Firm-Level Exposure to Geopolitical Risk: Economic and Financial Effects*

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Abstract

We propose a novel measure of firm-level geopolitical risk exposure that integrates the geographical distribution of corporate revenues with country-specific geopolitical risk. Firms more exposed to geopolitical risk experience subdued real investment and sales alongside deteriorating financial conditions. We construct a new series of country-specific geopolitical risk shocks and employ them as an instrumental variable to estimate causal effects. Our results show that an increase in geopolitical risk detrimentally affects firms on both real and financial dimensions, underscoring the importance of granular data in capturing the heterogeneous impacts of geopolitical tensions.

JEL classification: F36, F50, F65, G30

Keywords: geopolitical risk, fragmentation, real impact, financial performance, revenue exposure

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1 Introduction

The disruptive economic consequences of geopolitical risk have gained prominence in the academic (Caldara and Iacoviello, 2022; Iacoviello et al., 2024; Fernandez-Villaverde et al., 2024) and policy debate (e.g. Gopinath et al., 2024; Draghi, 2024; Lagarde, 2024; ECB, 2024) due to escalating tensions between countries, recently labeled as *geoeconomic fragmentation* (Aiyar et al., 2023a; Clayton et al., 2024; Mohr and Trebesch, 2024) . Geopolitical fractures have been accelerating in recent years, as exemplified by events such as Brexit, trade disputes between the United States and China, restrictions associated with the Covid-19 pandemic, and, more dramatically, Russia's invasion of Ukraine and the conflicts in the Middle East started at the end of 2023.

So far, most of the literature has concentrated on the aggregate (global or country-level) impacts of geopolitical risk, while granular, firm-level analyses - particularly those exploring the role of heterogeneous exposure - remain relatively scarce.

This paper contributes to filling this gap in the literature by constructing a novel measure of firm-level exposure to country-specific geopolitical risk based on the geographical distribution of corporate revenues. This granular measure, which we label *revenue-weighted geopolitical risk* (*rwgr*), exploits the ultimate origin of firms' business risk, i.e. the location where firms generate their revenue streams.[1]

As a laboratory to investigate whether the heterogeneous exposure of firms shapes the effects of geopolitical shocks, we consider a comprehensive panel of the largest traded non-financial firms in the United States and and Europe from 2010 to 2022. We employ the *International Country Risk Guide* (ICRG) (Hall and Jones, 1999; Acemoglu et al., 2001; Acemoglu and Johnson, 2005) to map accurately the heterogeneous firms' exposure to geopolitical risk. Compared to the popular Geopolitical Risk Index (GPR; Caldara and Ia-

[1] In this sense, our approach contributes to recent studies highlighting the importance of using microdata to effectively assess the impacts of geoeconomic fragmentation (Fisman et al., 2022; Borin et al., 2023).

coviello, 2022), the ICRG offers a broader cross-country coverage, which is crucial to track firms' exposure precisely and for a broader set of countries, and better reflects country-specific geopolitical tensions rather than global or anglophone perceptions (Bondarenko et al., 2024).

Our first result is that firms more exposed to geopolitical risk experience subdued real investment and sales alongside tighter financial conditions. To estimate the causal effects of geopolitical risk, we construct a narrative series of country-specific geopolitical risk shocks following a similar approach to Alessandri and Gazzani (forthcoming). We employ this series as an instrumental variable. The identification strategy exploits the cross-sectional variation in firms' exposure to the same geopolitical events within a panel framework (Juvenal and Petrella, 2024 apply a similar IV strategy in the context of commodity price shocks). We uncover that investment and sales significantly decline in response to heightened geopolitical risk. On the financial side, firms face lower and more volatile equity valuations. Finally, we document that firms shy away from markets hit by geopolitical shocks as their exposure drops. Geopolitical shocks affect affect firms' operational and strategic behavior as they reduce their exposure to the affected market, with potential losses in case of irreversible capital investment.

Our analysis exploits the most possible highly granular data on revenue exposure. This granularity enables us to estimate the effect of geopolitical shocks on firm dynamics very accurately, but it also narrows the scope of the channels we examine. Specifically, we focus exclusively on direct revenue exposure to geopolitical risk; our analysis does not capture the indirect exposure stemming from revenues tied to intermediate inputs.[2] Furthermore, we measure exposure solely in terms of outputs rather than production inputs. Consequently, our findings likely represent a lower bound on the overall importance of

[2]For instance, a firm may sell intermediate input in a very safe market but to a firm that is itself exposed to a risky market.

heterogeneous exposure to geopolitical risk.

This paper highlights that geopolitical risk is not solely a global shock, affecting all firms uniformly; instead, its consequences depend on the heterogeneous exposure of individual firms. The findings in this paper underscore the need for a more granular view of the economic transmission of geopolitical risk and highlight the critical role of micro-level data in both academic research and policy discussions.

Literature review. This paper contributes to the literature on the economic effects of geopolitical shocks. Most works have analyzed this topic from an aggregate - often global - perspective (Caldara and Iacoviello, 2022; Iacoviello et al., 2024). Recently, the literature has introduced the concept of geoeconomic fragmentation due to worsening international relationships, whose consequences consequences potentially span various domains (IMF, 2023c ; Bolt et al., 2023; Aiyar et al., 2023c; Gopinath, 2024; Clayton et al., 2024; Nispi Landi and Moro, 2024; Fernandez-Villaverde et al., 2024).[3] Conversely, the evidence on the heterogeneous and granular implications of geopolitical tensions is more limited.[4] Our work contributes to filling this gap by studying the implications of firm-level exposure to geopolitical shocks. We construct a new database that measure the granular exposure to geopolitical tensions and a new series of country-level geopolitical shocks. This paper also relates with Hassan et al. (2019) who measure firm-level exposure

[3]For instance, increasing protectionist measures as tariffs and trade restrictions can disrupt the smooth functioning of highly interconnected global value chains (Attinasi et al., 2023; Bosone et al., 2024; Jakubik and Ruta, 2023; Campos et al., 2023; Fajgelbaum et al., 2024; Hakobyan et al., 2023; Quintana, 2024). Other works have explored the implications for energy and commodity markets such as import flows, price differentials across geographical areas, and political stances on the balance between energy security and the energy transition (e.g. IMF, 2023a; Ferriani and Gazzani, 2023; Emiliozzi et al., 2023; Albrizio et al., 2023; Alvarez et al., 2023; Bolhuis et al., 2023). On the financial side, most papers have focused on the impact on cross-border capital flows (especially foreign direct investments), asset prices, investors' risk aversion and diversification benefits at the aggregate level (IMF, 2023b; Aiyar and Ohnsorge, 2024; Feng et al., 2023; Aiyar et al., 2023b; Salisu et al., 2022; Lee, 2023; Catalán et al., 2024; Okuda and Tsuruga, 2024; Tan, 2024).

