Shield or Shackle? Macroprudential Policy and the Transmission of Geopolitical Risk to Stock Market Liquidity

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Abstract

Macroprudential policy is designed to strengthen banking sector resilience, but it may also influence the functioning of capital markets during periods of heightened geopolitical risk. Whether macroprudential policy mitigates or amplifies the adverse effects of geopolitical shocks on stock market liquidity remains largely unexplored. This paper examines how country-level geopolitical risk affects the stock market liquidity of more than 10,000 non-financial firms across 28 European countries over 2008–2023 and whether the macroprudential policy stance moderates this relationship. We find that geopolitical risk significantly reduces stock market liquidity, with a one-standard-deviation increase lowering liquidity by 4.7% to 15.3%, depending on the liquidity measure. More importantly, macroprudential policy conditions this transmission. We uncover a pronounced asymmetry between policy tightening and loosening. Tightening amplifies the adverse effect of geopolitical risk, further deteriorating liquidity by 10.1% to 19.3% relative to the baseline effect. In contrast, loosening mitigates the deterioration by 12.5% to 28.7%, suggesting that greater balance-sheet flexibility enables banks to better support market liquidity during periods of heightened uncertainty. Our findings show that macroprudential policy can either reinforce or cushion the transmission of geopolitical shocks to equity markets. They highlight an important trade-off in policy design: while tighter regulation strengthens banking sector resilience, timely regulatory easing may help preserve stock market liquidity during periods of geopolitical stress. By showing that macroprudential policy conditions the transmission of geopolitical risk to stock market liquidity, this study extends the macroprudential literature beyond its traditional focus on banking-sector outcomes.

Keywords: geopolitical risk; macroprudential policy; stock market liquidity; equity markets

JEL Classification: G12; G18; G28; G32; F38

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1. Introduction

In an increasingly fractured global landscape, geopolitical risk is no longer a peripheral concern; it has become an important source of risk for domestic capital markets and financial stability. For non-financial corporations across Europe, equity market liquidity plays a central role in enabling firms to raise capital, reallocate assets, and withstand macroeconomic stress (Amihud and Noh, 2021; Amihud and Levi, 2023; Cakici and Zaremba, 2021; Cheung et al., 2023; Im et al., 2022; Lin et al., 2026; Nyborg and Wang, 2021; Stereńczak and Kubiak, 2022). However, rising geopolitical risk may reduce stock liquidity, and this risk is not spread evenly across Europe. Countries with greater geographic or institutional exposure to regional conflicts, trade disputes, or deteriorating institutional conditions may experience localized financial shocks that are less pronounced in more insulated economies.

A growing body of empirical research documents the implications of global shocks and geopolitical stress for financial stability and market dynamics (Baele et al., 2020; Banerjee et al., 2024; Bouri et al., 2024; Salisu et al., 2022). Periods of heightened geopolitical turmoil trigger flight-to-safety behavior and increase market-wide uncertainty, disrupting trading mechanisms and constraining financial intermediaries' ability to provide liquidity (Baele et al., 2020). Geopolitical shocks also amplify volatility spillovers across asset classes and affect broader financial conditions (Banerjee et al., 2024). Yet, while the literature shows that geopolitical risk adversely affects aggregate market stability, its transmission to the secondary-market liquidity of non-financial firms remains largely unexplored. Only limited empirical evidence, often based on a single liquidity proxy and highly heterogeneous cross-country samples, has examined this relationship (Fiorillo et al., 2023). More importantly, existing research has not considered whether macroprudential policy moderates the effect of geopolitical risk on corporate stock market liquidity. This gap matters because macroprudential interventions affect banks' balance-sheet capacity, funding conditions, and risk-taking incentives, all of which may shape the transmission of geopolitical shocks to equity markets.

Despite an extensive literature examining the effects of macroprudential policy on banking-sector activities, credit supply, and systemic risk indicators (Davis et al., 2022; Gómez et al., 2020; González, 2022; Igan et al., 2023; Meuleman and Vander Vennet, 2022; Mirzaei et al., 2021; Olszak et al., 2025), its spillover effects on the equity liquidity of non-financial corporations remain largely unexplored. This leaves an important gap in our understanding of financial stability. Macroprudential interventions, although primarily designed to strengthen bank resilience and curb systemic risk, affect balance-sheet capacity, alter funding costs, and reshape financial intermediaries' risk-taking behavior (Brunnermeier and Pedersen, 2009). Consequently, an important question lies at the intersection of market microstructure and financial regulation: does a country's macroprudential framework preserve corporate financing conditions during periods of heightened geopolitical risk, or does it inadvertently constrain equity market liquidity? The existing macroprudential literature focuses predominantly on banking-sector resilience and often treats macroprudential buffers as stabilizing instruments. This paper examines the issue from the perspective of non-financial firms by investigating whether tighter regulatory stances constrain equity market liquidity when firms are particularly exposed to geopolitical stress.

To examine this empirical tension, we draw on theoretical predictions concerning liquidity frictions, balance-sheet constraints, and policy transmission (Brunnermeier and Pedersen, 2009) to formulate three hypotheses. Hypothesis 1 predicts that geopolitical risk is negatively associated with the stock market liquidity of non-financial firms. Heightened geopolitical tensions increase information asymmetry, perceived crash risk, and market makers' inventory risk, thereby widening bid–ask spreads, reducing trading volumes, and impairing market depth. Hypothesis 2 predicts that the macroprudential policy stance has no uniform direct effect on the stock liquidity of non-financial firms, because macroprudential instruments primarily target banking-sector resilience and aggregate credit conditions rather than secondary-market trading conditions. Hypothesis 3 predicts that macroprudential policy moderates the relationship between geopolitical risk and stock liquidity. Specifically, macroprudential loosening mitigates the adverse relationship by expanding financial intermediaries' balance-sheet capacity, whereas macroprudential tightening amplifies the negative effect of geopolitical shocks by constraining funding liquidity.

We empirically test these hypotheses using a comprehensive dataset of publicly listed non-financial companies across 28 European countries over the period 2008–2023, encompassing over 80,000 firm-year observations from more than 10,000 unique companies. European capital markets – representing roughly 13.5% of total global domestic market capitalization – provide a suitable empirical setting. Their high degree of institutional integration, particularly within the European Union, reduces some sources of institutional heterogeneity while preserving substantial cross-country variation in banking dependence, legal origin, market development, and exposure to geopolitical shocks.

We find that geopolitical risk significantly reduces stock market liquidity for European non-financial firms. We find little evidence that macroprudential policy changes directly affect stock liquidity, but they play an important moderating role. Specifically, macroprudential policy loosening mitigates the negative impact of geopolitical stress across liquidity measures. Conversely, macroprudential tightening tends to reinforce this adverse effect. Importantly, these moderating effects depend on the intensity of policy adjustments rather than merely on whether a regulatory change occurs, and the magnitude varies depending on the underlying dimension of market liquidity under analysis. These conclusions remain unchanged once we use alternative geopolitical risk measures, consider dynamic effects, apply a different structure of the individual company and time effects, or apply ML techniques for inference.

This study contributes to the literature on financial stability and regulatory policy in four ways. First, to our knowledge, we provide the first empirical evidence on the moderating channel of macroprudential policy in shaping the relationship between geopolitical shocks and corporate equity liquidity, demonstrating that regulatory interventions can actively attenuate – or inadvertently compound – external shocks. Second, we measure geopolitical risk using a composite index constructed from multiple dimensions of geopolitical conditions. This approach captures local, regional, and systemic sources of geopolitical risk, and complements analyses based on individual indicators. Third, we measure stock liquidity using four complementary indicators capturing trading activity, price impact, transaction costs, and a composite market liquidity. This allows us to identify which dimensions of liquidity are most affected by geopolitical risk and macroprudential policy. Fourth, we extend the macroprudential literature beyond its traditional focus on financial institutions, documenting the real-economy spillovers of macroprudential policy on non-financial corporate equity markets.

The remainder of the paper proceeds as follows. Section 2 reviews the related theoretical and empirical literature and formalizes our hypotheses. Section 3 presents the data, variable constructions, and empirical methodology. Section 4 reports the baseline empirical results and interaction effects. Section 5 details an extensive suite of robustness tests, fixed-effects variations, dynamic persistence analyses, and high-dimensional machine-learning (LASSO) inference procedures. The final section concludes with policy implications.

2. Related Literature and Hypothesis Development

2.1. Geopolitical Risk and Stock Market Liquidity

An increasing body of research recognizes geopolitical risk as an important source of uncertainty affecting capital markets (Caldara & Iacoviello, 2022). Broadly defined, geopolitical risk encompasses structural shifts and heightened expectations surrounding war, military conflict, international sanctions, diplomatic breakdowns, and civil unrest. While these systemic tensions are largely exogenous to individual corporate decisions, they influence investors' risk perceptions, asset pricing, and market behaviour (Carney et al., 2024; Chowdhury et al., 2025; Zhang et al., 2023b).

From a theoretical perspective, market microstructure models predict that market liquidity deteriorates when uncertainty increases. Kyle (1985) demonstrates that higher information asymmetry reduces market depth because liquidity providers require greater compensation for bearing adverse-selection risk. Similarly, Glosten and Milgrom (1985) show that greater informational uncertainty widens bid–ask spreads as market makers or, more broadly, liquidity providers protect themselves against trading with better-informed investors. Amihud and Mendelson (1986) further argue that higher transaction costs reduce market liquidity and increase the expected return required by investors. Because geopolitical risk increases uncertainty about firms' future cash flows and the macroeconomic environment, it is expected to affect these fundamental determinants of stock market liquidity.

Consistent with these theoretical predictions, empirical evidence across geographic regions and asset classes shows that spikes in geopolitical risk increase market stress, price volatility, and downside risk (Neto, 2025; Zhang et al., 2023b). Such shocks increase investors' required compensation for risk and reduce market liquidity, consistent with the asset-pricing implications of illiquidity documented by Amihud and Mendelson (1986) and Amihud (2002). While valuation responses may vary across countries depending on institutional characteristics, market development, or sector-specific hedging opportunities (Snarska et al., 2025; Tirtiroglu et al., 2004), the literature generally finds that geopolitical shocks generate volatility spillovers that affect cross-asset pricing (Ahmed et al., 2023; Smales, 2021).

The financial effects of geopolitical risk are not confined to realized conflict events. Recent studies suggest that expectations of future geopolitical tensions often exert more persistent effects on financial markets than the actual onset of hostilities (Fiorillo et al., 2023, 2024; Kamal & Wahlstrøm, 2023). This observation is consistent with theoretical models showing that uncertainty about future government actions and political developments is incorporated into asset prices before uncertainty materializes (Pastor & Veronesi, 2012). As geopolitical uncertainty rises, investors revise expectations about firms' future cash flows, increase required risk premia, and assign greater probability to adverse tail events (Carney et al., 2024; Chowdhury et al., 2025). This forward-looking pricing mechanism is also consistent with market microstructure theory, according to which changes in expectations affect trading behaviour before uncertainty is fully reflected in realized market outcomes (Pasquariello, 2008).

At the portfolio level, geopolitical uncertainty also influences capital allocation. Heightened uncertainty increases risk aversion and induces well-documented flight-to-quality and flight-to-safety behaviour, leading investors to rebalance portfolios away from relatively risky equities toward sovereign debt and other safe-haven assets (Baele et al., 2020; Beirne & Renzhi, 2025). Foreign institutional investors, which frequently provide liquidity in local equity markets, may reduce their exposure to politically vulnerable markets as geopolitical tensions intensify (Lugo & Montone, 2026). Together with cross-border volatility spillovers and financial contagion (Chatziantoniou et al., 2025; Zhou et al., 2025), these portfolio adjustments reduce market liquidity, although they can temporarily boost trading. Moreover, the interaction between declining funding liquidity and deteriorating market liquidity may reinforce this process, as predicted by the liquidity spiral framework of Brunnermeier and Pedersen (2009). Higher transaction costs, wider bid–ask spreads, and lower market depth further reduce trading activity (Fatemi et al., 2025; Kim et al., 2024), particularly in markets where liquidity is already limited (Fiorillo et al., 2023; Kim et al., 2024).

Synthesizing these theoretical arguments and empirical findings, we expect geopolitical risk to reduce the stock market liquidity of non-financial corporations:

H1: *Increases in country-level geopolitical risk are associated with lower stock market liquidity for non-financial corporations.*

2.2. Macroprudential Policy and Stock Market Liquidity: The Neutral Standalone Baseline

Since the Global Financial Crisis, macroprudential regulation has become the primary institutional architecture deployed by sovereign authorities to safeguard systemic stability, limit financial interconnectedness, and curb procyclical lending behavior (Claessens, 2015; Landau, 2018; Zulkhibri, 2019). Unlike microprudential oversight – which safeguards the solvency of isolated institutions – macroprudential policy adopts a holistic, system-wide mandate (Meuleman & Vander Vennet, 2020; Poutineau & Vermandel, 2017). Its toolkit encompasses inter alia dynamic capital buffers, liquidity coverage ratios, credit-growth caps, and foreign exchange restrictions (Claessens, 2015; ESRB, 2016; FSB, 2024; Zulkhibri, 2019).

While macroprudential instruments are engineered exclusively to fortify banking resilience rather than regulate equity trading floors, they exert an indirect "domino effect" on stock market liquidity through financial intermediaries and institutional investors (Berger & Bouwman, 2009; Brunnermeier & Pedersen, 2009). The primary transmission channel operates through intermediaries' balance sheets and funding constraints. According to Brunnermeier and Pedersen's (2009) theoretical framework, market liquidity and funding liquidity are inextricably linked: when liquidity providers face tight capital requirements or stringent liquidity mandates, their leverage limits contract, risk-bearing capacity shrinks, and market-making activities stall (Cerutti et al., 2017; Claessens et al., 2013; Gómez et al., 2020; Landau, 2018; Meuleman & Vander Vennet, 2020).

A secondary, indirect channel operates through real-economy credit availability and firm-level fundamentals (Fernández Lafuerza & Galán, 2025; Godlewski & Olszak, 2025). By dictating bank lending capacity and corporate financing costs (Olszak et al., 2025), macroprudential adjustments influence corporate profitability, capital expenditure, and default risk – factors that ultimately dictate information asymmetry and investor trading appetite in stock markets.

