each quarter. We find that the impact of EPU is concentrated in the first three quarters of the fiscal year. Specifically, the coefficients on $EPU_Quarter$ are 0.007, 0.012, and 0.007 for Q1, Q2, and Q3, respectively, all significant at the 1% level. In contrast, the coefficient for the fourth quarter (Q4) is 0.001 and is statistically insignificant. These findings suggest that the strategic decision to acquire patents as a substitute for internal R&D is concentrated in the early stages of the fiscal year. Economically, managers leverage the discretionary nature of patent acquisitions to manage annual earnings; by strategically timing these transactions during the first three quarters, they retain the tactical flexibility needed to align their reported performance with annual expectations before the final fiscal results are locked in.

Under elevated policy uncertainty, firms are more likely to opt for patent acquisitions—which allow capitalization—while scaling back expensed internal R&D to buffer quarterly performance. However, By the fourth quarter, the extensive margin of acquisition becomes less responsive to EPU. At this stage, innovation budgets and reporting trajectories are largely finalized, significantly narrowing the window for managers to decide whether to initiate a new purchase. Because the Q4 results lack statistical significance, the shift toward a "buying" strategy appears to be a proactive portfolio reallocation rather than a last-minute opportunistic move. This finding is consistent with the literature (e.g., Bereskin et al., 2018) documenting how managers under pressure substitute internal R&D with acquired, lower-risk patent assets to meet specific targets.

The quarterly evidence is consistent with the earnings management mechanism identified in Table 5. These results reinforce the interpretation that the reallocation of innovation sourcing is influenced by financial reporting incentives. Specifically, firms leverage the accounting treatment of patent acquisitions to manage the performance volatility associ-

ated with a volatile policy environment. Overall, the timing of these transactions suggests that policy uncertainty is a significant determinant of both the mode and the timing of corporate innovation sourcing.

Table 6: Timing of Earnings Management (Quarterly ln(1+Patents))

*This table presents quarterly regression estimates that assess whether the effect of economic policy uncertainty (EPU) on patent acquisition varies over the fiscal year. The dependent variable is the logarithm of one plus the number of patents acquired in each quarter. The key explanatory variable is quarterly economic policy uncertainty (EPU_Quarter), measured at the firm–quarter level. Separate regressions are estimated for the first through the fourth fiscal quarters (Q1–Q4). All specifications include firm fixed effects and a standard set of control variables defined in Appendix Table A1. Robust standard errors are reported in parentheses.*** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.*

	(1)	(2)	(3)	(4)
	ln(1+ number of patents bought of this quarter)			
VARIABLES	Q1	Q2	Q3	Q4
EPU_Quarter	0.007***	0.012***	0.007***	0.001
	(0.002)	(0.002)	(0.002)	(0.001)
lnAssets	0.040***	0.035***	0.027***	0.027***
	(0.005)	(0.005)	(0.004)	(0.004)
RD ratio	0.003	0.008***	0.003	0.007***
	(0.002)	(0.003)	(0.002)	(0.002)
Tobin's Q	0.002	0.004**	0.001	0.004**
	(0.001)	(0.002)	(0.002)	(0.001)
ROA	−0.053	−0.013	0.032	−0.023
	(0.037)	(0.040)	(0.035)	(0.042)
Leverage	0.002	0.018	0.021	−0.005
	(0.022)	(0.022)	(0.020)	(0.018)
PPE ratio	−0.020	−0.017	0.007	0.007
	(0.033)	(0.024)	(0.020)	(0.021)
Capex ratio	0.016	0.038	−0.048	0.028
	(0.046)	(0.049)	(0.048)	(0.043)
Observations	25,586	25,586	25,586	25,586
Adj. R-squared	0.086	0.082	0.088	0.104
Firm Fixed Effects	Yes	Yes	Yes	Yes

5 Heterogeneity and Endogeneity

5.1 Trading Liquidity and Industry Heterogeneity

We further examine whether the impact of *EPU* on innovation sourcing strategies is moderated by market-level frictions and industry characteristics. The decision to substitute internal R&D with external patent acquisition likely depends on the ease of transacting in the technology market and the competitive environment of the industry.