[4]Wang et al. (2019); Dissanayake and Wu (2021) are notable exceptions from which we significantly differ regarding the data employed and methodology. First, we do not use the GPR index to measure geopolitical risk but the ICRG index. Second, we build a very granular measure of revenue exposure by employing data disclosed by the major firms in Europe and the United States.

to political risk, broadly defined, by means of textual analysis on earnings call. Our scope is more narrowly defined as we focus on geopolitical risk and exploit balance sheet data to measure firm's revenue exposure to local market rather than risk perceptions via earnings call. Finally, our work also contributes to the literature that considers real and financial interdependence - by linking revenue exposure to financial performance - as it shows that real international linkages influence financial market developments (Forbes and Chinn, 2004; Auer et al., 2022; Di Giovanni and Hale, 2022).

Structure of the paper. The rest of the paper is organized as follows. Section 2 describes the dataset, Section 3 presents the construction of our exposure index and a basic empirical analysis that abstract from any causal interpretation. Section 4 is devoted to a causal analysis by means of instrumental variable estimation. Section 5 describes the strategic response of firms to geopolitical risk. Finally, Section 7 concludes.

2 Dataset

The construction of a unique dataset constitutes a key contribution of our work and we achieve it by combining information from three main sources. Our sample spans between 2010 and 2022 and consists of non-financial firms included in the Eurostoxx 600 and the S&P 500, i.e. the two regional benchmarks encompassing the largest European and US firms.

Corporate revenues. We rely on the *Orbis-Bureau van Dijk* database to obtain detailed information on the geographical breakdown of corporate revenues. This data, typically provided as complementary information in the explanatory notes to the official financial statements, exhibits an extremely high level of heterogeneity across firms in reporting. Substantial differences in the disclosed information may arise across firms regarding the number of countries, the aggregation level of geographical macro-areas, and even the

availability of the information itself. Figure A.1 in the Appendix presents some examples of revenue breakdown retrieved from *Orbis*. Processing this data requires an extensive exercise of geographical reclassification. Despite cases where data on revenue information is unavailable or not clearly assigned to a specific country or geographical area, we are able to map, on average, almost 83% of corporate revenues (median around 88%).[5] We compute firms' specific geographical revenue exposure as the share of yearly revenues obtained in a specific market.

We present the geographical breakdown of corporate revenues in Figure 1. Not surprisingly, the largest share of revenues originates from the geographical area where firms are listed. The breakdown shows that there is a very strong internal component in terms of demand for the goods of these firms and market exposure. In fact, approximately 72% of revenues are generated in the United States (and Canada) for S&P500 firms, compared to an average of 64% in Europe for Eurostoxx companies; this is in line with the higher degree of openness of the European economic block. For US firms, the residual source of revenues is almost evenly divided between Europe and the rest of the world. In contrast, the second most significant market for European firms is the US, whose share gradually increases to around one-quarter of total foreign revenues toward the end of the sample period. In both regions, final revenues generated in China hovers around 3%.

Geopolitical risk. We measure a country's geopolitical risk using the *International Country Risk Guide* (ICRG) assessment published by the Political Risk Services (PRS). The political risk rating ranges from 0 to 100, with higher scores associated with lower risk levels. Several influential studies have adopted this index ((Hall and Jones, 1999; Acemoglu et al., 2001; Acemoglu and Johnson, 2005); Bekaert et al., 2014; Lehkonen and

[5]The corporate revenues that are not mapped are associated to geographical aggregates in which countries are not clearly identifiable (e.g. "Asia and rest of the world", "Europe, CIS, Middle East and Africa"...). These observations are excluded from the sample as they cannot be matched with any country-specific measure of geopolitical risk.

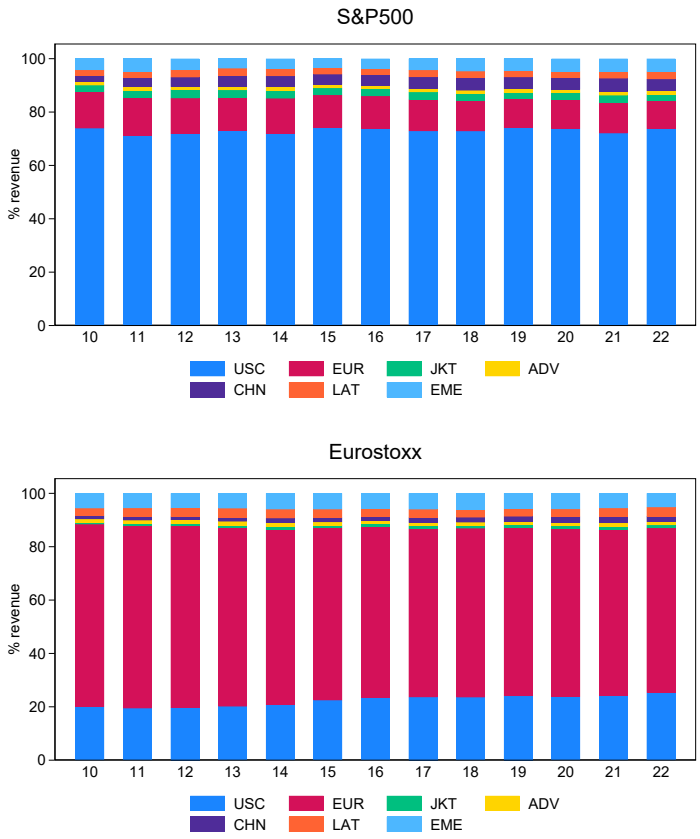


FIGURE 1: *Geographical breakdown of corporate revenues: S&P500 (upper panel) vs Eurostoxx (lower panel). Acronyms are as follows: United States and Canada (USC), Europe (EUR), Japan, South Korea and Taiwan (JKT), other advanced economies (ADV), China (CHN), Latin America (LAT), other emerging markets (EME)*