However, in the absence of an external macroeconomic shock, the standalone net effect of macroprudential adjustments on non-financial stock liquidity remains theoretically ambiguous and practically muted. On one hand, policy tightening might restrict balance-sheet elasticity and reduce market-making liquidity (the balance-sheet constraint hypothesis). On the other hand, a more fortified banking system reduces systemic tail-risk perception, fostering a safer macroeconomic climate that supports long-term market participation (the systemic stability hypothesis). Because these two opposing forces offset each other during tranquil, baseline economic periods, routine shifts in macroprudential policy stance are unlikely to directly drive corporate equity liquidity on their own. This leads to our second hypothesis:

H2: *In the absence of external systemic shocks, changes in the domestic macroprudential policy stance do not exert a direct, standalone effect on corporate stock market liquidity.*

2.3. Bridging the literatures: Macroprudential Regimes as Shock Shield or Shackle

While the literatures on geopolitical risk and macroprudential policy have developed largely independently, they are connected through a common transmission mechanism: the balance-sheet capacity of financial intermediaries. Geopolitical shocks increase the demand for market liquidity by raising uncertainty and trading frictions, whereas macroprudential policy influences the capacity of financial intermediaries to supply liquidity. Integrating these two strands therefore provides a natural framework for explaining why the effects of geopolitical risk on stock market liquidity differ across regulatory environments.

Financial market microstructure theory suggests that stock market liquidity is not a fixed market characteristic but depends on the willingness and ability of financial intermediaries to absorb order imbalances during periods of stress (Brunnermeier & Pedersen, 2009; Næs et al., 2011; Pasquariello, 2008). In the model of Brunnermeier and Pedersen (2009), market liquidity and funding liquidity are mutually reinforcing. When intermediaries face tighter funding constraints or reduced balance-sheet capacity, their ability to provide market liquidity declines, amplifying the effects of adverse shocks. Geopolitical events are therefore expected to affect stock market liquidity not only directly through investor behaviour but also indirectly through their interaction with intermediaries' financial constraints.

Macroprudential policy provides the institutional setting in which this interaction takes place (Meuleman & Vander Vennet, 2020). During periods of macroprudential tightening, higher capital and liquidity requirements reduce the balance-sheet flexibility of financial intermediaries. When geopolitical shocks occur simultaneously, intermediaries may have less capacity to absorb temporary market imbalances, maintain market-making activities, or accommodate sudden shifts in portfolio demand. Consequently, tighter macroprudential conditions may amplify the adverse effects of geopolitical risk on stock market liquidity (Fiorillo et al., 2023; Zhou et al., 2025). By contrast, macroprudential loosening, particularly through the release of capital or liquidity buffers, increases the balance-sheet capacity available to financial intermediaries. This additional flexibility enables intermediaries to continue providing market liquidity during periods of heightened uncertainty, thereby mitigating the deterioration in stock market liquidity associated with geopolitical shocks (Zaremba et al., 2022). Rather than affecting stock liquidity directly, macroprudential policy is therefore expected to influence the extent to which geopolitical risk is transmitted to equity markets.

Taken together, these arguments suggest that the effect of geopolitical risk on stock market liquidity depends not only on the intensity of the shock itself but also on the regulatory environment in which it occurs. Macroprudential policy may therefore serve either as a shield that preserves intermediaries' capacity to supply market liquidity during periods of stress or as a shackle that constrains the balance-sheet flexibility needed to absorb external shocks.

Building on this theoretical framework, we argue that macroprudential policy acts as a moderating mechanism in the relationship between geopolitical risk and stock market liquidity.

Moreover, this moderating effect is expected to be asymmetric because policy tightening and policy loosening affect intermediaries' balance-sheet capacity in opposite directions. Therefore, we formulate the following hypotheses:

H3. *The negative relationship between geopolitical risk and corporate stock market liquidity is moderated by the domestic macroprudential policy stance.*

To capture this asymmetry, we distinguish between tightening and loosening measures.

H3a (The Shackle Mechanism). *The negative relationship between geopolitical risk and stock market liquidity is stronger during periods of macroprudential policy tightening.*

H3b (The Shield Mechanism). *The negative relationship between geopolitical risk and stock market liquidity is weaker during periods of macroprudential policy loosening.*

3. Data and Empirical Design

3.1. Empirical strategy

To test whether domestic macroprudential policy acts as a shield or a shackle in shaping the effect of geopolitical risk on stock market liquidity (Hypotheses *H1–H3*), we estimate the following baseline panel regression model:

$$\begin{aligned} \mathrm{LIQ}_{i,c,t} = \alpha &+ \beta_1 \mathrm{GRI}_{c,t} + \beta_2 \mathrm{MaPP}_{c,t} + \beta_3 \left(\mathrm{GRI}_{c,t} \times \mathrm{MaPP}_{c,t}\right) \\ &+ \boldsymbol{\gamma}' \mathrm{FirmControls}_{i,c,t-1} + \boldsymbol{\delta}' \mathrm{MControls}_{c,t} \\ &+ \eta_c + \mu_j + \tau_t + \varepsilon_{i,c,t} \end{aligned} \tag{1}$$

where subscripts i, j, c, and t denote the firm, industry, country, and calendar year, respectively. $\mathrm{LIQ}_{i,c,t}$ represents one of our proxy measures of stock market liquidity for firm i in year t. $\mathrm{GRI}_{c,t}$ measures country-level geopolitical risk, while $\mathrm{MaPP}_{c,t}$ captures the domestic macroprudential policy stance.

To mitigate simultaneity and potential reverse causality between firm performance and stock market trading conditions, all firm-specific control variables ($\mathrm{FirmControls}_{i,c,t-1}$) are lagged by one period ($t-1$). Macroeconomic control variables $\mathrm{MControls}_{c,t}$ capture observable country-level macroeconomic conditions. In addition, the empirical specification incorporates a comprehensive set of fixed effects. Country fixed effects η_c control for time-invariant institutional and structural characteristics, industry fixed effects μ_j capture persistent industry-specific differences in stock liquidity, and year fixed effects τ_t absorb common macroeconomic and financial shocks affecting all European capital markets. Standard errors are two-way clustered at the firm and year levels to account for serial correlation within firms and cross-sectional dependence across firms.

The primary coefficients of interest are β_1, β_2, and β_3. According to *H1*, we expect $\beta_1 < 0$, indicating that higher geopolitical risk reduces corporate stock market liquidity. Under *H2*, the standalone coefficient β_2 is expected to be statistically indistinguishable from zero in the absence of exogenous shocks. The interaction coefficient β_3 captures the moderating effect of macroprudential policy and provides a direct test of *H3*. To examine whether the moderating effect differs between policy tightening and loosening (*H3a* and *H3b*), we re-estimate Equation (1) by decomposing the aggregate macroprudential policy indicator into separate tightening (*MaPP_T*) and loosening (*MaPP_L*) measures.

3.2. Variables construction and measurement

Measuring Stock Market Liquidity

Our dependent variable is stock market liquidity, defined as the ability to trade large quantities of a security rapidly, at low transaction costs, and with minimal price impact (Stereńczak et al., 2020). Because liquidity is inherently multidimensional, no single proxy adequately captures all its characteristics (Chou et al., 2024). We therefore employ three complementary measures representing trading activity, price impact, and transaction costs, and combine them into a composite liquidity index.

First, we measure trading activity and market depth using the turnover ratio ($\text{Turnover}_{i,t}$):

$$Turnover_{it} = \sum_{m=1}^{NoTD_t} \frac{Vol_{imt}}{MV_{imt}} \tag{2}$$

where $NoTD_t$is the number of trading days available for stock i in year *t*, $m$indexes trading days, Vol_{imt}denotes the trading value of stock i on day m of year *t*, and $MV_{imt}$is the corresponding market capitalization.

Second, we capture the price-impact dimension using the Amihud (2002) illiquidity ratio ($ILLIQ_{i,t}$):

$$ILLIQ_{it} = \frac{1}{NoTD_{it}} \sum_{m=1}^{NoTD_{it}} \frac{|r_{imt}|}{Vol_{imt}} \tag{3}$$

where r_{imt} is the log-return of the ith stock on day m of year t, and Vol_{imt} is the corresponding trading volume in EUR million.

Third, we measure the transaction cost dimension using the Percent Quoted Closing Spread ($\text{PQCS}_{i,t}$) proposed by Chung and Zhang (2014):

$$PQCS_{it} = \frac{1}{NoTD_{it}} \sum_{m=1}^{NoTD_{it}} \frac{ask_{imt} - bid_{imt}}{mid_{imt}} \tag{4}$$

where mid_{imt} is the mid-price (defined as $\frac{ask_{imt}+bid_{imt}}{2}$) of prices for stock *i* quoted at the end of day *m* of year *t*.

To ensure reliable estimation of all liquidity measures, we require each stock to have at least 100 trading days per year. This criterion excludes extremely infrequently traded stocks while improving the stability of the estimated liquidity measures. Because all three indicators exhibit pronounced skewness and kurtosis, we apply logarithmic transformations to reduce the influence of extreme observations. Moreover, since higher values of *ILLIQ* and *PQCS* indicate lower liquidity, both measures are multiplied by −1 so that higher values consistently represent greater liquidity across all indicators.

Finally, to obtain a comprehensive measure of stock market liquidity, we construct a Composite Liquidity Index (*LIQ*) using Principal Component Analysis (PCA). PCA extracts the common latent component shared by the individual liquidity measures while reducing measurement error associated with any single proxy. The index is defined as the first principal component of the log-transformed *Turnover*, *−ILLIQ*, and *−PQCS* measures. The first principal component explains approximately 71% of the common variance, with relatively balanced factor loadings across all three liquidity dimensions.

Quantifying Geopolitical Risk

Our primary explanatory variable is country-level geopolitical risk. The most widely used measure is the Geopolitical Risk Index (*GPR*) developed by Caldara and Iacoviello (2022), which quantifies geopolitical tensions using automated textual analysis of major international newspapers. However, the country-specific *GPR* series are unavailable for a substantial share of European countries included in our sample, which would considerably reduce the size and balance of the panel.

Moreover, no single indicator fully captures the multidimensional nature of geopolitical risk. Event-based indices primarily reflect realized geopolitical events, whereas institutional indicators capture countries' structural exposure and resilience to geopolitical tensions. To obtain a broader measure of country-level geopolitical exposure while preserving comprehensive coverage of European economies, we construct a Geopolitical Risk Index (*GRI*) using Principal Component Analysis (PCA). The index combines four complementary indicators:

- World Uncertainty Index (*WUI*) – measures the frequency of uncertainty-related terms in Economist Intelligence Unit country reports (Ahir et al., 2022).
- Global Peace Index (*GPI*) – captures societal safety, domestic conflict, and militarization using a composite of 23 indicators (Institute for Economics and Peace, 2025).
- World Governance Indicators (*WGI*) – Political Stability and Absence of Violence/Terrorism indicator published by the World Bank.
- Freedom in the World (*FIW*) – evaluates political rights and civil liberties (Freedom House, 2025).

To ensure consistent interpretation, the *WGI* and *FIW* measures are multiplied by -1 so that higher values of all four indicators uniformly represent greater geopolitical risk. PCA is then used to extract their common latent component while reducing measurement error associated with any individual indicator. The resulting first principal component explains approximately 64% of the total variance across the four measures. It captures a broad concept of country-level geopolitical exposure by combining external uncertainty (*WUI*), peace and conflict conditions (*GPI*), institutional vulnerability (*FIW*), and political stability (*WGI*). The resulting *GRI* is moderately correlated with the original Caldara and Iacoviello (2022) index (r = 0.47) while providing substantially broader coverage across European countries, thereby allowing us to retain a balanced panel throughout the analysis.

Macroprudential Policy Indicators

Our second explanatory variable is macroprudential policy, measured using the Integrated Macroprudential Policy (iMaPP) database developed by the International Monetary Fund

(Alam et al., 2019). The iMaPP database records monthly changes in macroprudential regulation across 17 policy instruments, covering both tightening and loosening actions implemented by national authorities. Following the approach adopted in the iMaPP database, all regulatory instruments are aggregated into summary measures of policy stance. This allows us to capture the overall macroprudential policy environment while avoiding excessive model complexity arising from estimating the effects of numerous individual instruments.

Because macroprudential policy can influence financial markets through both its overall stance and the direction and intensity of individual regulatory interventions, we construct several complementary measures. Our baseline indicator, *MaPP*, measures the cumulative annual macroprudential policy stance. It is computed as the net annual sum of monthly policy actions across all available instruments, where tightening measures are coded as +1, loosening measures as −1, and months without regulatory changes as 0. Positive values therefore indicate a tightening of the macroprudential framework, whereas negative values reflect an overall policy loosening. To distinguish between tightening and loosening regimes, we also construct a directional indicator (*MaPP_ind*), which takes the value 1 when the annual net stance is positive, −1 when it is negative, and 0 otherwise.

Since offsetting tightening and loosening actions may conceal substantial regulatory activity, we additionally separate both types of interventions. We therefore construct *MaPP_T* and *MaPP_L*, defined as the annual gross numbers of tightening and loosening actions, respectively. These variables measure the intensity of macroprudential policy independently of its net direction and enable us to examine whether tightening and loosening exert asymmetric effects on stock market liquidity. Finally, we construct two binary indicators, *MaPP_Tdum* and *MaPP_Ldum*, which equal one whenever at least one tightening (loosening) measure is implemented during a given year and zero otherwise. These variables capture the occurrence of regulatory interventions irrespective of their frequency and are used in robustness analyses.

Control Variables

Following the corporate finance and market microstructure literature (Fiorillo et al., 2023; Zhang et al., 2023a), we control for both macroeconomic and firm-specific determinants of stock market liquidity.

The set of macroeconomic control variables (*MControls*) includes annual real GDP growth (*GDPg*), inflation measured by the Consumer Price Index (*CPI*), and the unemployment rate (*UNEmp*). These variables capture the overall macroeconomic environment that may influence trading activity, investors' risk appetite, and market liquidity.

Following previous studies (Fiorillo et al., 2023; Zhang et al., 2023a), the firm-specific control variables (*FirmControls*) include firm size (*lnMV*), measured as the natural logarithm of market capitalization (EUR million); return volatility (*Volatility*), calculated as the annual standard deviation of daily stock returns; firm valuation (*M-BV*), measured by the market-to-book value ratio of equity; financial leverage (*Leverage*), defined as the ratio of total debt to total capital; profitability (*EBIT_Assets*), measured as earnings before interest and taxes scaled by total assets; and asset tangibility (*Tangibility*), calculated as net property, plant, and equipment divided by total assets. The firm-level controls account for time-varying firm characteristics that have been shown to influence stock market liquidity.

To mitigate the influence of extreme observations, all firm-level control variables are winsorized annually at the 2.5th and 97.5th percentiles. Detailed definitions of all variables and their data sources are reported in Appendix Table A1.

3.3. Sample construction

We compile the empirical dataset from several complementary data sources. Firm-level financial statements, daily stock prices, and trading activity are obtained from S&P Capital IQ. The geopolitical risk indicators are collected directly from their original providers: the World Uncertainty Index (*WUI*) (Ahir et al., 2022), the Global Peace Index (*GPI*) published by the Institute for Economics and Peace, the Worldwide Governance Indicators (*WGI*) of the World Bank, and the Freedom in the World (*FIW*) database compiled by Freedom House. Information on macroprudential policy interventions is obtained from the IMF's Integrated Macroprudential Policy (iMaPP) database (Alam et al., 2019), while macroeconomic control variables are retrieved from the World Bank database.