Table 7 reports these heterogeneity results. Columns (1) and (2) examine the moderating role of patent market liquidity. We construct the 'Liquidity' variable to measure the liquidity of the patent market accessible to the firm((Hochberg et al., 2018);(Han et al., 2025)). It is an indicator variable that takes the value of 1 if the average liquidity of a firm's acquired patents is higher than the sample average across all firms, and 0 otherwise. This suggests that the firm operates in a technology market with higher liquidity. The coefficient on the interaction term $EPU \times Liquidity$ is positive and statistically significant at the 1% level for acquisition volume and the 5% level for the acquisition ratio. This finding suggests that the shift toward external innovation is more pronounced when transaction costs in the secondary patent market are lower. Higher market liquidity facilitates the reallocation of technological capabilities, enabling firms to utilize patent acquisitions more effectively as a hedge against policy-induced shocks. Columns (3) and (4) examine whether the response to policy uncertainty varies between high-tech and non-high-tech industries. Based on the high-tech industry catalogs defined in the Classification of High-tech Industries (Manufacturing) (2017) and the Classification of High-tech Industries (Services) (2018), we construct a dummy variable, HighTech. This variable takes the value of 1 if a firm operates within a high-tech industry, and 0 otherwise. The coefficient on the interaction term $EPU \times HighTech$ is positive and statistically significant. This result is consistent with the view that firms in high-tech sectors face higher rates of technological obsolescence and more intense competitive pressure. When elevated EPU increases the risk associated with long-term, irreversible internal R&D, firms in high-tech industries are more likely to utilize the secondary market to maintain their technological competitiveness and parity.

Collectively, these cross-sectional results provide additional support for the strategic substitution hypothesis. The findings indicate that the impact of policy uncertainty on firms' innovation boundaries is moderated by market-level liquidity and industry-level competitive demands. Specifically, the reallocation toward patent acquisition is stronger where market frictions are lower and the need for technological speed is greater, suggesting that firms' sourcing decisions are sensitive to the costs and benefits of external procurement under uncertainty.

Table 7: Heterogeneity of Trading Liquidity and High-Tech Industries

*This table reports heterogeneity analyses that explore whether the relationship between economic policy uncertainty (EPU) and firms' patent acquisition behavior varies with patent market liquidity and industry characteristics. The dependent variables are the logarithm of one plus the number of patents acquired, ln(1+Patents), and the ratio of acquired patents to total granted patents, Bought Ratio. The key explanatory variables are interaction terms between EPU and measures of patent market liquidity (Liquidity) as well as an indicator for high-tech industries (HighTech). Columns (1) and (2) focus on heterogeneity with respect to trading liquidity, while Columns (3) and (4) examine differential responses between high-tech and non-high-tech industries. All specifications include firm fixed effects and a standard set of control variables defined in Appendix Table A1. Robust standard errors are reported in parentheses.*** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.*

VARIABLES	(1) Trading liquidity ln(1+Patents)	(2) Trading liquidity Bought Ratio	(3) High tech industries ln(1+Patents)	(4) High tech industries Bought Ratio
EPU × Liquidity	0.026***	0.012**		
	(0.007)	(0.006)		
EPU × HighTech			0.012**	0.008**
			(0.005)	(0.004)
EPU	0.016***	0.030***	0.026***	0.033***
	(0.005)	(0.005)	(0.005)	(0.004)
lnAssets	0.091***	0.018***	0.090***	0.018***
	(0.009)	(0.005)	(0.006)	(0.005)
RD ratio	0.014***	0.002	0.014***	0.001
	(0.004)	(0.003)	(0.004)	(0.003)
Tobin's Q	0.011***	−0.003	0.011***	−0.003
	(0.003)	(0.002)	(0.003)	(0.002)
ROA	−0.007	−0.030	−0.002	−0.027
	(0.067)	(0.061)	(0.070)	(0.053)
Leverage	−0.068*	0.005	−0.060*	0.009
	(0.036)	(0.032)	(0.031)	(0.023)
PPE ratio	0.011	0.011	0.015	0.012
	(0.042)	(0.034)	(0.040)	(0.030)
Capex ratio	−0.005	0.027	−0.010	0.024
	(0.084)	(0.060)	(0.083)	(0.062)
Observations	25,586	25,586	25,586	25,586
Adj. R-squared	0.207	0.070	0.206	0.070
Firm Fixed Effects	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