Heimonen, 2015; Chen et al., 2016; King et al., 2021 among many others). The rating assesses geopolitical risk across twelve dimensions: government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, military in politics, religious tensions, law and order, ethnic tensions, democratic accountability, and bureaucracy quality. In our baseline analysis we employ the dimensions more closely related to pure geopolitical risk (hence excluding socioeconomic conditions, investment profile, corruption, democratic accountability, and bureaucracy quality dimensions) but we show that qualitatively similar results hold if we use broader definition of the index. The ICRG index offers two main advantages for our analysis compared to other popular

metrics in the literature (the Geopolitical Risk - GPR - index developed by Caldara and Iacoviello, 2022). First, and most importantly, the ICRG index is available for more than 140 countries compared to around 45 countries covered by the GPR index. This more comprehensive coverage is crucial for our study, enabling us to map firms' revenue exposure to political risk accurately. Second, the ICRG index is based on a set of questions to ensure a certain degree of consistency, both between countries and over time, whereas the country-specific GPR indices evaluate geopolitical risk based on three US newspapers and ultimately "*capture the US perspective on risks posed by, or involving, the country in question*" (Bondarenko et al., 2024).[6]

Real indicators. Following Cloyne et al. (2023) and Di Giovanni and Rogers (2024), we consider the investment ratio (capital expenditures over lagged net property, plant and equipment) and sales to total assets to investigate whether geopolitical risk affects firms' sales, investment, and strategic adjustments in market exposure. This underscores the broader economic implications of firms' revenue-based geopolitical exposure. These variables are obtained from Refinitiv and are available at the yearly frequency, being based on balance-sheet data.

Financial indicators. We retrieve three monthly dependent variables from *LSEG* to measure firms' profitability and financial performance. We consider two dependent variables reflecting investors' assessment of firms' value and profitability: the IBES expected 12-month-forward *price-earnings (P/E)* ratio and equity returns. We also include a metric for equity return *volatility.*[7] We also rely on *LSEG* to obtain other firm-specific control

[6]Figure A.2 presents evidence on the quantitative importance of geopolitical risk. The map illustrates risk rankings based on the ICRG 2022 assessment: lower geopolitical scores are typically associated with advanced economies (Western countries, Japan, Australia, South Korea), while most emerging economies exhibit higher geopolitical risk. The considerable variability across countries, with the political risk score ranging between approximately 30 and 90 points out of 100, suggests that the index capture idiosyncratic fluctuations rather then a common factor.

[7]The volatility is measured as annualized standard deviation of equity returns computed over a 100-day interval.

variables. Descriptive statistics for the main variables of interest are reported in Table A.ADO: Anche qui ci vanno Industry FE1.[8]

3 Geopolitical risk and firm dynamics

In this Section, we first describe the index of revenue exposure that we construct and then we show its relationship with firm dynamics in a simple empirical framework that abstract from causal claims.

3.1 Measuring firms' exposure to geopolitical risk

We measure revenue exposure for firm i, market j, and year t as follows:

$$re_{i,j,t} = \frac{\text{revenues}_{i,j,t}}{\sum_j \text{revenues}_{i,j,t}} \tag{1}$$

which we use as input to measure revenue-weighted geopolitical risk:

$$rwgr_{i,t} = \sum_j re_{i,j,t} \times ICRG_{j,t} \tag{2}$$

where $ICRG$ is the country-specific index of geopolitical risk. $rwgr$ is a firm-specific weighted average geopolitical risk associated with each firm, where the weights are proportional to the revenue-exposure of the firm in each market. Among all the categories included in the index, we focus on those more strictly related to geopolitical tensions (see Section 2). As the score in the ICRG database measures the soundness of the country, we transform the variable such that larger values of $ICRG$, and consequently in $rwgr$, are interpretable as higher in geopolitical risk.

[8] All dependent and explanatory variables are winsorized at 1% on both tails.

3.2 Basic econometric approach

We study the relationship between geopolitical instability and firm dynamics by employing the following regression model:

$$y_{i,t} = \alpha_s + \alpha_t + \beta\, rwgr_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t} \tag{3}$$

where $y_{i,t}$ represents dependent variable of interest for firm i in time t; α_s are economic sector fixed-effects, α_t are yearly time fixed-effects, $rwgr_{i,t}$ is the (log of) time-varying and firm-specific measure of geopolitical risk, $X_{i,t}$ is a set of firm-specific controls including return on assets (ROA), return on equity (ROE), leverage, firm size (proxied by total assets), cash to total assets, working capital (current assets-current liabilities), share of fixed assets to total assets, , a dummy for firms paying dividends, and the number of employees (only for the real analysis); finally, $\varepsilon_{i,t}$ is a standard error term.

The real variables of interest are investment ratio and sales to assets (see Section 2 for further details), whose frequency is annual and are expressed as standardized variables. On the financial side, we study equity returns, equity volatility (in log terms), and the analyst forecast on price-earning ratio from IBES (in log terms), which are available at the monthly frequency.

	(1) Investment ratio	(2) Sales/Total assets
rwgr	-1.251***	-1.696***
	(0.000)	(0.000)
Constant	-3.290***	-10.843***
	(0.000)	(0.000)
Observations	10,027	11,465
R-squared	0.47	0.44
Controls	YES	YES
Time FE	YES	YES
Industry FE	YES	YES

Table 1: **Real variables**. The table presents estimates of Equation 3. Controls include return on assets (ROA), return on equity (ROE), leverage, firm size (proxied by total assets), cash to total assets, working capital, share of fixed assets to total assets, a dummy for firms paying dividends, and the number of employees (in log). Dependent variables are investment ratio (capital expenditure over lagged net property, plant, and equipment) and sales to assets. Models also include a constant and time, and industry fixed effects. P-values based on robust standard errors in parentheses. *, **, and *** denote significance at, respectively, the 10%, 5% and 1% level.

	(1) IBES P/E	(2) Equity returns	(3) Equity volatility
rwgr	-0.331***	-0.013**	0.492***
	(0.000)	(0.039)	(0.000)
Constant	1.659***	-0.039	0.752***
	(0.000)	(0.110)	(0.000)
Observations	131,175	134,814	136,102
R-squared	0.22	0.22	0.51
Controls	YES	YES	YES
Time FE	YES	YES	YES
Industry FE	YES	YES	YES

Table 2: **Financial performances**. The table presents estimates of Equation 3. Controls include return on assets (ROA), return on equity (ROE), leverage, firm size (proxied by total assets), cash to total assets, working capital, share of fixed assets to total assets, and a dummy for firms paying dividends. Dependent variables are the IBES 12-month-forward *price-earnings (P/E)* ratio, Equity returns (measured as log-difference in market capitalization), and equity return volatility. Models also include a constant and time, and industry fixed effects. P-values based on robust standard errors in parentheses. *, **, and *** denote significance at, respectively, the 10%, 5% and 1% level.

Table 1-2 reports the estimated β from Eq.(3). The results show that firms most exposed to geopolitically risky markets display subdued investment and sales on the real side and lower yet more volatile equity returns on the financial side. Additionally, analysts expect lower valuation suggesting that firms' profitability deteriorate due to weaker expected growth or higher perceived risk.