The baseline sample covers the period 2008–2023, reflecting the joint availability of all variables required to construct the composite geopolitical risk index. In robustness analyses employing alternative geopolitical risk measures, longer sample periods are considered whenever data availability permits. The initial sample consists of 13,533 publicly listed companies, corresponding to 124,832 firm-year observations, listed on stock exchanges in 34 European countries. To avoid duplication, only firms with a primary listing on a European stock exchange are retained. To ensure reliable estimation of stock liquidity, we exclude 25,042 firm-year observations for firms with fewer than 100 trading days in a given year. We further exclude

1,507 companies (12,503 firm-year observations) operating in the broadly defined financial sector because their regulatory environment and balance-sheet structures differ fundamentally from those of non-financial firms.

The final baseline sample comprises 87,287 firm-year observations representing 10,480 listed non-financial firms across 34 European countries. Because the World Uncertainty Index is unavailable for Cyprus, Estonia, Iceland, Luxembourg, Malta, and Serbia, the baseline estimations using the composite *GRI* cover 28 countries. However, in the robustness analyses employing alternative geopolitical risk measures, these countries are included whenever the relevant data are available. Due to occasional missing observations required to construct individual variables, the effective estimation sample varies slightly across model specifications. Appendix Table A2 reports the distribution of observations by country (Panel A), industry, and year (Panel B).

3.4. Descriptive statistics

Table 1 reports the descriptive statistics for all variables used in the empirical analysis, while Appendix Table A3 presents the corresponding pairwise correlation matrix.

Following the logarithmic transformation of the liquidity measures and the annual winsorization of firm-level control variables, most variables exhibit acceptable levels of skewness and kurtosis. The only notable exception among the firm-specific variables is the market-to-book ratio (*M-BV*), which remains positively skewed (skewness = 2.895; kurtosis = 13.906), reflecting the presence of a relatively small number of high-growth firms. Among the country-level variables, elevated kurtosis is observed only for *GPI*, *FIW*, *CPI*, and *UNEmp*, indicating occasional extreme geopolitical and macroeconomic observations.

[INSERT TABLE 1 ABOUT HERE]

The composite liquidity index (*LIQ*) has a mean of −0.034 and a standard deviation of 1.490, indicating substantial cross-sectional variation in stock market liquidity across European firms. Similarly, the composite geopolitical risk index (*GRI*) is centred around zero (mean = −0.000) with a standard deviation of 1.602, providing considerable variation in country-level geopolitical conditions.

Regarding macroprudential policy, the average value of *MaPP* equals 3.020 net policy actions per year (median = 3.000), suggesting that tightening measures slightly outnumbered loosening actions over the sample period. By contrast, *MaPP_L* exhibits substantial positive skewness (skewness = 4.028; kurtosis = 20.292), indicating that policy loosening episodes were relatively infrequent and concentrated in a limited number of country-year observations.

Correlation Analysis and Multicollinearity Diagnostics

The pairwise correlations reported in Appendix Table A3 are broadly consistent with our theoretical expectations. First, the three individual liquidity measures – *Turnover*, *ILLIQ*, and *PQCS* – are strongly positively correlated after the directional adjustment of the illiquidity measures, supporting the use of their first principal component (*LIQ*) as a comprehensive measure of stock market liquidity.

Second, the geopolitical risk indicators are generally positively correlated with one another, although the World Uncertainty Index (*WUI*) exhibits weaker correlations, reflecting its distinct, text-based construction. Most geopolitical risk measures are negatively correlated with stock liquidity, providing preliminary descriptive support for Hypothesis *H1*.

Third, the aggregate macroprudential policy indicators (*MaPP* and *MaPP_ind*) display only weak positive correlations with stock liquidity. The small magnitude of these coefficients suggests that macroprudential policy has little direct association with liquidity in a univariate setting, consistent with Hypothesis *H2*, which predicts that its primary role is conditional on geopolitical shocks.

To assess potential multicollinearity, we compute Variance Inflation Factors (VIFs). The maximum VIF equals 1.68 (mean = 1.36), well below conventional thresholds. After incorporating country, industry, and year fixed effects, the maximum and mean VIF decline further to 1.57 and 1.19, respectively. These results indicate that multicollinearity is unlikely to affect the estimation of our panel regression models.

Time-Series Patterns

Figure 1 illustrates the evolution of stock market liquidity, geopolitical risk, and macroprudential policy over the sample period.

European stock market liquidity exhibits pronounced procyclicality, consistent with Næs et al. (2011). Periods of reduced liquidity coincide with major episodes of financial and geopolitical stress, including the Global Financial Crisis, the European sovereign debt crisis, the COVID-19 pandemic, and the escalation of the Russia–Ukraine conflict. Geopolitical risk follows a broadly similar pattern, with elevated values during periods of heightened international tensions.

Macroprudential policy became increasingly active after the Global Financial Crisis, reflecting the gradual expansion of macroprudential frameworks across Europe. While tightening measures dominate over most of the sample period, a marked increase in policy loosening occurred in 2020, when authorities released macroprudential buffers in response to the COVID-19 crisis.

[INSERT FIGURE 1 ABOUT HERE]

Cross-Country Heterogeneity

Appendix Figures A1–A3 illustrate the cross-country distribution of stock market liquidity, geopolitical risk, and macroprudential policy actions.

Stock liquidity displays considerable geographical heterogeneity. Mature Western European markets generally exhibit deeper and more liquid equity markets than emerging European economies. Geopolitical risk, in contrast, is driven primarily by geographic proximity to regional conflicts rather than by economic development, with the highest values observed in Russia and Ukraine. Macroprudential interventions are implemented throughout Europe, although their intensity varies substantially across countries, with more frequent tightening observed in several Central and Eastern European jurisdictions.

Overall, these descriptive findings reveal substantial cross-sectional and temporal variation in the main variables of interest, supporting the use of a panel specification with country, industry, and year fixed effects.

4. Empirical Results and Discussion

This section presents the main empirical findings. Section 4.1 reports the baseline regressions examining the relationship between geopolitical risk, macroprudential policy, and stock market liquidity, providing direct tests of Hypotheses *H1* and *H2*. Section 4.2 investigates whether these relationships differ across macroprudential policy regimes, with particular emphasis on the asymmetry between policy tightening and loosening (*H3*).

4.1. Baseline Results: Geopolitical Shocks and Macroprudential Baseline

Table 2 reports the baseline regression results examining the relationship between geopolitical risk, macroprudential policy, and stock market liquidity. To ensure robustness across different dimensions of market liquidity, we estimate the models using four alternative dependent variables: *Turnover*, the Amihud illiquidity ratio (*ILLIQ*), the Percent Quoted Closing Spread (*PQCS*), and the composite liquidity index (*LIQ*).

[INSERT TABLE 2 ABOUT HERE]

Testing Hypothesis H1: Geopolitical Risk and Market Liquidity

Across all specifications reported in Table 2, the coefficient on *GRI* is consistently negative and statistically significant for most liquidity measures. In the benchmark specification (Column 4), geopolitical risk is negatively associated with the composite liquidity index (*LIQ*; $\beta = -0.0880$, $p < 0.05$), and the effect becomes slightly stronger when the alternative macroprudential policy indicator is used ($\beta = -0.0956$, $p < 0.01$; Column 8). At the individual liquidity dimension level, higher geopolitical risk significantly reduces trading activity (*Turnover*; $\beta = -0.153$, $p < 0.01$; Column 1) and increases price impact (*ILLIQ*; $\beta = -0.191$, $p < 0.01$; Column 2). Although the coefficients for *PQCS* remain negative ($\beta = -0.0473$ and $\beta = -0.0566$), they are not statistically significant. This suggests that quoted spreads are either less responsive to geopolitical shocks or more affected by idiosyncratic factors than turnover- and price-impact-based measures.

The estimated effects are also economically meaningful. A one-standard-deviation increase in *GRI* (1.602) is associated with a 4.7–15.3% decline in stock market liquidity, depending on the liquidity measure considered. The largest effects are observed for trading activity (*Turnover*) and price impact (*ILLIQ*), whereas quoted bid–ask spreads (*PQCS*) appear considerably less affected. Overall, these findings provide strong support for Hypothesis *H1*, indicating that heightened geopolitical risk reduces stock market liquidity.

These results are consistent with the growing literature on geopolitical risk and financial markets. In particular, they corroborate the findings of Fiorillo et al. (2023), who show that geopolitical risk increases price impact and reduces market liquidity. They also complement Lugo and Montone (2026), who show that when political relations between two countries worsen, foreign institutional investors pull back from the local stock market, and that they sell less liquid stocks first. Their paper shows how investors behave; ours shows the market outcome: stock liquidity falls when geopolitical risk rises. Finally, our findings are consistent with Beirne and Renzhi (2025), extending their evidence on capital-flow volatility by showing that geopolitical shocks also reduce liquidity at the firm level.

Testing Hypothesis H2: Unconditional Macroprudential Effects

In contrast to the pervasive effect of geopolitical risk, the unconditional relationship between macroprudential policy and stock market liquidity is statistically insignificant. As reported in Table 2 (Columns 1–4), the coefficient on the aggregate macroprudential policy index (*MaPP*) is insignificant across all liquidity measures (*Turnover*: $\beta = -0.00350$; *ILLIQ*: $\beta = -0.0115$; PQCS: $\beta = -0.00408$; *LIQ*: $\beta = -0.00444$). Replacing the continuous policy index with the directional indicator (*MaPP_ind*; Columns 5–8) produces similar results, with no statistically significant effects across any specification (e.g., *LIQ*: $\beta = 0.0255$).

These findings indicate that macroprudential policy does not exert a direct and unconditional influence on stock market liquidity. This result is consistent with the primary objective of macroprudential regulation, which is to strengthen the resilience of the banking system by influencing capital buffers, credit supply, and banks' balance-sheet capacity rather than secondary equity markets. Any effect on stock market liquidity is therefore likely to be indirect and dependent on broader economic and financial conditions.

Overall, the baseline estimates are consistent with Hypothesis *H2*, suggesting that routine macroprudential policy actions do not directly affect stock market liquidity in the absence of heightened geopolitical stress.

Micro- and Macro-Level Control Variables

Firm size (*lnMV*) is strongly and positively associated with stock market liquidity, indicating that larger firms have higher trading activity, lower trading frictions, and greater market depth. Higher stock return volatility (*Volatility*) is associated with increased trading activity but also with wider bid–ask spreads, suggesting that heightened uncertainty stimulates trading while raising transaction costs. This pattern fits the mechanism discussed in Section 2, whereby uncertainty-driven portfolio rebalancing temporarily boosts trading even as liquidity deteriorates (Lugo & Montone, 2026).

Among firm characteristics, the market-to-book ratio (*M-BV*) is negatively related to stock market liquidity, consistent with greater valuation uncertainty and information asymmetry among high-growth firms. *Leverage* is positively associated with liquidity, whereas *EBIT_Assets* and *Tangibility* are negatively related to the composite liquidity measure, indicating that more profitable and asset-intensive firms tend to exhibit lower trading activity or higher trading frictions. The negative coefficient on *Tangibility* is in line with Gopalan et al. (2012), who show that firms with less liquid assets have less liquid stocks, as fixed assets are harder to value and increase information asymmetry.

At the macroeconomic level, GDP growth (*GDPg*) and inflation (*CPI*) are generally positively associated with stock market liquidity, although these relationships are not statistically significant across all specifications. By contrast, the unemployment rate (*UNEmp*) does not exhibit a systematic relationship with liquidity.

Overall, the baseline results indicate a robust negative relationship between geopolitical risk and stock market liquidity, while providing no evidence that macroprudential policy exerts a direct unconditional effect on liquidity. The two results are consistent with our framework: macroprudential policy need not move liquidity in calm periods, but it may shape how strongly liquidity reacts when geopolitical risk rises. The next section tests this conditional effect (*H3*).

4.2. The links between liquidity and geopolitical risk – the role of macroprudential policy stance

To examine whether the effect of geopolitical risk (*GRI*) on stock market liquidity depends on the prevailing macroprudential policy stance, as proposed in Hypothesis *H3*, we extend the baseline specification by interacting *GRI* with alternative measures of macroprudential policy. Table 3 reports the results using both the continuous macroprudential policy index (*MaPP*) and its directional counterpart (*MaPP_ind*). Across all specifications, the coefficient on *GRI* remains negative and statistically significant for *Turnover*, *ILLIQ*, and the composite liquidity index (*LIQ*), confirming that geopolitical risk is associated with lower stock market liquidity, corroborating the baseline results.

[INSERT TABLE 3 ABOUT HERE]

Columns (1)–(4) show the interaction between *GRI* and the continuous macroprudential policy index (*MaPP*). The interaction term (*GRI* × *MaPP*) is negative and statistically significant for *Turnover* ($\beta = -0.00305$, $p < 0.01$), *ILLIQ* ($\beta = -0.00451$, $p < 0.05$), and *LIQ* ($\beta = -0.00233$, $p < 0.05$). These results indicate that the adverse effect of geopolitical risk on stock market liquidity becomes stronger as the cumulative macroprudential policy stance shifts towards tightening. Columns (5)–(8) replace the continuous index with the directional indicator (*MaPP_ind*). Although the interaction term remains negative for *Turnover* and *LIQ*, it is statistically significant only for *Turnover*. This suggests that the effect of macroprudential policy depends primarily on the cumulative intensity of policy actions rather than on the occurrence of individual tightening or loosening episodes.

The pattern across liquidity dimensions is also informative. The moderating effect appears for trading activity and price impact but not for quoted spreads. Price impact captures the cost of executing larger trades, which depends on the capacity of liquidity providers to absorb order imbalances, whereas quoted spreads capture the cost of small transactions. This suggests that the deterioration in liquidity falls mainly on larger trades, typical of institutional investors, and stems from a weakened supply of liquidity, while the cost of small trades, typically executed by less informed, retail investors, remains largely unchanged.

Overall, the results in Table 3 support Hypothesis *H3*, indicating that the relationship between geopolitical risk and stock market liquidity depends on the prevailing macroprudential policy stance. However, because *MaPP* combines tightening and loosening actions into a single net measure, it cannot distinguish between potentially asymmetric policy effects.
Table 4 therefore decomposes the aggregate macroprudential policy index into cumulative tightening (*MaPP_T*) and loosening (*MaPP_L*) measures, together with their binary counterparts (*MaPP_Tdum* and *MaPP_Ldum*). Across all specifications, the coefficient on *GRI* remains negative and statistically significant for most liquidity measures, confirming that geopolitical risk reduces stock market liquidity irrespective of the policy environment. As in the baseline models, the direct effect of *GRI* on *PQCS* remains statistically insignificant.