5.2 Patent Quality Heterogeneity

Table 8 reports the results of the heterogeneity analysis based on technological quality. In the Chinese institutional context, invention patents represent radical high-quality innovations subject to substantive examination, while utility model patents typically represent incremental improvements.

The coefficients on EPU are positive and statistically significant at the 1% level for both types of patents. Specifically, in Column (1), the coefficient for invention patent volume is 0.021, and the coefficient for utility model patents in Column (2) is 0.019; in Column (3), the coefficient for invention bought ratio is 0.014, and the coefficient for utility bought ratio in Column (4) is 0.010. Specifically, the magnitude of the effect is more pronounced for high-quality invention patents. The difference tests reported at the bottom of the table confirm that the impact of policy uncertainty on invention patent acquisition is significantly greater than its impact on utility model acquisition (Difference $= 0.0212, p < 0.01$ for volume; Difference $= 0.0138, p < 0.01$ for ratio).

These findings suggest that the reallocation toward the secondary market is primarily driven by the demand for high-quality technological assets. This pattern is consistent with the real options channel: internal radical innovation—typically leading to invention patents—is highly vulnerable to policy-induced shocks due to its substantial sunk costs and extended gestation periods. As uncertainty increases, firms scale back internal radical R&D and instead secure proven, high-quality technologies through external acquisition to maintain their core technological competitiveness. The significant difference between invention and utility model patents indicates that patent acquisition serves as a strategic response to mitigate the heightened risks associated with internal radical innovation rather than a uniform increase in all types of external sourcing.

5.3 Addressing Endogeneity: Instrumental Variable Analysis

To address potential endogeneity issues, such as omitted variable bias or reverse causality, we employ an instrumental variable (IV) approach. Specifically, we utilize the U.S. Economic Policy Uncertainty index as an external instrument for Chinese EPU. This identification strategy exploits the strong cross-border policy spillovers between the two largest economies, ensuring that our variation in uncertainty is exogenous to individual

Table 8: Economic Policy Uncertainty and Patent Acquisition: Heterogeneity by Patent Quality

*This table studies the impact of Economic Policy Uncertainty (EPU) on the purchase behavior of patents with different technological qualities (invention patents and utility patents). Based on the baseline regression, we categorize the dependent variables. Invention patents are used as a proxy for high-tech patents, and utility patents are used as a proxy for low-tech patents. In the first two columns, the dependent variables are the logarithms of the number of invention patents and utility patents bought. In the last two columns, the dependent variables are the bought ratios of invention patents and utility patents. Control variables include ROA, RD ratio, leverage, etc. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.*

VARIABLES	(1) Invention ln(1+Patents)	(2) Utility ln(1+Patents)	(3) Invention Bought Ratio	(4) Utility Bought Ratio
EPU	0.021***	0.019***	0.014***	0.010***
	(0.003)	(0.003)	(0.001)	(0.001)
lnAssets	0.056***	0.049***	0.006***	0.004**
	(0.006)	(0.007)	(0.002)	(0.002)
RD ratio	0.010***	0.007**	0.001	−0.000
	(0.003)	(0.003)	(0.001)	(0.001)
Tobin's Q	0.007***	0.005**	−0.001	0.000
	(0.002)	(0.002)	(0.001)	(0.001)
ROA	−0.028	0.009	−0.005	−0.002
	(0.043)	(0.053)	(0.021)	(0.020)
Leverage	−0.040*	−0.025	0.005	0.001
	(0.024)	(0.028)	(0.010)	(0.010)
PPE ratio	0.014	0.016	0.005	0.006
	(0.027)	(0.033)	(0.011)	(0.011)
Capex ratio	0.006	−0.026	0.030	0.005
	(0.054)	(0.066)	(0.023)	(0.023)
Difference	0.0212*** (p<0.01)		0.0138*** (p<0.01)	
Observations	25,586	25,586	25,586	25,586
Adj. R-squared	0.178	0.175	0.084	0.062
Firm Fixed Effects	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Chinese firm-level innovation decisions.