A 1% increase in *rwgr* is associated to a fall by 1.25 standard deviation in the investment ratio and 1.7 standard deviation in sales to assets ; as concerns the financial variables, a 1% increase in *rwgr* generates a 0.3 reduction in the forward P/E ratio and an almost 0.5% increase in equity volatility, whereas market capitalization decreases by 1 percentage point.

These findings are robust to including an ICRG economic index, which suggests that the exposure to geopolitical risk matters irrespective of the direct exposure to countries'

economic fundamentals (see Section 6).

4 Causal Estimates

The estimates presented in Section 3 do not carry a causal interpretation due to potential endogeneity threats such as self-selection. For instance, the most productive firms may sort themselves across the safest markets. To overcome these concerns, we resort to a panel IV strategy that enables us to estimate the causal effect of geopolitical risk on firm dynamics.

4.1 Narrative series of geopolitical shocks

We construct a novel country-specific series of narrative geopolitical shocks that we use to instrument *rwgr*. Our approach isolates the major fluctuations in the ICRG index driven by geopolitical events. We proceed in two steps, similar to Alessandri and Gazzani (forthcoming), who construct an instrument for natural gas supply shocks.

First, we select large fluctuations in the ICRG index in a broad set of advanced and emerging economies. We focus on those ICRG monthly percentage changes that are larger in modulus than three (country-specific) standard deviations.[9] This first step pinpoints 144 events. Second, we follow a narrative approach and isolate those ICRG swings unambiguously driven by geopolitical events and unrelated to economic shocks. This second step further filters the observations that comprise our instrumental variable variation, consisting of 105 events. The instrument takes the value of the monthly percentage change in the ICRG index. Notable examples are the Libyan civil war in 2011, the invasions of Crimea (2014) and Ukraine (2022), or the change of regime in Venezuela after

[9] Focusing on the events that are larger in modulus than a 2.5% change selects a very similar set of events.

Chávez death. Table A.ADO: Anche qui ci vanno Industry FE8 in the Appendix contains the full set of events employed in its construction.

To explicitly diagnose whether economic fluctuations contaminate our narrative instrument, we build a "control" IV as the percentage change in the economic risk rating developed by PRS to assess countries economic risk.[10] At the monthly frequency, the correlation between our geopolitical risk IV and the economic "control" IV is 0.03. At the annual frequency, that correlation is instead -0.09 . This diagnostic exercise thus suggests that our IV successfully isolates geopolitical shocks unrelated to changes in economic fundamentals.

4.2 Instrumental variable estimation

We employ the IV to estimate the effect of an increase in $rwgr$ on firm dynamics. The strategy exploits the cross-sectional variation in the exposure of different firms to country-specific geopolitical events (see Juvenal and Petrella, 2024 for a similar panel IV strategy in the context of commodity price shocks). This estimation is carried out with variables in growth rates as the IV is by construction built as a percentage change. We also include a lag of $\Delta IVrwgr$ to capture the potentially delayed effects of geopolitical shocks on our dependent variables of interest:

$$\Delta y_{i,t} = \alpha_i + \alpha_t + \beta_0 \, \Delta IVrwgr_{i,t} + \beta_1 \, \Delta IVrwgr_{i,t-1} + \gamma X_{i,t} + \varepsilon_{i,t} \tag{4}$$

where $IVrwgr$ is the IV version of firm revenue exposure built using the narrative approach, the controls included are a lag of $\Delta y_{i,t}$ and the set of variables described in Eq.(3), and α_i, α_t, and $\alpha_s$are firms, time. The first stage includes all controls that appear in the second stage as it is customary. The instrument is extremely strong meaning that the

[10]The economic risk rating takes into account the following dimensions: GDP per head, real GDP growth, annual inflation rate, budget balance over GDP, current account over GDP.

inference is reliable.

Tables 3-4 report the IV estimates for the real and financial variables, respectively. *rwgr* significantly detrimentally affects sales within the same year while investment responds with delay. The financial side, in terms of earnings forecasts, equity returns and volatility responds significantly as well to *rwgr* shocks. Overall, these results underscore that geopolitical shocks detrimentally affect firm dynamics heterogeneously depending on their revenue exposure. Notably, these results hold even if we include the ICRG economic indicator as control in the regression (see Section 6).

	(1) Investment ratio	(2) Sales/Assets
$rwgr_t$	2.463	-1.470**
	(0.169)	(0.029)
$rwgr_{t-1}$	-4.343***	0.355
	(0.009)	(0.643)
Observations	7,419	8,706
R-squared	0.10	0.33
Controls	YES	YES
Time FE	YES	YES
Firm FE	YES	YES
1st stage F-stat	68.2	103.6

Table 3: **Causal effect of geopolitical risk on firms real variables.** IV estimation with two instruments for two endogenous variables; variables in growth rates. See Table 1 for the list of controls. P-values based on robust standard errors in parentheses. *, **, and *** denote significance at, respectively, the 10%, 5% and 1% level.

	(1) IBES P/E	(2) Equity returns	(3) Equity volatility
$rwgr_t$	-0.153**	-0.336***	-0.228*
	(0.030)	(0.001)	(0.078)
$rwgr_{t-1}$	-0.275***	-0.366***	0.969***
	(0.002)	(0.000)	(0.000)
Observations	127,891	133,318	133,183
R-squared	0.05	0.04	0.05
Controls	YES	YES	YES
Time FE	YES	YES	YES
Firm FE	YES	YES	YES
1st stage F-stat	7258.0	7340.8	7295.9

Table 4: **Causal effect of geopolitical risk on firms' financial performances.** IV estimation with two instruments for two endogenous variables; variables in growth rates. See Table 1 for the list of controls. P-values based on robust standard errors in parentheses. *, **, and *** denote significance at, respectively, the 10%, 5% and 1% level.

5 Firms' operational response to geopolitical risk

This section investigates whether fluctuations in geopolitical risk affect firms' strategic and operational choices. Companies that generate revenues in markets that become more geopolitically risky may decide to pull out of the country. In this sense, a representative case is the retreat of companies from Russia following the invasion of Ukraine in 2022 (Tosun and Eshraghi, 2022, Tosun et al., 2024, Kiesel and Kolaric, 2023). For example, according to the list of firms pulling out of Russia compiled by the Yale School of Management (Sonnenfeld et al., 2022), when McDonald's announced its intention to exit the Russian market and sell its business there, it owned about 850 stores (84% of which were company-owned), accounting for roughly 3% of its global revenue.

To answer this question, we fully exploit the information in our panel dataset by transforming it from a firm-year dataset to a firm, market (source of revenues) and year dataset.