[INSERT TABLE 4 ABOUT HERE]

Columns (1)–(4) examine the continuous policy measures. The interaction between geopolitical risk and cumulative tightening (*GRI* × *MaPP_T*) is negative and statistically significant only for *Turnover*, indicating that policy tightening mainly amplifies the decline in trading activity during periods of heightened geopolitical risk. By contrast, the interaction between geopolitical risk and cumulative loosening (*GRI* × *MaPP_L*) is positive and statistically significant across all liquidity measures (for *Turnover* at the 10% level). Given the negative effect of *GRI* on *Turnover*, *ILLIQ*, and *LIQ*, these positive interaction terms indicate that cumulative macroprudential loosening mitigates the adverse impact of geopolitical risk on these dimensions of liquidity. . For quoted bid–ask spreads, however, the direct effect of *GRI* is insignificant, so there is no adverse effect to offset; the significant interaction indicates only that the response of spreads to geopolitical risk varies with the policy stance.

Columns (5)–(8) report the results based on the binary policy indicators. Neither the interaction with the tightening dummy (*GRI* × *MaPP_Tdum*) nor that with the loosening dummy (*GRI* × *MaPP_Ldum*) remains consistently significant across liquidity measures. These findings suggest that the moderating role of macroprudential policy is driven by the cumulative intensity of policy interventions rather than by isolated policy actions.

Taken together, the results reveal a clear asymmetry in the transmission of macroprudential policy. While tightening measures primarily reinforce the decline in trading activity associated with geopolitical shocks, cumulative policy loosening mitigates the adverse effects of geopolitical risk across multiple dimensions of stock market liquidity. These findings provide strong support for Hypothesis *H3*.

The economic magnitude of these effects is substantial. A one-standard-deviation increase in the aggregate *MaPP* index amplifies the negative effect of geopolitical risk on liquidity by approximately 10–19% relative to the baseline effect. Decomposing the policy index reveals an important asymmetry. Four cumulative tightening actions (approximately one standard deviation of *MaPP_T*) increase the negative effect of geopolitical risk on trading activity by about 8%, whereas three cumulative loosening actions (one standard deviation of *MaPP_L*) reduce the adverse liquidity effect by approximately 13–29%, depending on the liquidity measure considered.

Our results relate most directly to Fiorillo et al. (2023), who document that geopolitical risk reduces stock market liquidity through greater financing constraints and information asymmetry. We find the same negative relationship in European markets, but our evidence shows that it is not invariant across institutional settings: the strength of the transmission depends systematically on the macroprudential policy environment, with cumulative policy loosening mitigating, and policy tightening reinforcing, the adverse effects of geopolitical risk on liquidity.

Zaremba et al. (2022) show a similar pattern: financial markets respond differently to adverse news depending on the prevailing policy environment. Our results indicate that the same holds for market liquidity, as identical increases in geopolitical risk generate markedly different liquidity responses under different macroprudential policy stances.

The results are also in line with the macroprudential literature emphasizing state dependence and asymmetric policy transmission. Claessens (2015) and Zulkhibri (2019) argue that the effectiveness of macroprudential policy depends on the broader financial and regulatory environment. In our setting, it is the cumulative intensity of macroprudential actions, rather than the occurrence of individual policy measures, that determines how strongly geopolitical shocks affect stock market liquidity.

Finally, our results fit the theoretical framework of Pasquariello (2008), in which market liquidity deteriorates when financial constraints limit investors' ability to absorb adverse shocks. Whereas Pasquariello focuses on constraints arising within markets, our evidence points to macroprudential policy as an institutional factor that shapes how tight these constraints are when geopolitical risk rises

5. Robustness checks and sensitivity analyses

To assess the robustness of our findings and ensure that they are not driven by specific modelling choices, we conduct a series of sensitivity analyses. In particular, we examine whether the results depend on (i) the measurement of geopolitical risk, (ii) the timing of geopolitical and macroprudential effects, (iii) the panel specification, and (iv) the selection of control variables. Across all robustness tests, the main conclusions remain unchanged.

Alternative geopolitical risk measures

We first examine whether the results depend on the construction of the geopolitical risk index. While the baseline analysis uses a composite geopolitical risk measure (*GRI*) derived from the first principal component of four underlying indicators, the literature offers several alternative measures that differ in country coverage and time horizon. We therefore re-estimate the baseline specifications using each individual indicator as well as alternative principal component indices constructed from two- and three-variable combinations. In total, we consider nine alternative geopolitical risk proxies (Table OA1 in the Online Appendix). Because some of these indicators cover longer periods or more countries than the four used to construct the baseline *GRI*, the estimation samples in these tests can be larger than in the baseline specifications, which explains the differences in the number of observations across columns.

The results are highly consistent across all specifications. Regardless of the measure employed, geopolitical risk remains negatively associated with stock market liquidity, although the magnitude of the estimated coefficients varies somewhat across alternative proxies. Likewise, the interaction between geopolitical risk and macroprudential policy remains negative, indicating that tighter macroprudential regimes consistently amplify the adverse effect of geopolitical risk on stock market liquidity.

Timing of the effects

We next investigate whether the estimated relationships reflect only contemporaneous shocks or persist over time. To this end, we augment the baseline specification with lagged values of *GRI*, *MaPP*, and their interaction (Table OA2 in the Online Appendix).

The results indicate that the negative effect of geopolitical risk persists beyond the contemporaneous period, suggesting that geopolitical shocks have lasting implications for stock market liquidity. By contrast, the moderating effect of macroprudential policy is primarily contemporaneous, as the lagged policy variables and their interactions with geopolitical risk are generally statistically insignificant.

We also examine whether macroprudential policy operates through cumulative rather than annual regulatory actions. Specifically, we construct a three-year rolling macroprudential policy index (*MaPPMA*) covering years *t*, *t–1*, and *t–2* and re-estimate the baseline models (Table OA3 in the Online Appendix). The results closely mirror the baseline findings. Cumulative macroprudential tightening continues to reinforce the adverse effect of geopolitical risk on liquidity, whereas cumulative policy loosening mitigates it. These findings suggest that the effects of macroprudential policy accumulate over time and are particularly pronounced during periods of sustained regulatory easing.

Alternative panel specifications

We further assess whether our findings depend on the underlying panel specification. Although the baseline models include country, industry, and year fixed effects, unobserved firm-specific heterogeneity may still influence the estimates.

To address this concern, Table OA4 reports results obtained from several alternative fixed-effects specifications together with a correlated random-effects estimator following Mundlak (1978) and Wooldridge (2019). While the coefficients on *GRI* is consistently negative and significant, the coefficient on the time-series mean of *GRI* is significantly positive. However, the implied between effect is statistically insignificant ($\beta + \gamma = 0.0149$, t-stat = 0.79). This indicates that the negative relationship between geopolitical risk and stock liquidity is driven by within-country variation rather than persistent cross-country differences in geopolitical risk. This finding is consistent with Hypothesis *H1*, which concerns the within-stock effect. Across all specifications, the interaction of geopolitical risk with macroprudential policy remain negative and statistically significant. Moreover, the corresponding between effect is also negative and statistically significant, indicating that the moderating role of macroprudential policy is present both within and across countries. This indicates that the main conclusions are not sensitive to the choice of panel estimator or fixed-effects structure.

High-dimensional controls and LASSO-based inference

Finally, we examine whether the results depend on the selection of control variables. We therefore employ the double-selection LASSO procedure of Belloni et al. (2014, 2016), which selects controls from a high-dimensional set of firm-level and macroeconomic variables. Before estimation, all variables are residualised with respect to country, industry, and year fixed effects following the Frisch–Waugh–Lovell theorem (Frisch and Waugh, 1933; Lovell, 1963). The results are reported in Table 5.

The LASSO estimates closely replicate the baseline findings. Across all specifications, geopolitical risk remains negatively associated with stock market liquidity, while the direct effect of macroprudential policy remains limited. More importantly, the interaction between geopolitical risk and macroprudential policy remains negative and statistically significant across all liquidity measures, confirming that tighter macroprudential policy amplifies the adverse effect of geopolitical risk on market liquidity.

The LASSO framework also confirms the asymmetric effects documented in the main analysis. Cumulative macroprudential tightening strengthens the negative impact of geopolitical risk on liquidity, whereas cumulative policy loosening significantly mitigates this relationship across all liquidity measures.

To ensure that these findings are not specific to a particular machine-learning estimator, we additionally implement partialling-out and cross-fitted partialling-out LASSO procedures following Chernozhukov et al. (2018). As reported in Tables OA5 and OA6, the estimated coefficients and statistical significance remain virtually unchanged, providing further evidence that our conclusions are robust to alternative high-dimensional inference procedures.

6. Conclusions

This paper examines how geopolitical risk and macroprudential policy jointly shape stock market liquidity for European non-financial firms over the period 2008–2023. While previous studies have shown that geopolitical risk reduces market liquidity and that macroprudential policy strengthens financial system resilience, little is known about how these two forces interact. Using firm-level data covering more than 80,000 firm-year observations from 28

European economies, this study extends the macroprudential literature beyond the banking sector by examining its implications for secondary equity market liquidity.

The empirical findings reveal three main results. First, geopolitical risk significantly reduces stock market liquidity across several dimensions, including trading activity, price impact, and a composite liquidity measure. The strongest effects are observed for liquidity measures reflecting the execution of large transactions, whereas quoted bid–ask spreads appear less sensitive to geopolitical shocks. Second, macroprudential policy does not exert a direct unconditional effect on stock market liquidity. This suggests that macroprudential regulation does not systematically influence equity market trading under normal market conditions.

The main contribution of this paper lies in demonstrating that the effect of geopolitical risk on stock market liquidity depends on the prevailing macroprudential policy stance. In particular, cumulative macroprudential tightening amplifies the adverse impact of geopolitical shocks, whereas cumulative policy loosening mitigates these effect. Moreover, the results show that policy intensity matters more than the occurrence of individual policy actions. This finding highlights the importance of distinguishing between tightening and loosening measures rather than relying solely on aggregate macroprudential indices, which may conceal important asymmetries in policy transmission.

These findings have implications for several strands of the literature. First, they show that the transmission of geopolitical shocks to market liquidity is conditional on the institutional environment in which financial markets operate. Second, they provide new evidence for the macroprudential literature by demonstrating that policy intensity, rather than isolated regulatory actions, is the key mechanism through which macroprudential policy influences market outcomes. More broadly, the results suggest that macroprudential regulation affects not only banking sector resilience but also the ability of capital markets to absorb adverse external shocks.

The findings have several policy implications. Although macroprudential policy is primarily designed to safeguard financial stability, its effects extend beyond the banking sector. During periods of heightened geopolitical uncertainty, sustained macroprudential tightening may reduce the capacity of financial intermediaries to supply market liquidity, while cumulative policy loosening can help mitigate these adverse effect. These results suggest that policymakers should consider potential spillover effects on capital market functioning when calibrating macroprudential measures, particularly during periods of elevated geopolitical risk. Incorporating market liquidity indicators into macroprudential policy assessments may therefore improve the balance between financial stability objectives and the efficient functioning of capital markets. This balance matters for the real economy: lower stock liquidity raises the cost of equity capital, so the stance chosen by regulators ultimately affects firms' access to finance and their investment activity.

This study is subject to several limitations that provide opportunities for future research. Future work could examine whether the documented relationships differ across bank-based and market-based financial systems, firm ownership structures, or firm size. Further research could also investigate the interaction between monetary policy and macroprudential regulation during periods of heightened geopolitical uncertainty. Finally, extending the analysis to emerging economies and explicitly modelling the role of non-bank financial intermediaries and dealer balance-sheet capacity would improve our understanding of the mechanisms through which macroprudential policy shapes stock market liquidity during geopolitical shocks.

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Table 1
Descriptive statistics

Variable	Mean	Std.Dev.	Skewness	Kurtosis	5th percentile	Median	95th percentile
Turnover	-1.837	1.844	-1.210	4.949	-5.473	-1.508	0.579
ILLIQ	-0.363	3.906	0.385	2.296	-6.112	-0.902	6.984
PQCS	4.314	1.416	0.088	2.701	1.976	4.229	6.835
LIQ	-0.034	1.490	0.085	2.504	-2.411	-0.088	2.620
WUI	0.098	0.065	1.842	7.575	0.023	0.087	0.196
GPI	1.663	0.276	2.650	13.433	1.361	1.620	1.989
WGI	-0.593	0.424	0.955	5.649	-1.231	-0.548	0.106
FIW	-92.235	12.291	4.619	26.176	-100.000	-95.000	-82.000
GRI	-0.000	1.602	2.971	15.453	-1.702	0.006	1.585
MaPP	3.020	4.958	-0.149	4.681	-5.000	3.000	11.000
MaPP_ind	0.483	0.713	-1.011	2.645	-1.000	1.000	1.000
MaPP_T	3.202	4.005	1.265	4.498	0.000	2.000	11.000
MaPP_L	1.031	2.928	4.028	20.292	0.000	0.000	5.000
lnMV	4.291	2.463	0.168	2.450	0.336	4.136	8.709
Leverage	0.325	0.290	0.905	3.517	0.000	0.287	0.878
EBIT_Assets	-0.012	0.211	-2.280	9.321	-0.494	0.038	0.215
M-BV	2.369	3.166	2.895	13.906	0.000	1.364	8.917
Volatility	0.037	0.026	1.911	6.901	0.012	0.029	0.095
Tangibility	0.250	0.256	1.068	3.125	0.001	0.160	0.821
GDPgrowth	1.320	3.347	-0.967	6.164	-5.125	1.646	6.246
CPI	2.626	2.869	2.600	19.799	-0.217	1.962	8.369
Unemployment	7.222	3.779	2.372	11.186	3.231	6.990	13.365

Note: This table presents the descriptive statistics for the main variables used in the empirical analysis, based on a sample of listed non-financial firms across 28 European countries from 2008 to 2023. The dependent variables capture stock market liquidity: *Turnover* is the ratio of shares traded to outstanding shares; *ILLIQ* is the Amihud (2002) illiquidity ratio; *PQCS* is the percent quoted spread; and *LIQ* is the composite liquidity index; *Turnover*, *ILLIQ* and *PQCS* are log-transformed. *GRI* denotes the composite geopolitical risk index constructed via principal component analysis (PCA). *MaPP* represents the aggregate macroprudential policy index, decomposed into tightening (*MaPP_T*) and loosening (*MaPP_L*) measures, as well as a directional indicator (*MaPP_ind*). All continuous firm-level variables are winsorized annually at the 2.5th and 97.5th percentiles to reduce the impact of outliers. Variable definitions and data sources are provided in Appendix Table A1.