Table 9 reports the two-stage least squares (2SLS) regression results. Column (1) presents the first-stage regression, where U.S. EPU strongly predicts Chinese EPU with a coefficient of 1.952 (significant at the 1% level). The Cragg-Donald Wald F-statistic is 8,685.732, far exceeding conventional thresholds and confirming the strength of our instrument. Columns (2) and (3) report the second-stage results. The coefficients on the instrumented EPU are positive and statistically significant for both the volume of patent acquisitions ($\ln(1 + Patents)$) and the acquisition ratio ($Bought_Ratio$). These results indicate that the positive impact of policy uncertainty on firms' external innovation sourcing persists after accounting for potential endogeneity.

The consistency between the IV estimates and the baseline results provides further support for our identification strategy. These findings suggest that the shift toward the secondary patent market is a response to exogenous uncertainty shocks rather than an artifact of firm-specific unobservable factors. By isolating exogenous variation in EPU, the IV analysis reinforces the hypothesis that firms utilize patent acquisitions as a flexible tool to manage technological risk when the macro-policy environment is uncertain. Overall, these results provide evidence of a causal relationship between policy uncertainty and corporate innovation sourcing.

6 Robustness and Geopolitical Risk

6.1 Robustness Checks

Table 10 reports the results of several tests conducted to examine the robustness of our baseline findings. In Column (1), we estimate a Poisson regression model to address the discrete nature of patent counts, based on the volume instead of ratio(Cohn et al., 2022). The coefficient on EPU remains positive and statistically significant at the 1% level ($\beta = 0.164, z\text{-stat} = 6.56$), suggesting that the OLS specification does not yield biased estimates for non-negative integer outcomes. In Columns (2) and (3), we employ an alternative measure of policy uncertainty—the mainland China version of the EPU index(Davis et al., 2019). The results are consistent with the baseline findings; the coefficients on $EPU_mainland$ are positive and statistically significant at the 1% level for both the acquisition volume and the ratio.

Table 9: Policy Uncertainty and Patent Acquisition: 2SLS Estimates using U.S. EPU as an Instrument

*This table presents the two-stage least squares (2SLS) regression results using U.S. EPU as an instrumental variable for Chinese EPU. Column (1) reports the first-stage regression, where the dependent variable is Chinese EPU and the instrument is U.S. EPU (EPU_USA). Columns (2) and (3) report the second-stage results, where the dependent variables are ln(1+Patents) (the natural logarithm of one plus the number of patents acquired) and Bought_Ratio (the ratio of acquired patents to total granted patents), respectively. Control variables include firm size (lnAssets), R&D intensity (RD ratio), growth opportunities (Tobin's Q), profitability (ROA), leverage, asset tangibility (PPE ratio), and capital expenditures (Capex ratio). All regressions include firm fixed effects. Robust standard errors are reported in parentheses. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.*

VARIABLES	(1) EPU	(2) ln(1+ Patents)	(3) Bought Ratio
EPU_USA	1.952***		
	(0.018)		
EPU		0.010*	0.018***
		(0.006)	(0.004)
lnAssets	0.817***	0.112***	0.038***
	(0.018)	(0.011)	(0.006)
RD ratio	0.080***	0.018***	0.005*
	(0.008)	(0.004)	(0.003)
Tobin's Q	0.064***	0.012***	−0.002
	(0.007)	(0.003)	(0.002)
ROA	−2.552***	−0.072	−0.089
	(0.158)	(0.068)	(0.061)
Leverage	−0.544***	−0.076**	−0.005
	(0.098)	(0.036)	(0.032)
PPE ratio	−0.030	0.000	−0.001
	(0.120)	(0.042)	(0.034)
Capex ratio	−3.331***	−0.082	−0.040
	(0.189)	(0.085)	(0.061)
Observations	25,586	25,586	25,586
Adjusted R-squared		0.033	0.019
Firm Fixed Effects	Yes	Yes	Yes
CD Wald F	8685.732		