We estimate how firm i revenues share from a specific market j vary in the year t (Δre) in response to a spike in geopolitical risk ($\Delta ICRG$) in that market. Again we allow for the possibility of a lagged effect and exploit our narrative series of geopolitical shocks to instrument $\Delta ICRG$. We then estimate the following equation:

$$\Delta re_{i,j,t} = \alpha_i + \alpha_t + \alpha_j + \delta_{ij} + \mu_{it} + \beta_0 \Delta ICRG_{j,t} + \beta_1 \Delta ICRG_{j,t-1} + \rho \Delta re_{i,j,t-1} + u_{i,j,t} \quad (5)$$

where α_i, α_t, and α_j are firm, year, and market fixed effects; δ_{ij} and μ_{it} are firm-market and firm-year fixed effects. $u_{i,j,t}$ is a standard error term. This approach effective control for the average variation at the year, firm, market, firm-market and firm-year levels. Notice that although market-year fixed effects are excluded because would absorb $\Delta ICRG_{j,t}$, we include $\Delta ECO_{j,t}$ that control for variations in the economic fundamentals of each country j without any material effect on the results. Finally, time-varying firm controls do not enter this specification because they are already fully captured by μ_{it}.

Table 5 (column 1) presents the estimates of the model outlined in Eq. (5); column 2 presents the results when including $\Delta ECO_{j,t}$. We find that an increase in the geopolitical risk in country j leads to an average fall in the revenue exposure of firms to that country: a one unit increase in our instrumented ICRG index generates a 12 percentage point reduction in the revenue share generated in the affected market. The results indicate that the consequences of geopolitical risk extend to firms' strategic decisions, such as their presence in the final revenue markets.

6 Robustness and additional exercises

Our results are robust to several perturbations of the baseline specification.

VARIABLES	(1) Δre_t	(2) Δre_t
$\Delta ICRG_t$	-12.665***	-12.145***
	(0.007)	(0.010)
$\Delta ICRG_{t-1}$	0.231	1.776
	(0.965)	(0.742)
Observations	28,504	28,504
R-squared	0.03	0.03
ECO control	NO	YES
Single & double FE	YES	YES
1st stage F-stat	522.6	523.8

Table 5: **Firms strategic response to geopolitical risk**. Dependent variable is the firm-year share of revenue generated in a specific market j. P-values based on robust standard errors in parentheses. *, **, and *** denote significance at, respectively, the 10%, 5% and 1% level.

Controlling for ICRG economic fundamentals. Our results are robust to including an economic ICRG index ("economic risk rating") that tracks the development of economic fundamentals country-by-country (Tables A.ADO: Anche qui ci vanno Industry FE2-A.ADO: Anche qui ci vanno Industry FE3). The correlation between *rwgr* and the dependent variable of interest remains significant in all case but for equity returns where the sign is consistent although not statistically significant. Broadly speaking these results suggest that firms' exposure to geopolitical risk matters irrespective of the economic fundamentals of the country. This results hold both in the basic empirical approach and in the instrumental variable estimation (see Tables A.ADO: Anche qui ci vanno Industry FE4-A.ADO: Anche qui ci vanno Industry FE5), as well as in the strategic firms' response as already showed in Section 5.

Alternative definition of *rwgr*. The main results of the paper are robust to alternative definitions of *rwgr*. We consider broader definitions based on i) all the twelve categories within the ICRG political score, i.e. including also socioeconomic conditions and investment profile; ii) all categories in the ICRG index but excluding the two that encompass the economic dimension to create a broader version of the political score compared to

our baseline. Results are displayed in Tables A.ADO: Anche qui ci vanno Industry FE6-A.ADO: Anche qui ci vanno Industry FE7. **Alternative definition of exposure.** The findings in the paper are robust if we measure revenue-exposure either as predetermined, contemporaneous or as time-average. In all our baseline estimates we assume predetermined share, which is a conservative assumption as it ensures that shocks are not mixed into the exposure implicitly assumes no firms' strategic response within the same year (as revenues are measured only at the annual frequency). Nonetheless, employing contemporaneous shares yields similar results. Alternatively, one can use an intermediate approach by constructing the average exposure in the sample. All the measures produce consistent results with our baseline; tables are available upon request.

7 Conclusions

The literature has interpreted geopolitical risk mostly as a aggregate - and often global - phenomenon. This paper investigates whether heterogeneous exposure to country-level geopolitical risk matters for firm dynamics. We construct a novel firm-level revenue-weighted geopolitical risk index to investigate this nexus. We observe that geopolitical risk has both real effects, as it is associated with lower investment and sales, and financial impacts, reflected in subdued firms' expected profitability and lower and more volatile returns. To provide causal estimates, we construct a novel IV for geopolitical risk at the country level by exploiting events such as conflicts, elections and international tensions. The IV estimation suggests that an increase in the geopolitical exposure of firms detrimentally affects their real and financial side validating our baseline non-causal evidence. These findings are robust to controlling for countries' economic fundamentals, suggesting the geopolitics matters as an additional source of fluctuations on top of strictly economic

ones. Finally, firm dynamics are also affected in terms of strategic and operation choices as firms shy away from markets that become less sound from a geopolitical perspective.

These findings underscore the need for a more granular view of the economic transmission of geopolitical risk and highlight the critical role of micro-level data in both academic research and policy discussions. Research exploring the exposure to geopolitical risk from the input side, taking into account the complexities of strictly interconnected global value chains,would complement the findings in this paper.