Table 2
Baseline regression results

Variable	*(1)* *Turnover*	*(2)* *ILLIQ*	*(3)* *PQCS*	*(4)* *LIQ*	*(5)* *Turnover*	*(6)* *ILLIQ*	*(7)* *PQCS*	*(8)* *LIQ*
lnMV	0.222***	1.384***	0.406***	0.463***	0.222***	1.384***	0.407***	0.463***
	(17.47)	(95.43)	(51.16)	(61.86)	(17.51)	(95.92)	(51.92)	(62.44)
Volatility	14.73***	-1.387	-7.339***	0.400	14.73***	-1.357	-7.311***	0.418
	(10.45)	(-0.96)	(-9.20)	(0.47)	(10.49)	(-0.94)	(-9.17)	(0.49)
M-BV	-0.0279***	-0.0431***	-0.0183***	-0.0221***	-0.0279***	-0.0431***	-0.0183***	-0.0221***
	(-4.34)	(-6.18)	(-7.85)	(-6.13)	(-4.34)	(-6.18)	(-7.78)	(-6.11)
Leverage	0.247***	0.362***	0.159***	0.195***	0.247***	0.362***	0.158***	0.195***
	(4.84)	(5.76)	(7.08)	(6.36)	(4.84)	(5.72)	(7.03)	(6.32)
EBIT_Assets	-0.651***	-1.056***	-0.262***	-0.453***	-0.651***	-1.056***	-0.263***	-0.454***
	(-9.20)	(-13.69)	(-7.84)	(-12.46)	(-9.22)	(-13.75)	(-7.81)	(-12.50)
Tangibility	-0.705***	-0.754***	-0.259***	-0.421***	-0.705***	-0.754***	-0.259***	-0.421***
	(-10.09)	(-8.81)	(-8.96)	(-10.06)	(-10.08)	(-8.81)	(-8.93)	(-10.05)
GDPgrowth	0.0127	0.0155	0.0331**	0.0204**	0.0118	0.0121	0.0311**	0.0187*
	(1.25)	(1.41)	(2.29)	(2.23)	(1.18)	(1.10)	(2.15)	(2.02)
CPI	0.0191	0.0366**	0.0175*	0.0181*	0.0198	0.0394**	0.0193**	0.0194**
	(1.44)	(2.16)	(2.10)	(1.98)	(1.53)	(2.42)	(2.33)	(2.17)
Unemployment	-0.0169	-0.0133	-0.00165	-0.00692	-0.0169	-0.0133	-0.00159	-0.00686
	(-1.26)	(-0.85)	(-0.13)	(-0.69)	(-1.27)	(-0.87)	(-0.13)	(-0.70)
GRI	-0.153***	-0.191***	-0.0473	-0.0880**	-0.157***	-0.206***	-0.0566	-0.0956***
	(-3.30)	(-3.43)	(-0.84)	(-2.54)	(-3.52)	(-4.01)	(-1.11)	(-3.24)
MaPP	-0.00350	-0.0115	-0.00408	-0.00444				
	(-0.56)	(-1.40)	(-0.88)	(-1.05)				
MaPP_ind					0.00240	0.0220	0.0467	0.0255
					(0.07)	(0.62)	(1.04)	(1.06)
Constant	-2.963***	-6.033***	2.844***	-1.918***	-2.976***	-6.084***	2.804***	-1.947***
	(-25.53)	(-40.76)	(25.02)	(-21.16)	(-25.64)	(-43.61)	(25.67)	(-22.90)
Country/ Industry/Time FE	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
Observations	80,529	80,529	79,512	79,512	80,529	80,529	79,512	79,512
Adj. R^2	0.270	0.772	0.723	0.652	0.270	0.771	0.724	0.652
Adj. Within-R^2	0.088	0.716	0.636	0.559	0.088	0.716	0.636	0.559

Note: This table reports the baseline panel regression estimates evaluating the impact of geopolitical risk (*GRI*) and macroprudential (*MaPP*) on corporate stock liquidity across European non-financial firms from 2008 to 2023. *MaPP* represents the aggregate macroprudential policy index and *MaPP_ind* is a directional indicator. Columns (1)–(4) correspond to individual liquidity proxies (*Turnover*, *ILLIQ*, *PQCS*, and composite *LIQ*). Standard errors are double-clustered at the firm and year levels and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. See Appendix Table A1 for full variable descriptions.

Table 3
Macroprudential policy stance as a moderating channel in the geopolitical risk–stock liquidity relationship

Variable	*(1)* *Turnover*	*(2)* *ILLIQ*	*(3)* *PQCS*	*(4)* *LIQ*	*(5)* *Turnover*	*(6)* *ILLIQ*	*(7)* *PQCS*	*(8)* *LIQ*
lnMV	0.222***	1.384***	0.407***	0.463***	0.222***	1.384***	0.407***	0.463***
	(17.62)	(96.71)	(51.11)	(62.35)	(17.54)	(95.90)	(52.04)	(62.38)
Volatility	14.77***	-1.324	-7.313***	0.435	14.76***	-1.338	-7.314***	0.428
	(10.38)	(-0.92)	(-9.09)	(0.51)	(10.36)	(-0.92)	(-9.14)	(0.50)
M-BV	-0.0279***	-0.0432***	-0.0183***	-0.0221***	-0.0279***	-0.0432***	-0.0183***	-0.0221***
	(-4.31)	(-6.14)	(-7.80)	(-6.09)	(-4.31)	(-6.18)	(-7.82)	(-6.11)
Leverage	0.249***	0.365***	0.160***	0.196***	0.248***	0.363***	0.158***	0.195***
	(4.87)	(5.78)	(7.13)	(6.39)	(4.85)	(5.74)	(7.05)	(6.35)
EBIT_Assets	-0.650***	-1.054***	-0.261***	-0.453***	-0.648***	-1.054***	-0.263***	-0.453***
	(-9.25)	(-13.68)	(-7.83)	(-12.50)	(-9.23)	(-13.65)	(-7.83)	(-12.43)
Tangibility	-0.705***	-0.754***	-0.259***	-0.421***	-0.705***	-0.754***	-0.259***	-0.420***
	(-10.09)	(-8.80)	(-8.96)	(-10.06)	(-10.09)	(-8.80)	(-8.93)	(-10.05)
GDPgrowth	0.0116	0.0140	0.0325**	0.0195**	0.0133	0.0131	0.0310**	0.0192*
	(1.16)	(1.35)	(2.23)	(2.15)	(1.26)	(1.10)	(2.14)	(2.01)
CPI	0.0231	0.0425**	0.0199**	0.0212**	0.0234*	0.0418**	0.0189**	0.0206**
	(1.71)	(2.53)	(2.55)	(2.40)	(1.79)	(2.57)	(2.35)	(2.36)
Unemployment	-0.0171	-0.0136	-0.00174	-0.00704	-0.0157	-0.0124	-0.00171	-0.00649
	(-1.30)	(-0.89)	(-0.14)	(-0.72)	(-1.22)	(-0.82)	(-0.14)	(-0.65)
GRI	-0.149***	-0.185***	-0.0449	-0.0848**	-0.144***	-0.197***	-0.0581	-0.0911***
	(-3.22)	(-3.34)	(-0.81)	(-2.54)	(-3.03)	(-3.67)	(-1.13)	(-2.95)
MaPP	0.00137	-0.00432	-0.00126	-0.000687				
	(0.21)	(-0.54)	(-0.24)	(-0.16)				
GRI×MaPP	-0.00305***	-0.00451**	-0.00175	-0.00233**				
	(-5.27)	(-2.90)	(-1.58)	(-2.87)				
MaPP_ind					-0.000705	0.0198	0.0470	0.0243
					(-0.02)	(0.53)	(1.03)	(0.96)
GRI × MaPP_ind					-0.0355***	-0.0248	0.00384	-0.0119
					(-3.04)	(-0.73)	(0.16)	(-0.67)
Constant	-2.986***	-6.067***	2.831***	-1.936***	-2.995***	-6.097***	2.806***	-1.953***
	(-25.61)	(-43.07)	(24.58)	(-21.57)	(-25.81)	(-43.92)	(24.78)	(-22.35)
Country/ Industry/Time FE	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
Observations	80,529	80,529	79,512	79,512	80,529	80,529	79,512	79,512
Adj. R^2	0.270	0.772	0.724	0.652	0.270	0.772	0.724	0.652
Adj. Within-R^2	0.088	0.716	0.636	0.559	0.088	0.716	0.636	0.559

Note: This table presents the baseline panel regression estimates evaluating the moderating role of the overall macroprudential policy stance (*MaPP*) and its directional indicator (*MaPP_ind*) on the relationship between geopolitical risk (GRI) and stock market liquidity across European non-financial firms over the period 2008–2023. Columns (1)–(4)

report specifications incorporating the continuous net macroprudential policy index (*MaPP*), while Columns (5)–(8) report specifications using the binary policy indicator (*MaPP_ind*). The dependent variables capture four distinct dimensions of stock market liquidity: trading activity (*Turnover*), price impact (*ILLIQ*), bid-ask spread (*PQCS*), and a composite liquidity index (*LIQ*). All specifications include firm-level and country-level control variables, as well as country, industry, and time fixed effects. Standard errors are double-clustered at the firm and year levels, with t-statistics reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Variable definitions and data sources are provided in Appendix Table A1.

Table 4
Macroprudential policy asymmetry and the liquidity response to geopolitical risk

Variable	*(1) Turnover*	*(2) ILLIQ*	*(3) PQCS*	*(4) LIQ*	*(5) Turnover*	*(6) ILLIQ*	*(7) PQCS*	*(8) LIQ*
GRI	-0.155***	-0.202***	-0.0539	-0.0923**	-0.153***	-0.240***	-0.0758	-0.108***
	(-3.33)	(-3.56)	(-0.97)	(-2.76)	(-3.16)	(-4.42)	(-1.41)	(-3.41)
MaPP_T	0.00390	-0.00104	-0.000439	0.000507				
	(0.58)	(-0.13)	(-0.08)	(0.12)				
MaPP_L	0.0120	0.0143	-0.000383	0.00332				
	(1.14)	(0.98)	(-0.04)	(0.43)				
GRI×MaPP_T	-0.00295***	-0.00143	0.000659	-0.000684				
	(-3.03)	(-0.64)	(0.40)	(-0.59)				
GRI×MaPP_L	0.00278*	0.00866***	0.00528***	0.00462***				
	(1.80)	(3.85)	(3.16)	(3.97)				
MaPP_Tdum					0.0254	0.0152	0.0427	0.0263
					(0.55)	(0.28)	(0.69)	(0.91)
MaPP_Ldum					0.0435	0.0466	-0.0417	-0.00251
					(0.99)	(0.83)	(-1.13)	(-0.08)
GRI×MaPP_Tdum					-0.0421*	0.0329	0.0334	0.00913
					(-1.79)	(0.90)	(1.17)	(0.44)
GRI×MaPP_Ldum					0.0367	0.0614	0.0292	0.0330
					(1.60)	(1.49)	(1.30)	(1.72)
Constant	-3.014***	-6.119***	2.810***	-1.958***	-3.013***	-6.106***	2.793***	-1.964***
	(-27.02)	(-44.04)	(24.20)	(-22.30)	(-25.82)	(-42.01)	(22.28)	(-21.63)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country/ Industry/Time FE	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
Observations	80,529	80,529	79,512	79,512	80,529	80,529	79,512	79,512
Adj. R^2	0.271	0.772	0.724	0.653	0.270	0.772	0.724	0.652
Adj. Within-R^2	0.089	0.716	0.637	0.560	0.088	0.716	0.637	0.559

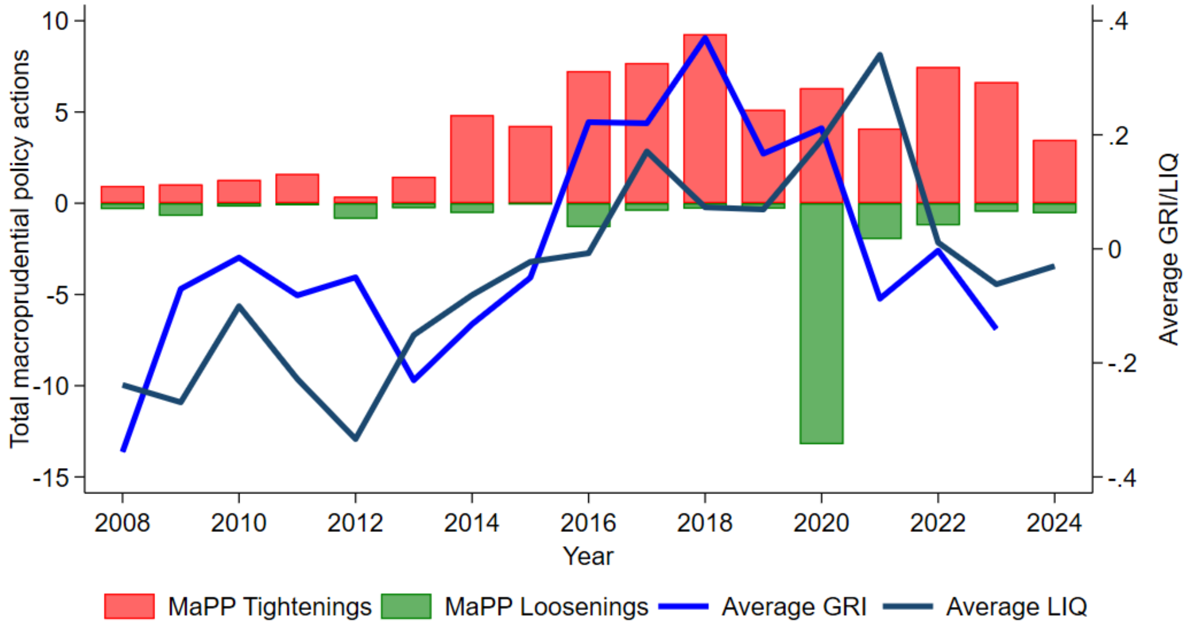
Note: This table presents the baseline panel regression estimates examining the asymmetric moderating effects of macroprudential tightening and loosening on the relationship between geopolitical risk (*GRI*) and corporate stock market liquidity across European non-financial firms from 2008 to 2023. Columns (1)–(4) evaluate specifications using cumulative continuous macroprudential tightening (*MaPP_T*) and loosening (*MaPP_L*) indices, while Columns (5)–(8) report results using binary dummy indicators for policy tightening (*MaPP_Tdum*) and loosening (*MaPP_Ldum*). Stock market liquidity is measured across four distinct dimensions: trading activity (*Turnover*), price impact (*ILLIQ*), bid-ask spread (*PQCS*), and a composite liquidity index (*LIQ*). All models incorporate a comprehensive set of firm-level and country-level control variables, alongside country, industry, and year fixed effects. Standard errors are double-clustered at the firm and year levels, with corresponding t-statistics reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed definitions and data sources for all variables are provided in Appendix Table A1.