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Alternatively, rather than reflecting a risk-hedging strategy, the shift toward the secondary market may be driven by the superior absorptive capacity of firms (Cohen et al., 1990).Companies with larger patent portfolios typically possess stronger R&D capabilities and technical understanding, making them more likely to address gaps through acquisitions during periods of uncertainty.Simultaneously,companies that have acquired patents in recent years or consistently built patent portfolios are highly likely to remain active in today's patent market. Both mechanisms may drive increased external patent purchases.To address potential omitted variable bias, we include additional firm-level controls. In Columns (4) and (5), we control for a firm's historical innovation performance using its cumulative patent stock ($\ln patent_stock$). The coefficients on EPU remain highly significant, indicating that the increase in external acquisition is not a reflection of persistent firm-level innovation patterns. The persistence of the EPU effect eliminates the influence of path dependency and absorptive capacity. Furthermore, the deepening reliance on external patent acquisitions stems not from heightened economic uncertainty, but rather from China's macroeconomic slowdown over the past decade and the global economic downturn. Under this practical pressure, companies may increasingly favor acquiring external technologies to mitigate the irreversibility of independent R&D and internal development. In Columns (6) and (7), we incorporate macroeconomic control variables, extending the baseline model by adding macroeconomic indicators (including GDP growth rate, M2 growth rate, and total R&D investment growth rate) to control for the effects of omitted variables. The EPU effect persists in these specifications, confirming that the findings do not merely reflect broader economic cycles.

Collectively, these results suggest that the baseline findings are invariant to alternative measurements and control structures. The stability of the EPU coefficient across these specifications provides further support for the hypothesis that firms utilize the secondary patent market as a strategic response to policy-induced uncertainty.

6.2 Geopolitical Risk and the Strategic Internalization of External Technology

To ensure our baseline findings extend beyond domestic policy shifts, we examine the impact of geopolitical risk (GPR) on firms' patent acquisition strategies. Geopolitical risk is defined as the risk associated with wars, terrorist acts, and tensions between states

Table 10: Robustness Checks

*This table presents the results of the robustness checks. The dependent variables are the logarithm of the number of patents bought and the patent purchase ratio. Control variables include ROA, RD ratio, leverage, etc. In the first column, we use logarithms while the second column employs ratios. Therefore, we perform Poisson regression only on the first column, replacing $ln(1+$ ů$)$ with the actual value itself(Cohn et al., 2022).In the second and third columns, we replace the original explanatory variables with the EPU_mainland indicator based on the baseline regression.In the fourth and fifth columns, we control for the firm's patent stock. In the sixth and seventh columns, we further control for three macroeconomic variables: GDP growth rate, M2 growth rate, and RD ratio, and perform the regression based on the baseline regression. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.*