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Appendix

NAME	ISIN	FY	DATE	REVENUES (th euros)	GEOLABEL	ISO3	TOT REVENUES
INTEL CORP	US4581401001	10	12/25/2010	5,377,371	Taiwan	TWN	33,262,101
INTEL CORP	US4581401001	10	12/25/2010	3,481,939	Japan	JPN	33,262,101
INTEL CORP	US4581401001	10	12/25/2010	4,215,727	China	CHN	33,262,101
INTEL CORP	US4581401001	10	12/25/2010	4,783,459	United States	USA	33,262,101
LEONARDO S.P.A.	IT0003856405	12	12/31/2012	4,247,000	Rest of Europe	EUR	16,504,000
LEONARDO S.P.A.	IT0003856405	12	12/31/2012	2,943,000	Italy	ITA	16,504,000
LEONARDO S.P.A.	IT0003856405	12	12/31/2012	2,155,000	United Kingdom	GBR	16,504,000
LEONARDO S.P.A.	IT0003856405	12	12/31/2012	4,057,000	North America	NAS	16,504,000
EPAM SYSTEMS, INC.	US29414B1044	12	12/31/2012	2,370	Netherlands	NLD	328,784
EPAM SYSTEMS, INC.	US29414B1044	12	12/31/2012	36,006	Russia	RUS	328,784
EPAM SYSTEMS, INC.	US29414B1044	12	12/31/2012	3,587	Ukraine	UKR	328,784
EPAM SYSTEMS, INC.	US29414B1044	12	12/31/2012	8,604	Kazakhstan	KAZ	328,784
LVMH MOET HENNESSY LOUIS VUITTON	FR0000121014	15	12/31/2015	2,487,000	Japan	JPN	35,664,000
LVMH MOET HENNESSY LOUIS VUITTON	FR0000121014	15	12/31/2015	3,552,000	France	FRA	35,664,000
LVMH MOET HENNESSY LOUIS VUITTON	FR0000121014	15	12/31/2015	9,345,000	United States	USA	35,664,000
LVMH MOET HENNESSY LOUIS VUITTON	FR0000121014	15	12/31/2015	6,408,000	Rest of Europe	EUR	35,664,000
EXXON MOBIL CORP	US30231G1022	16	12/31/2016	16,774,507	Canada	CAN	190,800,000
EXXON MOBIL CORP	US30231G1022	16	12/31/2016	9,000,098	France	FRA	190,800,000
EXXON MOBIL CORP	US30231G1022	16	12/31/2016	7,493,599	Germany	DEU	190,800,000
EXXON MOBIL CORP	US30231G1022	16	12/31/2016	66,526,923	United States	USA	190,800,000
RYANAIR HOLDINGS PLC	IE00BYTBXV33	18	03/31/2019	773,200	Germany	DEU	7,151,000
RYANAIR HOLDINGS PLC	IE00BYTBXV33	18	03/31/2019	1,440,800	Italy	ITA	7,151,000
RYANAIR HOLDINGS PLC	IE00BYTBXV33	18	03/31/2019	1,005,600	Spain	ESP	7,151,000
RYANAIR HOLDINGS PLC	IE00BYTBXV33	18	03/31/2019	1,715,300	United Kingdom	GBR	7,151,000
PETROFAC LIMITED	GB00B0H2K534	18	12/31/2018	89,083	Mexico	MEX	5,082,421
PETROFAC LIMITED	GB00B0H2K534	18	12/31/2018	184,279	Iraq	IRQ	5,082,421
PETROFAC LIMITED	GB00B0H2K534	18	12/31/2018	206,113	Russia	RUS	5,082,421
PETROFAC LIMITED	GB00B0H2K534	18	12/31/2018	693,449	Saudi Arabia	SAU	5,082,421
WIENERBERGER AG	AT0000831706	22	12/31/2022	864,903	United States	USA	4,976,732
WIENERBERGER AG	AT0000831706	22	12/31/2022	132,374	Sweden	SWE	4,976,732
WIENERBERGER AG	AT0000831706	22	12/31/2022	397,970	Netherlands	NLD	4,976,732
WIENERBERGER AG	AT0000831706	22	12/31/2022	166,570	Norway	NOR	4,976,732

FIGURE A.1: ***Revenues geographical breakdown***. *The figure displays some examples of revenues geographical breakdown for a sample of firms. To save space we limit to the top 4 destinations; data are obtained from Orbis-Bureau van Dijk.*

VARIABLES	Mean	St. Dev.	p25	p50	p75
ICRG	42.00	6.10	38	42.5	47
IBES P/E	19.03	14.27	11.83	15.69	21.15
Volatility (%)	30.23	13.89	21.00	26.80	35.32
Market Cap. (€ Bil)	18175.5	33197.61	2667.54	6562.85	17218.81
Investment ratio	1.19	6.01	0.13	0.21	0.35
Sales/Total assets	0.77	0.53	0.43	0.66	0.97

Table A.ADO: Anche qui ci vanno Industry FE1: The table provides descriptive statistics for key empirical variables (mean, standard deviation, 25th, 50th, and 75th percentile). Values are computed on the whole sample (US and European firms) over the period 2010-2022; variables are winsorized at 1% on both tails .

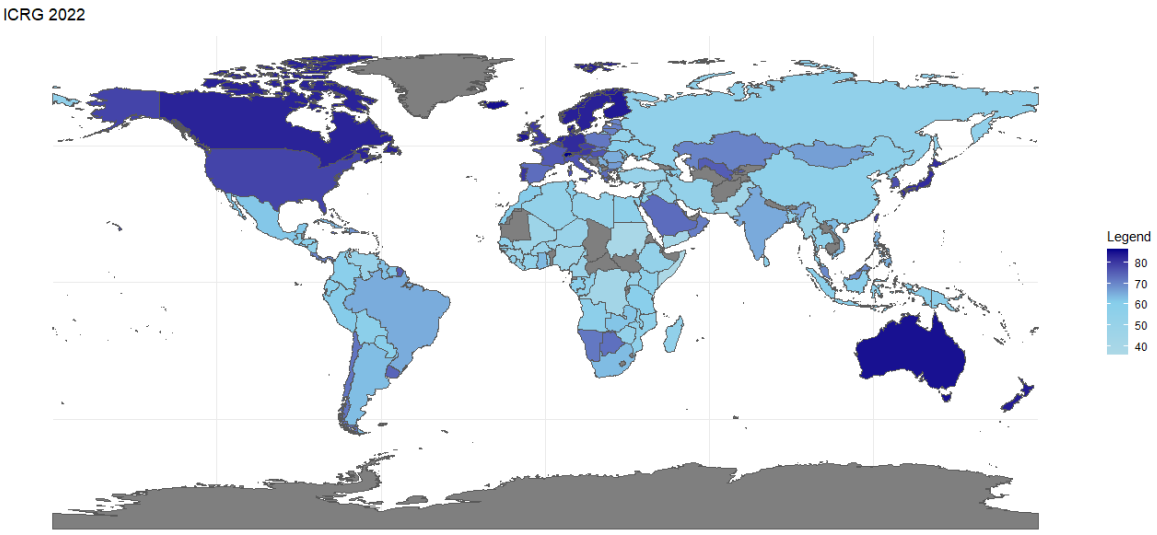


FIGURE A.2: *The plot displays countries' geopolitical risk in 2022. Data are from ICRG, higher values correspond to lower risk levels; gray countries have no available score.*

	(1) Investment ratio	(2) Sales/Assets
rwgr	-0.571***	-1.985***
	(0.004)	(0.000)
Constant	-7.055***	-9.416***
	(0.000)	(0.000)
Observations	10,027	11,465
R-squared	0.48	0.44
Controls	YES	YES
ICRG Eco rating	YES	YES
Time FE	YES	YES
Industry FE	YES	YES

Table A.ADO: Anche qui ci vanno Industry FE2: **Real variables** - adding ICRG economic rating. The table presents estimates of Equation 3. Controls include return on assets (ROA), return on equity (ROE), leverage, firm size (proxied by total assets), cash to total assets, working capital, share of fixed assets to total assets, a dummy for firms paying dividends, the number of employees (in log), and the ICRG economic rating. Dependent variables are investment ratio (capital expenditure over lagged net property, plant, and equipment) and sales to assets. Models also include a constant and time, and industry fixed effects. P-values based on robust standard errors in parentheses. *, **, and *** denote significance at, respectively, the 10%, 5% and 1% level.