Table 5. LASSO regression (double selection)

Variable	(1) *Turnover*	(2) *ILLIQ*	(3) *PQCS*	(4) *LIQ*	(5) *Turnover*	(6) *ILLIQ*	(7) *PQCS*	(8) *LIQ*	(9) *Turnover*	(10) *ILLIQ*	(11) *PQCS*	(12) *LIQ*
GRI	-0.134***	-0.194***	-0.0548***	-0.0874***	-0.128***	-0.205***	-0.0674***	-0.0926***	-0.142***	-0.216***	-0.0663***	-0.0967***
	(-5.62)	(-6.19)	(-4.65)	(-5.98)	(-5.36)	(-6.51)	(-5.72)	(-6.33)	(-5.90)	(-6.84)	(-5.62)	(-6.60)
MaPP	0.00453***	-0.00176	-0.000286	0.001000								
	(2.63)	(-0.75)	(-0.32)	(0.92)								
MaPP×GRI	-0.00347***	-0.00508***	-0.00200***	-0.00262***								
	(-9.62)	(-10.67)	(-11.99)	(-11.59)								
MaPP_ind					0.0179*	0.0370***	0.0566***	0.0337***				
					(1.95)	(2.96)	(11.11)	(6.00)				
MaPP_ind×GRI					-0.0365***	-0.0298***	0.00159	-0.0137***				
					(-8.91)	(-5.51)	(0.78)	(-5.57)				
MaPP_T									0.00729***	0.00349	0.00178*	0.00302***
									(3.91)	(1.38)	(1.89)	(2.59)
MaPP_L									0.00923***	0.0227***	0.00621***	0.00660***
									(2.63)	(5.09)	(3.31)	(2.97)
MaPP_T×GRI									-0.00308***	-0.00189***	0.000363	-0.000924***
									(-5.92)	(-2.80)	(1.48)	(-2.87)
MaPP_L×GRI									0.00362***	0.00911***	0.00525***	0.00486***
									(5.36)	(10.07)	(17.29)	(11.48)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	80,841	80,858	79,840	79,840	80,841	80,858	79,840	79,840	80,841	80,841	79,824	79,824
Selected control variables	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility
χ^2	131.299	185.894	213.830	188.498	131.466	91.674	155.052	115.627	141.464	233.695	423.542	239.005

Note: This table presents the double-selection LASSO regression estimates (Belloni et al., 2014) evaluating the robustness of the relationship between geopolitical risk (*GRI*), macroprudential policy stance, and corporate stock market liquidity across European non-financial firms over the period 2008–2023. Prior to estimation, all variables are residualized with respect to exchange, industry, and year fixed effects in accordance with the Frisch–Waugh–Lovell theorem. Columns (1)–(4) examine the baseline aggregate macroprudential index (*MaPP*), Columns (5)–(8) analyze the directional policy indicator (*MaPP_ind*), and Columns (9)–(12) evaluate continuous macroprudential tightening (*MaPP_T*) and loosening (*MaPP_L*) measures. Dependent variables capture four distinct dimensions of liquidity: trading activity (*Turnover*), price impact (*ILLIQ*), bid-ask spread (*PQCS*), and a composite liquidity index (*LIQ*). Control variables automatically selected by the LASSO algorithm from a high-dimensional set of firm-level and macroeconomic covariates are listed at the bottom of the table. Standard errors are double-clustered at the firm and year levels, with corresponding t-statistics reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed variable definitions are provided in Appendix Table A1.

Figure 1
Geopolitical Risk, Stock Liquidity, and Macroprudential Policy over Time



Note: Figure 1 illustrates the joint time-series evolution of country-level geopolitical risk (*GRI*), composite corporate stock market liquidity (*LIQ*), and the aggregate macroprudential policy stance (*MaPP*) across European countries over the sample period from 2008 to 2023. The composite geopolitical risk index (*GRI*) is constructed via principal component analysis (PCA) based on underlying geopolitical threat and event indicators. Composite stock liquidity (*LIQ*) represents the aggregate country-level average across European listed non-financial firms, where higher values indicate stronger market liquidity conditions. The macroprudential policy stance (*MaPP*) reflects net cumulative regulatory actions, with upward movements denoting macroprudential tightening and downward shifts indicating regulatory loosening. Shaded regions highlight key systemic shock episodes, including the Global Financial Crisis, the European Sovereign Debt Crisis, the COVID-19 pandemic, and the escalation of the Russia–Ukraine war. Detailed descriptions and sources for all variables are provided in Appendix Table A1.

APPENDIX

Table A1. Definitions of the variables

Symbol	Variable name	Definition	Source
		Stock liquidity measures	
Turnover	Turnover ratio	$Turnover_{it} = ln\left(\sum_{m=1}^{NoTD_t} \frac{Vol_{imt}}{MV_{imt}}\right)$	S&P Capital IQ
ILLIQ	Amihud illiquidity ratio	$ILLIQ_{it} = -ln\left(\frac{1}{NoTD_{it}} \sum_{m=1}^{NoTD_{it}} \frac{\lvert r_{imt}\rvert}{Vol_{imt}}\right)$	(Amihud, 2002); S&P Capital IQ
PQCS	Percent Quoted Closing Spread	$PQCS_{it} = -ln\left(\sum_{m=1}^{NoTD_{it}} \frac{ask_{imt} - bid_{imt}}{mid_{imt}}\right)$	(Chung & Zhang, 2014); S&P Capital IQ
LIQ	Stock liquidity indicator	First principal component of *Turnover*, *ILLIQ* and *PQCS.*	S&P Capital IQ
		Geopolitical risk measures	
WUI	World Uncertainty Index	The WUI is computed by counting the percentage of the word "uncertain" (or its variant) in the Economist Intelligence Unit country reports. The WUI is then rescaled by multiplying by 1,000,000. A higher number means higher uncertainty and vice versa.	(Ahir et al., 2022); worlduncertaintyindex.com
GPI	Global Peace Index	A composite index measuring the peacefulness of countries made up of 23 quantitative and qualitative indicators, each weighted on a scale of 1-5. The lower the score, the more peaceful the country.	Institute for Economics & Peace; visionofhumanity.org
WGI	Political Stability and Absence of Violence/Terrorism	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. The score is multiplied by -1 so that the higher value denotes higher risk.	World Bank; data.worldbank.org/indicator/PV.ES
FIW	Freedom in the World	Freedom in the World is an annual global report on political rights and civil liberties, composed of numerical ratings and descriptive texts for each country and a select group of territories. The score is multiplied by -1 so that the higher value denotes higher risk.	Freedom House; freedomhouse.org/report/freedom-world
GRI	Geopolitical Risk Index	First principal component of *WUI*, *GPI*, *WGI* and *FIW.*	Own calculations.

		Macroprudential policy measures	
MaPP	Macroprudential policy index	The sum of macroprudential policy action indicators of all 17 instruments. Each tightening event of a particular instrument is coded as a +1, each loosening event is coded as a -1, and no or neutral action is coded as a zero.	The IMF's integrated Macroprudential Policy (iMaPP) Database, originally constructed by Alam et al. (2019).
MaPP_ind	Macroprudential policy indicator	An indicator variable that takes the value of +1 if *MaPP* is positive (policy tightening), the value of -1 if *MaPP* is negative (policy loosening), and the value of zero if *MaPP* equals zero (no change).	The IMF's integrated Macroprudential Policy (iMaPP) Database, originally constructed by Alam et al. (2019).
MaPP_T	Macroprudential policy tightening index	The sum of macroprudential policy tightening indicators of all 17 instruments. The indicators takes 1 if the instrument is tightened and 0 otherwise.	The IMF's integrated Macroprudential Policy (iMaPP) Database, originally constructed by Alam et al. (2019).
MaPP_L	Macroprudential policy loosening index	The sum of macroprudential policy loosening indicators of all 17 instruments. The indicators takes 1 if the instrument is loosened and 0 otherwise.	The IMF's integrated Macroprudential Policy (iMaPP) Database, originally constructed by Alam et al. (2019).
MaPP_Tdum	Macroprudential policy tightening indicator	A binary variable that takes the value of 1 if *MaPP_T* is positive, and 0 otherwise.	The IMF's integrated Macroprudential Policy (iMaPP) Database, originally constructed by Alam et al. (2019).
MaPP_Ldum	Macroprudential policy loosening indicator	A binary variable that takes the value of 1 if *MaPP_L* is positive, and 0 otherwise.	The IMF's integrated Macroprudential Policy (iMaPP) Database, originally constructed by Alam et al. (2019).
		Control variables – company level	
lnMV	Firm size	The logarithm of market capitalisation as of the end of the previous year.	S&P Capital IQ
Volatility	Return volatility	The standard deviation of daily stock returns in a year. Only years with at least 100 daily returns are considered.	S&P Capital IQ
M-BV	Firm value	Market-to-book ratio computed as the ratio of market capitalisation as of the end of the previous year to the last known book value of equity.	S&P Capital IQ
Leverage	Firm indebtedness	The ratio of the total debt to total capital (sum of the total debt and the book value of equity) as of the end of the previous year.	S&P Capital IQ
EBIT_Assets	Firm profitability	Earnings before interest and taxes, scaled by total assets at the beginning of the fiscal year.	S&P Capital IQ

Tangibility	Asset tangibility	Net property, plant and equipment scaled by total assets as of the end of the previous year.	S&P Capital IQ
		Control variables – country level	
GDPg	GDP growth	The percentage change in Gross Domestic Product over each previous year of the constant price (base year 2015) series in United States dollars.	World Bank; data.worldbank.org/indicator/ NY.GDP.MKTP.KD.ZG
CPI	Inflation	The annual percentage change in the cost to the average consumer of acquiring a basket of goods and services over each previous year of the constant price (base year 2015) series in United States dollars.	World Bank; data.worldbank.org/indicator/ FP.CPI.TOTL
UNEmp	Unemployment rate	The share of the labour force that is without work but available for and seeking employment. Estimated using International Labour Organisation models.	World Bank; data.worldbank.org/indicator/ SL.UEM.TOTL.ZS

Table A2

Structure of the research sample by country and industry

Panel A: Structure by country												
Country	Initial sample				Excl. observations with less than 100 trading days				Final sample			
	# of firms	# of obs	% of firms	% of obs	# of firms	# of obs	% of firms	% of obs	# of firms	# of obs	% of firms	% of obs
Austria	123	1,185	0.91	0.95	90	816	0.75	0.82	77	694	0.73	0.80
Belgium	240	2,624	1.77	2.10	190	1,831	1.59	1.83	164	1,612	1.56	1.85
Bulgaria	229	2,765	1.69	2.21	177	859	1.48	0.86	139	648	1.33	0.74
Croatia	169	1,991	1.25	1.59	113	858	0.94	0.86	97	777	0.93	0.89
Cyprus	159	1,365	1.17	1.09	79	354	0.66	0.35	53	239	0.51	0.27
Czech Republic	43	297	0.32	0.24	25	147	0.21	0.15	21	116	0.20	0.13
Denmark	286	2,693	2.11	2.16	272	2,368	2.27	2.37	214	1,824	2.04	2.09
Estonia	40	312	0.30	0.25	38	281	0.32	0.28	36	269	0.34	0.31
Finland	243	2,301	1.80	1.84	232	2,159	1.94	2.16	212	2,030	2.02	2.33
France	1,111	12,266	8.21	9.83	1,040	9,572	8.68	9.59	968	8,845	9.24	10.13
Germany	1,497	13,286	11.06	10.64	1,423	12,028	11.87	12.05	1,218	10,223	11.62	11.71
Greece	301	3,233	2.22	2.59	291	3,007	2.43	3.01	263	2,791	2.51	3.20
Hungary	76	686	0.56	0.55	65	539	0.54	0.54	55	457	0.52	0.52
Iceland	42	309	0.31	0.25	33	185	0.28	0.19	23	146	0.22	0.17
Ireland	47	428	0.35	0.34	44	360	0.37	0.36	38	293	0.36	0.34
Italy	667	5,307	4.93	4.25	641	4,976	5.35	4.99	540	4,184	5.15	4.79
Latvia	40	368	0.30	0.29	22	164	0.18	0.16	18	156	0.17	0.18
Lithuania	53	499	0.39	0.40	46	374	0.38	0.37	40	330	0.38	0.38
Luxembourg	22	202	0.16	0.16	10	103	0.08	0.10	8	72	0.08	0.08
Malta	37	384	0.27	0.31	18	100	0.15	0.10	12	68	0.11	0.08
Netherlands	193	1,709	1.43	1.37	180	1,553	1.50	1.56	156	1,403	1.49	1.61
Norway	542	4,119	4.01	3.30	513	3,664	4.28	3.67	451	3,080	4.31	3.53
Poland	1,195	12,015	8.83	9.62	1,167	10,412	9.74	10.43	1,046	9,156	9.98	10.49
Portugal	65	799	0.48	0.64	60	609	0.50	0.61	52	561	0.50	0.64
Romania	323	4,292	2.39	3.44	153	1,104	1.28	1.11	141	935	1.35	1.07
Russia	428	3,345	3.16	2.68	283	2,435	2.36	2.44	252	2,229	2.40	2.55
Serbia	203	2,324	1.50	1.86	34	162	0.28	0.16	30	138	0.29	0.16
Slovakia	46	545	0.34	0.44	11	63	0.09	0.06	9	46	0.09	0.05
Slovenia	92	786	0.68	0.63	48	295	0.40	0.30	33	212	0.31	0.24
Spain	288	2,704	2.13	2.17	274	2,409	2.29	2.41	240	2,142	2.29	2.45
Sweden	1,379	10,894	10.19	8.73	1,317	9,784	10.99	9.80	1,240	9,230	11.83	10.57
Switzerland	313	3,750	2.31	3.00	289	3,412	2.41	3.42	240	2,721	2.29	3.12
Ukraine	84	757	0.62	0.61	62	279	0.52	0.28	47	224	0.45	0.26

United Kingdom	2,957	24,292	21.85	19.46	2,747	22,528	22.92	22.58	2,346	19,436	22.39	22.27
Total	13,533	124,832	100	100	11,987	99,790	100	100	10,480	87,287	100	100

Panel B: Structure by industry and year

Industry	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total	Total %
Communication Services	443	432	426	432	418	423	420	428	428	437	453	449	457	499	509	507	7,161	8.20
Consumer Discretionary	752	728	745	756	721	704	708	705	717	735	720	704	684	735	769	765	11,648	13.34
Consumer Staples	357	346	384	399	367	361	368	359	366	376	356	349	349	376	371	365	5,849	6.70
Energy	265	272	284	297	299	293	296	287	262	262	265	263	257	254	260	234	4,350	4.98
Health Care	405	412	415	425	418	430	456	513	558	593	604	621	639	693	714	699	8,595	9.85
Industrials	1,187	1,196	1,261	1,265	1,211	1,218	1,248	1,242	1,233	1,264	1,244	1,232	1,233	1,305	1,338	1,292	19,969	22.88
Information Technology	840	811	785	756	733	722	739	732	745	780	793	803	814	891	907	916	12,767	14.63
Materials	498	498	525	546	532	540	535	520	508	499	489	481	469	497	505	478	8,120	9.30
Real Estate	316	326	346	349	330	331	341	361	361	377	387	385	384	394	387	396	5,771	6.61
Utilities	144	154	219	214	208	194	198	199	196	194	189	200	192	204	201	151	3,057	3.50
Total	5,207	5,175	5,390	5,439	5,237	5,216	5,309	5,346	5,374	5,517	5,500	5,487	5,478	5,848	5,961	5,803	87,287	100