VARIABLES	(1) Poisson	(2) Different proxy for EPU	(3)	(4) Controlling patent stock	(5)	(6) Controlling macro variables	(7)
	Patents	ln(1+ Patents)	Bought Ratio	ln(1+ Patents)	Bought Ratio	ln(1+ Patents)	Bought Ratio
EPU	0.164***			0.028***	0.039***	0.033***	0.038***
	(0.025)			(0.004)	(0.003)	(0.004)	(0.003)
EPU_mainland		0.050***	0.086***				
		(0.008)	(0.007)				
lnAssets	0.569***	0.102***	0.020***	0.069***	0.021***	0.082***	0.023***
	(0.059)	(0.009)	(0.005)	(0.009)	(0.006)	(0.010)	(0.006)
RD ratio	0.047	0.016***	0.001	0.009*	0.003	0.014***	0.002
	(0.029)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)
Tobin's Q	0.108***	0.014***	0.001	0.007**	−0.002	0.009***	−0.001
	(0.027)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
ROA	−0.635	−0.039	−0.031	0.024	−0.035	0.014	−0.043
	(0.689)	(0.067)	(0.061)	(0.067)	(0.061)	(0.068)	(0.063)
Leverage	−0.914***	−0.076**	−0.006	−0.044	0.008	−0.049	0.001
	(0.307)	(0.036)	(0.032)	(0.036)	(0.032)	(0.036)	(0.033)
PPE ratio	0.118	0.017	0.027	0.021	0.013	0.014	0.018
	(0.405)	(0.042)	(0.034)	(0.041)	(0.034)	(0.041)	(0.034)
Capex ratio	−0.334	−0.056	0.005	0.027	0.017	0.021	−0.004
	(0.784)	(0.084)	(0.060)	(0.083)	(0.060)	(0.084)	(0.061)
GDPgrowth						−0.001	0.000
						(0.001)	(0.001)
M2growth						0.001	−0.002**
						(0.001)	(0.001)
RDgrowth						−0.002**	0.003***
						(0.001)	(0.001)
lnpatent_stock				0.026***	−0.005		
				(0.005)	(0.003)		
Observations	14,944	25,586	25,586	25,586	25,586	25,586	25,586
Adj. R-squared		0.205	0.074	0.207	0.070	0.206	0.071
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

that disrupt the normal course of international relations (Caldara and Iacoviello, 2022)[1]. By utilizing GPR as an alternative measure of uncertainty, we verify that our results are not merely artifacts of country-specific policy cycles but represent a broader strategic response to macro-level shocks.

Table 11 reports the results. The coefficient on GPR is positive and statistically significant at the 1% level across all specifications. In Column (1), the coefficient for the $Buyer_Dummy$ is 0.093, suggesting that firms are more likely to participate in the secondary patent market when global tensions increase. Similarly, in Columns (2) and (3), GPR exhibits a strong positive association with both the volume of patents acquired ($\beta = 0.165, p < 0.01$) and the strategic acquisition ratio ($\beta = 0.293, p < 0.01$).

The estimated effects are also economically significant and provide a concrete, real-world anchor for our mechanism. Geopolitical shocks are frequently associated with risks of technological isolation and supply chain disruptions. In the Chinese context, this aligns with the "Technological Decoupling" literature, which highlights how global trade tensions and "containment" risks incentivize firms to pursue immediate technological self-sufficiency (Han et al., 2024). By shifting toward the acquisition of existing external patents, firms can rapidly internalize proven technologies to buffer against the threat of being cut off from international innovation networks.

Control variables such as $lnAssets$ and $RD\ ratio$ remain positive and significant, consistent with the view that larger, more innovative firms are more proactive in rebalancing their portfolios under duress. These findings reinforce the external validity of our primary hypothesis: when faced with exogenous macro-shocks—be they domestic or geopolitical—firms utilize the secondary market as a flexible tool to maintain technological momentum while managing risk exposure.

7 Conclusion

This study investigates the transformative impact of Economic Policy Uncertainty on corporate innovation boundaries, shifting the focus from "how much" firms innovate to "how" they source innovation. Using a comprehensive panel of Chinese listed firms from 2006 to 2019, our findings uncover a robust positive relationship between policy

[1]The data is obtained from www.matteoiacoviello.com.

Table 11: Alternative Uncertainty Measure: Geopolitical Risk and External Technology Procurement

*In this table, we study the impact of geopolitical risk (GPR) on firm patent buying behavior. The dependent variables are the dummy variable indicating whether patents were bought, the logarithm of the number of patents bought, and the patent bought ratio. Control variables include ROA, RD ratio, leverage, etc. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.*