	(1) IBES P/E	(2) Equity returns	(3) Equity volatility
rwgr	-0.474***	-0.005	0.465***
	(0.000)	(0.413)	(0.000)
Constant	2.469***	-0.081***	0.893***
	(0.000)	(0.004)	(0.000)
Observations	131,175	134,814	136,102
R-squared	0.22	0.22	0.51
Controls	YES	YES	YES
ICRG Eco rating	YES	YES	YES
Time FE	YES	YES	YES
Industry FE	YES	YES	YES

Table A.ADO: Anche qui ci vanno Industry FE3: **Financial performances** - adding ICRG economic rating. The table presents estimates of Equation 3. Controls include return on assets (ROA), return on equity (ROE), leverage, firm size (proxied by total assets), cash to total assets, working capital, share of fixed assets to total assets, and a dummy for firms paying dividends. Dependent variables are the IBES 12-month-forward *price-earnings (P/E)* ratio, Equity returns (measured as log-difference in market capitalization), and equity return volatility. Models also include a constant and time, and industry fixed effects. P-values based on robust standard errors in parentheses. *, **, and *** denote significance at, respectively, the 10%, 5% and 1% level.

	(1) Investment ratio	(2) Sales/Assets
$rwgr_t$	2.366	-1.489**
	(0.186)	(0.027)
$rwgr_{t-1}$	-4.337***	0.358
	(0.009)	(0.641)
Observations	7,419	8,706
R-squared	0.11	0.33
Controls	YES	YES
ICRG Eco rating	YES	YES
Time FE	YES	YES
Firm FE	YES	YES
1st stage F-stat	67.8	104.2

Table A.ADO: Anche qui ci vanno Industry FE4: **Causal effect of geopolitical risk on firms real variables - adding ICRG economic rating.** IV estimation with two instruments for two endogenous variables; variables in growth rates. See Table 1 for the list of controls. P-values based on robust standard errors in parentheses. *, **, and *** denote significance at, respectively, the 10%, 5% and 1% level.

	(1) IBES P/E	(2) Equity returns	(3) Equity volatility
$rwgr_t$	-0.154**	-0.552***	-0.229*
	(0.029)	(0.000)	(0.001)
$rwgr_{t-1}$	-0.271***	-0.176	0.974***
	(0.002)	(0.294)	(0.000)
Observations	127,891	133,318	133,183
R-squared	0.05	0.04	0.05
Controls	YES	YES	YES
ICRG Eco rating	YES	YES	YES
Time FE	YES	YES	YES
Firm FE	YES	YES	YES
1st stage F-stat	7257.7	7341.1	7296.2

Table A.ADO: Anche qui ci vanno Industry FE5: **Causal effect of geopolitical risk on firms' financial performances - - adding ICRG economic rating.** IV estimation with two instruments for two endogenous variables; variables in growth rates. See Table 1 for the list of controls. P-values based on robust standard errors in parentheses. *, **, and *** denote significance at, respectively, the 10%, 5% and 1% level.

	(1)	(2)	(3)	(4)
	All ICRG Political dimensions		Excluding economic dimensions	
	Investment ratio	Sales/Total assets	Investment ratio	Sales/Total assets
rwgr	-0.640***	-1.498***	-0.770***	-1.597***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-1.277*	-10.885***	-1.639***	-10.884***
	(0.070)	(0.000)	(0.010)	(0.000)
Observations	10,027	11,465	10,027	11,465
R-squared	0.47	0.45	0.47	0.45
Controls	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES

Table A.ADO: Anche qui ci vanno Industry FE6: **Real variables - different ICRG index definitions**. The table presents estimates of Equation 3. The first two columns display estimates where the ICRG political rating includes all its dimensions (i.e. also the socioeconomic conditions and investment profile); the last two columns display estimates where we only exclude the subscores related to the socioeconomic conditions and investment profile from the overall rating. Controls include return on assets (ROA), return on equity (ROE), leverage, firm size (proxied by total assets), cash to total assets, working capital, share of fixed assets to total assets, a dummy for firms paying dividends, and the number of employees (in log). Dependent variables are investment ratio (capital expenditure over lagged net property, plant, and equipment) and sales to assets. Models also include a constant and time, and industry fixed effects. P-values based on robust standard errors in parentheses. *, **, and *** denote significance at, respectively, the 10%, 5% and 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)
	All ICRG Political dimensions			Excluding economic dimensions		
	IBES P/E	Equity returns	Equity volatility	IBES P/E	Equity returns	Equity volatility
rwgr	-0.562***	-0.010**	0.506***	-0.386***	-0.009*	0.482***
	(0.000)	(0.048)	(0.000)	(0.000)	(0.061)	(0.000)
Constant	0.469***	-0.032	1.080***	1.350***	-0.027	0.837***
	(0.000)	(0.145)	(0.000)	(0.000)	(0.190)	(0.000)
Observations	131,175	134,814	136,102	131,175	134,814	136,102
R-squared	0.22	0.22	0.51	0.22	0.22	0.51
Controls	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES

Table A.ADO: Anche qui ci vanno Industry FE7: **Financial performances - different ICRG index definitions**. The table presents estimates of Equation 3. The first three columns display estimates where the ICRG political rating includes all its dimensions (i.e. also the socioeconomic conditions and investment profile); the last three columns display estimates where we only exclude the subscores related to the socioeconomic conditions and investment profile from the overall rating. The table presents estimates of Equation 3. Controls include return on assets (ROA), return on equity (ROE), leverage, firm size (proxied by total assets), cash to total assets, working capital, share of fixed assets to total assets, and a dummy for firms paying dividends. Dependent variables are the IBES 12-month-forward *price-earnings (P/E)* ratio, Equity returns (measured as log-difference in market capitalization), and equity return volatility. Models also include a constant and time, and industry fixed effects. P-values based on robust standard errors in parentheses. *, **, and *** denote significance at, respectively, the 10%, 5% and 1% level.