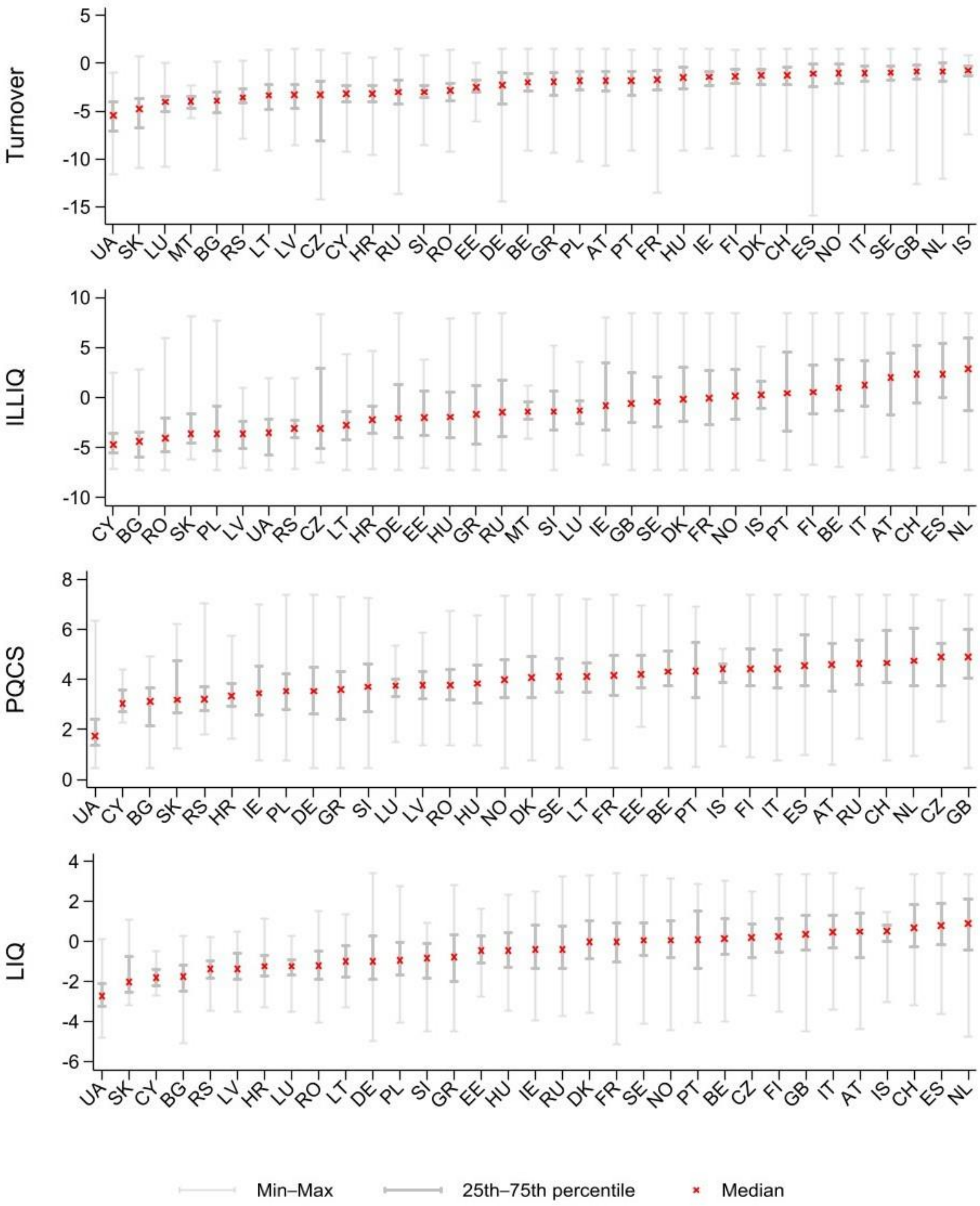
Table A3

Correlation matrix

Variable	*Turnover*	*ILLIQ*	*PQCS*	*LIQ*	*WUI*	*GPI*	*WGI*	*FIW*	*GRI*	*MaPP*	*MaPP_ind*	*lnMV*	*Leverage*	*EBIT_Assets*	*M-BV*	*Volatility*	*Tangibility*	*GDPgrowth*	*CPI*
ILLIQ	0.459																		
PQCS	0.413	0.855																	
LIQ	0.689	0.934	0.913																
WUI	0.105	0.104	0.229	0.169															
GPI	-0.093	-0.047	0.057	-0.027	0.073														
WGI	-0.121	-0.047	0.039	-0.042	0.120	0.857													
FIW	-0.171	-0.098	-0.039	-0.113	-0.055	0.805	0.674												
GRI	-0.133	-0.063	0.031	-0.057	0.084	0.964	0.917	0.889											
MaPP	-0.040	0.020	0.034	0.005	-0.096	0.074	0.095	0.126	0.105										
MaPP_ind	0.006	0.048	0.082	0.053	-0.032	-0.020	0.023	0.030	0.013	0.797									
lnMV	0.141	0.851	0.762	0.733	0.070	0.009	0.004	0.006	0.012	0.026	0.029								
Leverage	-0.012	0.059	0.004	0.023	-0.048	0.060	0.071	0.074	0.074	0.003	-0.012	0.073							
EBIT_Assets	-0.106	0.234	0.226	0.163	-0.054	0.037	0.049	0.092	0.062	-0.004	-0.019	0.369	0.041						
M-BV	0.110	0.130	0.109	0.135	0.069	-0.083	-0.088	-0.073	-0.086	-0.002	0.018	0.145	-0.052	-0.095					
Volatility	0.060	-0.498	-0.531	-0.417	-0.026	0.006	-0.031	0.011	-0.008	-0.084	-0.091	-0.586	0.008	-0.402	-0.007				
Tangibility	-0.157	0.046	0.043	-0.008	-0.022	0.066	0.064	0.139	0.098	-0.006	-0.019	0.156	0.238	0.157	-0.177	-0.116			
GDPgrowth	0.004	0.012	0.060	0.031	-0.165	-0.127	-0.110	0.031	-0.081	0.430	0.385	-0.009	-0.061	0.012	0.038	-0.093	-0.015		
CPI	-0.061	-0.066	-0.015	-0.053	-0.153	0.218	0.215	0.330	0.273	0.169	0.130	-0.043	-0.021	-0.008	-0.026	0.048	0.030	0.123	
Unemployment	-0.055	-0.053	-0.146	-0.098	-0.214	0.158	0.265	-0.003	0.142	-0.134	-0.121	-0.046	0.128	0.034	-0.074	-0.040	0.045	-0.171	-0.244

Note: This table presents the Pearson correlation matrix for the primary firm-level, country-level, and policy variables across the sample period (2008–2023). *Turnover*, *ILLIQ*, *PQCS*, and *LIQ* measure different dimensions of equity market liquidity. *GRI* is the composite geopolitical risk index derived from principal component analysis. *MaPP* represents the macroprudential policy stance index, with *MaPP_T* and *MaPP_L* capturing cumulative tightening and loosening measures, respectively. Detailed definitions of all variables are reported in Appendix Table A1.

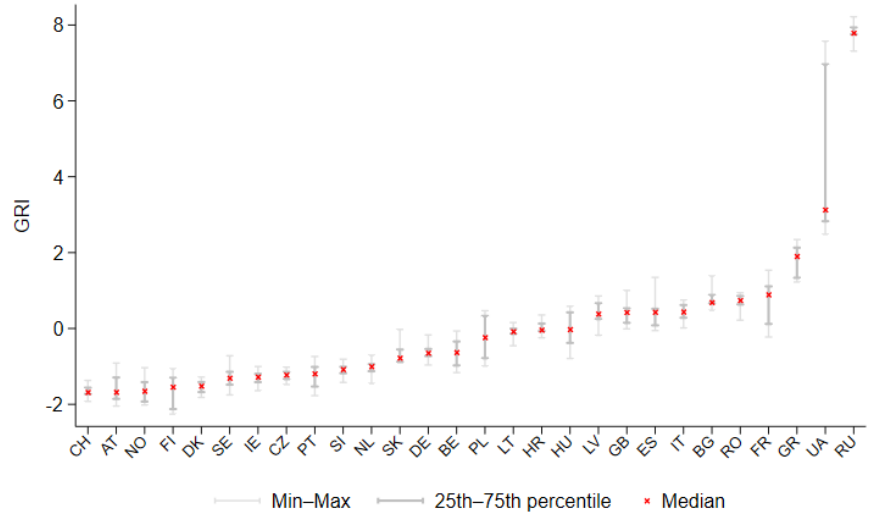
Figure A1
Country-level distribution of equity market liquidity across Europe



Note: This figure illustrates the cross-country distribution and variation of equity market liquidity proxies across the European nations included in the empirical sample over the period 2008–2023. The panels display country-level averages for the primary multidimensional liquidity indicators: trading activity (*Turnover*), price impact (*ILLIQ*), transaction costs (*PQCS*), and the aggregate composite liquidity index (*LIQ*). All underlying firm-level measures are averaged at the country level for publicly listed non-financial corporations. Detailed variable definitions and data sources are provided in Appendix Table A1. Country labels are reported using ISO 3166-1 alpha-2 codes.

Figure A2

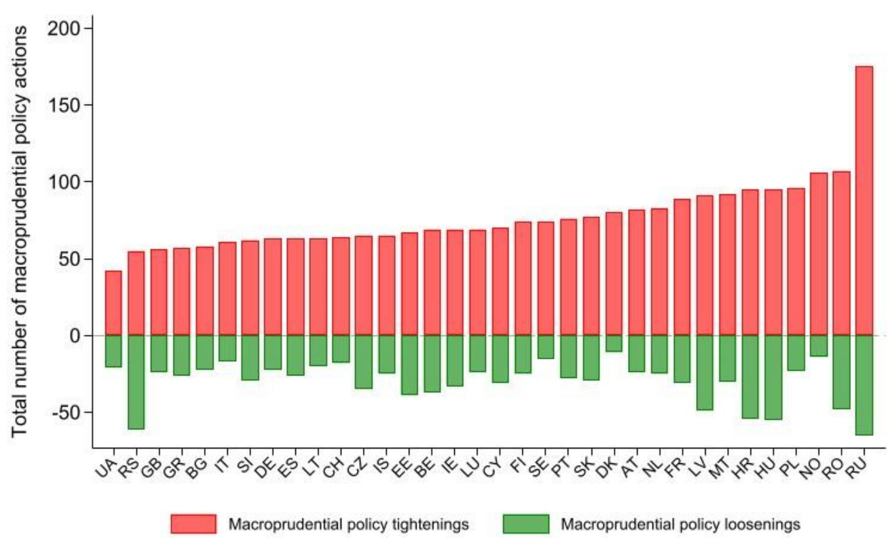
Cross-country distribution and spatial exposure to geopolitical risk (GRI) in Europe



Note: The figure presents the distribution of the Geopolitical Risk Index (*GRI*) across the sample countries. Countries are ordered from left to right according to the median value of GRI, from the lowest to the highest. The composite index (*GRI*) is constructed via principal component analysis (PCA) to capture localized, regional, and systemic geopolitical stress dynamics, incorporating underlying threat and event components. Values reflect country-level time-series averages, with higher values indicating greater geographical, institutional, or historical exposure to geopolitical risk. Country labels are reported using ISO 3166-1 alpha-2 codes. Detailed variable definitions and data sources are provided in Appendix Table A1.

Figure A3

Cross-country distribution of cumulative macroprudential policy actions across Europe



Note: The figure reports the cumulative number of macroprudential policy actions implemented in each country over the sample period. Red bars denote macroprudential policy tightenings, while green bars (displayed below zero) denote loosenings. Countries are ordered from left to right according to the total number of tightening measures, from the lowest to the highest. Country labels are reported using ISO codes. The sample includes 34 European countries. Comprehensive variable definitions, policy classification protocols, and data sources are detailed in Table A1.

Online Appendix for " Shield or Shackle? Macroprudential Policy, Geopolitical Risk, and Stock Market Liquidity"

August 2026

Table OA1

Alternative geopolitical risk indicators

Panel A: Macroprudential policy intensity

variable	(1) LIQ	(2) LIQ	(3) LIQ	(4) LIQ	(5) LIQ	(6) LIQ	(7) LIQ	(8) LIQ	(9) LIQ	(10) LIQ
WUI	1.018**									
	(2.49)									
MaPP	-0.00565	0.0182*	-0.00898*	-0.0259**	0.000688	-0.000823	-0.000848	-0.00175	-0.00162	-0.00336
	(-1.09)	(1.97)	(-1.74)	(-2.46)	(0.17)	(-0.20)	(-0.20)	(-0.47)	(-0.44)	(-0.99)
WUI×MaPP	0.00124									
	(0.05)									
GPI		-0.0227								
		(-0.18)								
GPI×MaPP		-0.0121**								
		(-2.37)								
WGI			-0.0722							
			(-0.68)							
WGI×MaPP			-0.0128***							
			(-3.27)							
FIW				-0.00949						
				(-1.16)						
FIW×MaPP				-0.000271**						
				(-2.54)						
FH					-0.139***					
					(-4.46)					
FH×MaPP					-0.00153					
					(-1.48)					
GRIalt1						-0.0807**				
						(-2.69)				
GRIalt1×MaPP						-0.00224**				
						(-2.63)				
GRIalt2							-0.0486			
							(-1.51)			
GRIalt2×MaPP							-0.00311***			
							(-2.95)			
GRIalt3								-0.0756**		
								(-2.26)		
GRIalt3×MaPP								-0.00200*		
								(-1.86)		

GRIalt4									-0.0802**	
									(-2.18)	
GRIalt4×MaPP									-0.00213*	
									(-2.08)	
GRIalt5										0.00139
										(0.06)
GRIalt5×MaPP										-0.00266*
										(-1.79)
Constant	-2.073***	-1.889***	-2.038***	-2.759***	-1.619***	-1.932***	-1.930***	-1.925***	-1.929***	-1.911***
	(-18.12)	(-11.10)	(-15.78)	(-3.73)	(-16.48)	(-21.99)	(-20.89)	(-24.09)	(-23.44)	(-23.15)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	112,415	85,111	108,284	104,240	113,263	79,512	79,512	84,429	84,429	84,429
Adj. R^2	0.637	0.653	0.636	0.645	0.638	0.652	0.652	0.652	0.652	0.652
Adj. Within-R^2	0.552	0.560	0.549	0.557	0.552	0.559	0.559	0.561	0.561	0.560