VARIABLES	(1) Buyer Dummy	(2) ln(1+Patents)	(3) Bought Ratio
GPR	0.093***	0.165***	0.293***
	(0.014)	(0.023)	(0.023)
lnAssets	0.061***	0.099***	0.014***
	(0.005)	(0.009)	(0.005)
RD ratio	0.009***	0.014***	−0.003
	(0.003)	(0.004)	(0.003)
Tobin's Q	0.011***	0.014***	0.001
	(0.002)	(0.003)	(0.002)
ROA	0.018	−0.018	0.007
	(0.039)	(0.067)	(0.062)
Leverage	−0.053**	−0.079**	−0.011
	(0.021)	(0.036)	(0.032)
PPE ratio	−0.002	0.003	0.003
	(0.024)	(0.041)	(0.034)
Capex ratio	−0.000	−0.037	0.040
	(0.053)	(0.084)	(0.061)
Observations	25,586	25,586	25,586
Adj. R-squared	0.181	0.205	0.077
Firm Fixed Effects	Yes	Yes	Yes

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

uncertainty and a firm's reliance on the secondary market for technology. We demonstrate that heightened systemic uncertainty does not merely dampen innovation; it fundamentally alters the corporate innovation mix by driving a strategic reallocation of resources away from internal R&D and toward the acquisition of external patents.

Our analysis indicates that this resource reallocation is driven by two strategic imperatives. Through risk avoidance channels, companies retreat to technological "safety margins" to circumvent the high sunk costs and inherent irreversibility of internal R&D. By leveraging the modular nature and shorter cycles of secondary markets, firms acquire "near-field" external patents to maintain technological momentum while minimizing integration risks during turbulent periods. Simultaneously, a financial reporting channel emerges: managers exploit accounting information asymmetries between R&D expense recognition and patent capitalization. By strategically timing transactions—particularly concentrating them in the first three quarters—firms deploy patent transactions as proactive tools to smooth earnings volatility while cushioning the impact of policy-induced performance fluctuations on financial statements.

The impact of geopolitical risks further intensifies this strategic shift, simultaneously catalyzing the process of internalizing external assets as a defensive measure against global "containment" and technological decoupling. Ultimately, this study demonstrates that corporate innovation behavior in turbulent environments is fundamentally an agile adaptation practice. These findings provide policymakers with critical insights: liquid technology markets are essential for maintaining macroeconomic resilience. Simultaneously, they offer managers crucial guidance for navigating complex investment sourcing challenges within an increasingly fragmented and unpredictable global landscape.

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Appendix

Table A1: Variable Definitions

Variable Name	**Definition**	**Data Source / Note**
Buyer_dummy	1 if the firm bought patents in $t+1$, 0 otherwise	CNIPA patent data
ln(1+Patents)	Log of (1 + number of patents bought in $t+1$)	CNIPA patent data
Bought Ratio	Number of patents bought divided by number of patents applied and finally granted in $t+1$	CNIPA patent data
Tech distance	Technological distance between a purchased patent and the assignee's existing patent portfolio prior to transaction	CNIPA Han et al.(2025)
EPU	Annual average Economic Policy Uncertainty Index (SCMP version), divided by 100	policyuncertainty.com
EPU_mainland	Annual average Economic Policy Uncertainty Index constructed from mainland newspapers, divided by 100	policyuncertainty.com (mainland version)
FC	1 if a firm's SA index (based on firm size and age) is higher than the sample average, 0 otherwise	Hadlock & Pierce (2010)
Cash holdings	1 if cash holdings are higher than the sample average, 0 otherwise	CSMAR
Multi	1 if the HHI of the patent portfolio's technology classes is lower than the sample average, 0 otherwise	Constructed from IPC categories
Overconfidence	1 if the proportion of the salaries of the top three executives in total executive compensation is higher than the sample average, 0 otherwise	CSMAR
Real EM	1 if real earnings management is higher than the sample average and upward-oriented, 0 otherwise	Constructed
Acc EM	1 if accounting earnings management is higher than the sample average and upward-oriented, 0 otherwise	Constructed
lnassets	Log of total assets	CSMAR / WIND
RDratio	R&D expenditure as a percentage of total assets	CSMAR / WIND
leverage	Total liabilities divided by total assets	CSMAR / WIND
PPE_ratio	Net property, plant and equipment divided by total assets	CSMAR / WIND
capex_ratio	Capital expenditure divided by total assets	CSMAR / WIND
lnage	Log of (1 + years since IPO)	CSMAR / WIND
ROA	Return on assets	CSMAR / WIND