Date	Country ISO	Δ ICRG (%)	Event
01/09/2012	ARG	-3	Protests in Argentina against Kirchner
01/08/2020	ARG	-4	Social protests
01/08/2010	AUS	-4	Political crisis and federal elections resulting in a hung parliament
01/01/2012	BEL	-3	Suicide attack in Liège
01/01/2011	BLR	-6	Protests following presidential elections
01/06/2020	BLR	-5	Belarus protests before the elections
01/03/2022	BLR	-6	War in Ukraine and sanctions
01/11/2014	BRA	5	Rousseff is reelected, political stability
01/05/2016	BRA	6	Rousseff's impeachment
01/10/2018	BRA	5	Bolsonaro wins elections, promises radical reforms
01/11/2015	CAN	4	Trudeau wins by a landslide
01/02/2019	CAN	-4	SNC-Lavalin scandal and government reshuffle
01/02/2022	CAN	-4	Anti-vax protests

01/01/2014	CHL	4	Bachelet's landslide victory in the general election
01/12/2017	CHL	5	Piñera wins, returning to a more market-oriented administration
01/07/2010	COL	5	Presidential elections with large majority, positive outlook
01/06/2022	COL	8	Gustavo Petro wins elections, focus on social justice, peaceful transition
01/02/2012	DEU	7	Gauck president after Wulff scandal; Germany supports fiscal compact
01/02/2011	EGY	-12	Egyptian revolution
01/08/2012	EGY	6	Morsi annuls military edict and recalls elected parliament
01/02/2013	EGY	-6	Protests, curfew
01/12/2011	ESP	6	General election in Spain, Rajoy wins (break from Zapatero)
01/01/2018	ESP	3	Catalan elections, anti-independence party wins
01/09/2019	ESP	-3	Failure to form a new government, new elections called
01/05/2012	FRA	5	Hollande wins elections
01/11/2013	FRA	-5	Ecotax protests & record-low presidential approval
01/06/2017	FRA	5	Macron's landslide victory after Hollande
01/05/2010	GBR	10	End of PM Gordon Brown, start of Cameron premiership
01/06/2016	GBR	-5	Brexit
01/07/2016	GBR	4	New May government
01/06/2017	GBR	-4	UK elections with a narrow majority
01/11/2011	GRC	7	Papademos heads a national unity government
01/01/2015	GRC	6	Tsipras wins elections and forms new government
01/11/2014	HKG	3	Protests subside
01/12/2014	HKG	3	End of protests
01/06/2019	HKG	-4	Protests
01/03/2020	HKG	3	COVID reduces protests
01/04/2014	IDN	-5	Legislative elections with no clear winner
01/05/2014	IND	6	Modi wins elections by a landslide
01/07/2013	IRN	5	Elections
01/12/2010	IRQ	6	New government formation
01/06/2014	IRQ	-6	Fall of Mosul (major ISIS victory)
01/07/2018	IRQ	-5	Protests
01/02/2021	ITA	5	New government (Draghi)
01/09/2011	JPN	7	Kan resigns after criticism over Fukushima
01/05/2018	JPN	-5	Protests against Abe
01/04/2020	KOR	4	Elections with an absolute majority
01/03/2011	LBY	-19	Start of the civil war
01/11/2011	LBY	15	Capture of Gaddafi, new government
01/07/2018	MEX	5	Landslide victory for Obrador
01/03/2010	NLD	-3	Government collapse
01/09/2012	NLD	3	Election
01/09/2013	NOR	3	Election
01/09/2017	NOR	3	Elections
01/03/2022	NOR	-4	Tensions with Russia after its invasion
01/12/2016	NZL	-5	Government collapse
01/05/2010	PAK	7	Constitutional reform
01/09/2010	PAK	-7	Tensions after floods
01/05/2013	PAK	14	General elections with a majority
01/07/2012	PER	-5	Anti-mining protests
01/06/2016	PER	7	Presidential elections
01/06/2010	PHL	5	Elections

01/05/2016	PHL	7	Elections
01/05/2017	PHL	-4	Siege of Marawi
01/07/2017	POL	-5	Protests
01/04/2018	POL	-6	Judicial reform law, tensions with the EU
01/06/2011	PRT	3	Election
01/03/2014	RUS	-5	Crimea crisis
01/01/2022	RUS	-4	Tensions over Ukraine (troop buildup)
01/03/2022	RUS	-6	War in Ukraine
01/12/2014	SWE	-2	Government crisis
01/06/2021	SWE	-2	Government crisis
01/07/2021	SWE	2	New government
01/09/2021	SWE	-2	Prime Minister resignation
01/01/2022	SWE	-2	Government turmoil
01/04/2022	SWE	-3	Sweden riots
01/10/2022	SWE	2	New government
01/06/2010	THA	6	End of military crackdown
01/07/2011	THA	17	Elections, Pheu Thai wins by a wide margin
01/08/2014	THA	10	New prime minister (military) after coup
01/01/2014	TUR	-6	Corruption scandal
01/04/2014	TUR	6	Elections won by AKP despite scandal
01/11/2015	TUR	5	Election
01/07/2016	TUR	-5	Failed coup
01/02/2012	TWN	3	New government
01/12/2015	TWN	6	China-Taiwan meeting in Singapore
01/02/2016	TWN	4	Presidential & legislative elections (first legislative majority)
01/03/2010	UKR	4	Election
01/03/2012	UKR	4	Initialing of the EU Association Agreement
01/02/2014	UKR	-5	Euromaidan revolution
01/03/2014	UKR	-8	Annexation of Crimea
01/12/2014	UKR	5	New government; steps toward NATO
01/12/2011	USA	5	US troop withdrawal from Iraq; US supports Russia joining WTO
01/09/2013	USA	-3	Tensions over government shutdown
01/10/2012	VEN	6	Chávez reelected (political stability)
01/04/2013	VEN	-6	Chávez dies, uncertainty
01/08/2018	VEN	-5	Attempted assassination of Maduro
01/06/2019	VEN	6	Peace talks
01/02/2011	VNM	-3	Change in Vietnam leadership
01/02/2013	VNM	-3	Internal activist issue
01/11/2014	VNM	2	US lifts arms embargo; India cooperation
01/08/2016	VNM	-3	South China Sea tensions
01/10/2012	ZAF	-4	Marikana massacre
01/12/2017	ZAF	5	Ramaphosa elected as ANC president
01/07/2021	ZAF	-4	South Africa unrest

Table A.ADO: Anche qui ci vanno Industry FE8: The table displays the list of events identified by changes in the monthly ICRG index that are larger, in modulus, than three country-specific standard deviations. Further details on each event are available upon request.