Panel B: Macroprudential policy change indicator

variable	(1) LIQ	(2) LIQ	(3) LIQ	(4) LIQ	(5) LIQ	(6) LIQ	(7) LIQ	(8) LIQ	(9) LIQ	(10) LIQ
WUI	0.979**									
	(2.36)									
MaPP_ind	0.00420	0.107	0.0140	-0.225	0.0473	0.0241	0.0237	0.0164	0.0158	0.0136
	(0.12)	(0.69)	(0.27)	(-1.01)	(1.08)	(0.94)	(0.91)	(0.64)	(0.62)	(0.53)
WUI×MaPP_ind	0.0999									
	(0.53)									
GPI		-0.0942								
		(-0.77)								
GPI×MaPP_ind		-0.0551								
		(-0.54)								
WGI			-0.0922							
			(-0.89)							
WGI×MaPP_ind			-0.0113							
			(-0.19)							
FIW				-0.00802						
				(-0.95)						
FIW×MaPP_ind				-0.00272						
				(-1.20)						
FH					-0.135***					

					(-4.11)					
FH×MaPP_ind					-0.0154					
					(-0.71)					
GRIalt1						-0.0861***				
						(-3.11)				
GRIalt1×MaPP_ind						-0.0118				
						(-0.62)				
GRIalt2							-0.0598*			
							(-2.03)			
GRIalt2×MaPP_ind							-0.00973			
							(-0.51)			
GRIalt3								-0.0830**		
								(-2.41)		
GRIalt3×MaPP_ind								-0.0124		
								(-0.50)		
GRIalt4									-0.0916**	
									(-2.44)	
GRIalt4×MaPP_ind									-0.0124	
									(-0.53)	
GRIalt5										-0.00884
										(-0.37)
GRIalt5×MaPP_ind										0.00150
										(0.08)
Constant	-2.090***	-1.791***	-2.053***	-2.639***	-1.642***	-1.950***	-1.945***	-1.944***	-1.948***	-1.924***
	(-18.56)	(-10.13)	(-16.16)	(-3.44)	(-16.12)	(-22.94)	(-21.75)	(-25.90)	(-25.06)	(-25.28)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	112,415	85,111	108,284	104,240	113,263	79,512	79,512	84,429	84,429	84,429
Adj. R^2	0.636	0.652	0.636	0.645	0.638	0.652	0.652	0.652	0.652	0.652
Adj. Within-R^2	0.552	0.560	0.548	0.557	0.552	0.559	0.558	0.560	0.560	0.560

Notes: This table examines the robustness of the baseline results to alternative measures of geopolitical risk. Panel A reports results using the cumulative macroprudential policy intensity index (MaPP), while Panel B uses the binary policy indicator (MaPP_ind). The alternative geopolitical risk measures include the individual indicators (WUI, GPI, WGI, FIW, and FH) and five alternative principal-component indices (GRIalt1–GRIalt5) constructed from different combinations of these indicators. All regressions include the full set of control variables together with country, industry, and year fixed effects. Standard errors are two-way clustered by firm and year. t-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Table OA2
Lagged vs contemporaneous effects

variable	(1) LIQ	(2) LIQ	(3) LIQ	(4) LIQ	(5) LIQ	(6) LIQ
GRI(t-1)	-0.0917***		-0.0924***	-0.0960***		-0.0945***
	(-3.20)		(-3.42)	(-3.59)		(-3.62)
GRI		-0.0823**			-0.0820**	
		(-2.50)			(-2.43)	
MaPP	-0.000822					
	(-0.21)					
GRI(t-1)×MaPP	-0.00233***					
	(-3.37)					
MaPP(t-1)		0.000220	-0.00144			
		(0.06)	(-0.39)			
GRI×MaPP(t-1)		-0.00162				
		(-1.18)				
GRI(t-1)×MaPP(t-1)			-0.00123			
			(-0.93)			
MaPP_ind				0.00860		
				(0.31)		
GRI(t-1)×MaPP_ind				-0.0141		
				(-0.80)		
MaPP_ind(t-1)					-0.0114	-0.0112
					(-0.59)	(-0.60)
GRI×MaPP_ind (t-1)					-0.0134	
					(-0.76)	
GRI(t-1)×MaPP_ind(t-1)						-0.00996
						(-0.57)
Constant	-2.012***	-1.947***	-1.997***	-2.025***	-1.946***	-2.002***
	(-21.49)	(-23.80)	(-23.59)	(-22.66)	(-23.11)	(-22.78)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	74,700	74,136	74,700	74,700	74,136	74,700
Adj. R^2	0.663	0.660	0.663	0.663	0.660	0.663
Adj. Within-R^2	0.570	0.570	0.570	0.570	0.570	0.570

Notes: This table examines whether the effects of geopolitical risk and macroprudential policy persist over time. The specifications include contemporaneous and lagged values of GRI, MaPP, MaPP_ind, and their interaction terms. All regressions include the baseline control variables together with country, industry, and year fixed effects. Standard errors are two-way clustered by firm and year. t-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Table OA3
Cumulative MaPP Changes

variable	(1) LIQ	(2) LIQ	(3) LIQ	(4) LIQ	(5) LIQ	(6) LIQ
GRI	-0.0852**	-0.0899**	-0.0970***	-0.0778**	-0.0920*	-0.0948***
	(-2.62)	(-2.54)	(-3.07)	(-2.27)	(-2.00)	(-3.03)
MaPPMA	-0.000525					
	(-0.26)					
GRI×MaPPMA	-0.00123**					
	(-2.15)					
MaPP_TMA		-0.000817				
		(-0.35)				
GRI×MaPP_TMA		-0.000302				
		(-0.37)				
MaPP_LMA			-0.000605			
			(-0.16)			
GRI×MaPP_LMA			0.00284**			
			(2.89)			
MaPPMAind				0.00453		
				(0.35)		
GRI×MaPPMAind				-0.0292**		
				(-2.74)		
MaPPMATdum					0.000893	
					(0.02)	
GRI×MaPPMATdum					-0.00148	
					(-0.05)	
MaPPMALdum						0.0146
						(0.60)
GRI×MaPPMALdum						0.00738
						(0.34)
Constant	-1.919***	-1.918***	-1.946***	-1.938***	-1.934***	-1.937***
	(-22.36)	(-20.14)	(-23.24)	(-21.92)	(-18.95)	(-22.80)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	79,489	79,489	79,489	79,512	79,512	79,512
Adj. R^2	0.652	0.652	0.653	0.652	0.652	0.652
Adj. Within-R^2	0.559	0.559	0.560	0.559	0.558	0.559

Notes: This table reports robustness tests based on cumulative three-year macroprudential policy indices constructed over years t, t–1, and t–2. MaPPMA denotes the cumulative aggregate policy index, whereas MaPP_TMA and MaPP_LMA refer to cumulative tightening and loosening measures. Binary cumulative indicators are denoted by MaPPMAind, MaPPMATdum, and MaPPMALdum. All specifications include the baseline control variables and country, industry, and year fixed effects. Standard errors are two-way clustered by firm and year. t-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Table OA4

Alternative fixed effects

variable	(1) LIQ	(2) LIQ	(3) LIQ	(4) LIQ	(5) LIQ	(6) LIQ	(7) LIQ	(8) LIQ
main								
GRI	-0.0929^{***}	-0.0995^{***}	-0.0800^{**}	-0.0854^{**}	-0.0891^{**}	-0.0951^{***}	-0.0929^{***}	-0.0995^{***}
	(-3.13)	(-3.72)	(-2.45)	(-2.85)	(-2.70)	(-3.13)	(-7.70)	(-8.26)
MaPP	-0.00147		-0.000332		-0.000494		-0.00147^{*}	
	(-0.40)		(-0.08)		(-0.12)		(-1.87)	
GRI×MaPP	-0.00229^{***}		-0.00241^{***}		-0.00241^{**}		-0.00229^{***}	
	(-3.97)		(-3.11)		(-2.92)		(-13.10)	
MaPP_ind		0.0240		0.0264		0.0245		0.0240^{***}
		(0.98)		(1.01)		(0.98)		(6.22)
GRI×MaPP_ind		-0.0145		-0.0125		-0.0126		-0.0145^{***}
		(-1.08)		(-0.75)		(-0.71)		(-7.60)
Constant	-1.175^{***}	-1.196^{***}	-1.944^{***}	-1.963^{***}	-1.948^{***}	-1.966^{***}	-1.388^{***}	-1.393^{***}
	(-15.85)	(-16.76)	(-21.64)	(-22.40)	(-21.56)	(-22.27)	(-14.22)	(-14.04)
xt_means								
GRI							0.108^{***}	0.138^{***}
							(4.83)	(4.99)
MaPP							-0.0402^{***}	
							(-6.17)	
GRI×MaPP							-0.00204	
							(-0.73)	
MaPP_ind								0.348^{***}
								(5.78)
GRI×MaPP_ind								-0.0902^{**}
								(-2.50)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	Yes	Yes	No	No	No	No
Industry FE	No	No	No	No	No	No	No	No
Firm FE	Yes	Yes	No	No	No	No	No	No
Time FE	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Country-Industry FE	No	No	No	No	Yes	Yes	No	No
Industry-Year FE	No	No	Yes	Yes	No	No	No	No
Correlated Random Effects	No	No	No	No	No	No	Yes	Yes
Observations	78,755	78,755	79,512	79,512	79,507	79,507	79,512	79,512

Adj. R^2	0.889	0.888	0.653	0.653	0.669	0.668		
Adj. Within-R^2	0.194	0.192	0.560	0.559	0.558	0.558		
Adj. R^2							0.575	0.575
Adj. Within-R^2							0.250	0.248

Notes: This table examines the sensitivity of the results to alternative panel estimators. The reported specifications include alternative combinations of firm, country, industry, country-industry, industry-year, and time fixed effects, as well as correlated random-effects models following Wooldridge (2019). Standard errors are two-way clustered by firm and year. t-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Table OA5

LASSO regression (partialling-out)

variable	(1) Turnover	(2) ILLIQ	(3) PQCS	(4) LIQ	(5) Turnover	(6) ILLIQ	(7) PQCS	(8) LIQ	(9) Turnover	(10) ILLIQ	(11) PQCS	(12) LIQ
GRI	-0.138***	-0.194***	-0.0549***	-0.0873***	-0.132***	-0.205***	-0.0674***	-0.0925***	-0.145***	-0.216***	-0.0665***	-0.0968***
	(-5.74)	(-6.17)	(-4.67)	(-5.97)	(-5.52)	(-6.49)	(-5.73)	(-6.32)	(-6.04)	(-6.84)	(-5.64)	(-6.61)
MaPP	0.00461***	-0.00178	-0.000259	0.000990								
	(2.68)	(-0.75)	(-0.29)	(0.91)								
MaPP×GRI	-0.00353***	-0.00508***	-0.00201***	-0.00262***								
	(-9.91)	(-10.67)	(-12.06)	(-11.58)								
MaPP_ind					0.0173*	0.0370***	0.0567***	0.0337***				
					(1.88)	(2.96)	(11.13)	(6.00)				
MaPP_ind×GRI					-0.0346***	-0.0297***	0.00145	-0.0137***				
					(-8.69)	(-5.53)	(0.71)	(-5.59)				
MaPP_T									0.00752***	0.00352	0.00179*	0.00303***
									(4.06)	(1.39)	(1.92)	(2.61)
MaPP_L									0.0100***	0.0228***	0.00617***	0.00666***
									(2.86)	(5.11)	(3.29)	(2.99)
MaPP_T×GRI									-0.00313***	-0.00193***	0.000360	-0.000943***
									(-6.14)	(-2.87)	(1.47)	(-2.94)
MaPP_L×GRI									0.00357***	0.00909***	0.00526***	0.00485***
									(5.36)	(10.06)	(17.33)	(11.48)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	80,841	80,858	79,840	79,840	80,841	80,858	79,840	79,840	80,841	80,841	79,824	79,824
Selected control variables	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility
χ^2	138.711	185.043	215.432	188.089	129.407	92.991	156.908	117.183	148.236	233.575	423.070	238.989

Notes: This table reports estimates obtained using the partialling-out LASSO estimator. Control variables are selected from a high-dimensional set of firm-level and macroeconomic characteristics using the procedure proposed by Belloni et al. (2014). Country, industry, and year fixed effects are included in all specifications. Standard errors are two-way clustered by firm and year. *t*-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Table OA6

LASSO regression (cross-fit partialling-out)

variable	(1) Turnover	(2) ILLIQ	(3) PQCS	(4) LIQ	(5) Turnover	(6) ILLIQ	(7) PQCS	(8) LIQ	(9) Turnover	(10) ILLIQ	(11) PQCS	(12) LIQ
GRI	-0.122***	-0.181***	-0.0510***	-0.0804***	-0.122***	-0.191***	-0.0643***	-0.0869***	-0.145***	-0.214***	-0.0659***	-0.0968***
	(-6.76)	(-8.05)	(-5.99)	(-7.88)	(-6.88)	(-8.41)	(-7.29)	(-8.36)	(-7.74)	(-8.86)	(-7.14)	(-8.81)
MaPP	0.00338*	-0.00165	-0.000257	0.000878								
	(1.92)	(-0.73)	(-0.31)	(0.84)								
MaPP×GRI	-0.00330***	-0.00487***	-0.00193***	-0.00254***								
	(-7.10)	(-8.60)	(-9.13)	(-8.71)								
MaPP_ind					0.0158	0.0346**	0.0545***	0.0319***				
					(1.49)	(2.57)	(10.13)	(5.08)				
MaPP_ind×GRI					-0.0336***	-0.0289***	0.00138	-0.0132***				
					(-5.98)	(-3.87)	(0.47)	(-3.58)				
MaPP_T									0.00750***	0.00337	0.00175*	0.00295**
									(4.07)	(1.35)	(1.91)	(2.56)
MaPP_L									0.00989**	0.0223***	0.00607***	0.00651***
									(2.55)	(4.49)	(2.88)	(2.61)
MaPP_T×GRI									-0.00312***	-0.00189**	0.000335	-0.000947**
									(-5.08)	(-2.32)	(1.18)	(-2.42)
MaPP_L×GRI									0.00356***	0.00903***	0.00521***	0.00481***
									(4.64)	(9.19)	(14.36)	(9.83)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	81,331	80,803	79,840	79,831	81,106	80,751	79,821	79,834	80,800	80,724	79,789	79,761
Selected control variables	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg Leverage ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg Leverage MBV ROA UNEmp lnAssets lnMV tangibility volatility	CPI GDPg MBV ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg Leverage ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg Leverage ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg Leverage ROA UNEmp lnAssets lnMV tangibility volatility	CPI EBIT_Assets GDPg Leverage ROA UNEmp lnAssets lnMV tangibility volatility
χ^2	100.699	163.491	138.113	150.322	96.089	100.567	154.314	114.633	133.881	236.418	340.258	224.168

Notes: This table reports estimates obtained using the cross-fit partialling-out estimator of Chernozhukov et al. (2018). The procedure provides robustness against overfitting and improves inference in high-dimensional settings. Country, industry, and year fixed effects are included in all specifications. Standard errors are two-way clustered by firm and year. t-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.