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## Article

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# The Impact of the Russo-Ukrainian War on the International Sovereign Debt Market: The Role of Trade Channel

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## ABSTRACT

The paper quantifies the impact of the outbreak of the Russo-Ukrainian war on sovereign bond yields for 58 countries. Our findings based on event study methodology and multivariate cross-sectional regression analysis highlight the salient role of trade channel in shaping the markets' reaction to the hostilities. The uptick in yields was higher in countries with a greater share of agricultural raw materials imports from Ukraine. No other persistent cross-geography differences in market reactions were found. The strength of the reaction was contingent on the individual countries' macroeconomic conditions. The post-event cumulative abnormal returns exhibited a positive associative link with the baseline inflation in the studied countries pointing to the inflationary pressure portended by the outbreak of war. No statistically significant links between the ex ante situation on the labor market and the subsequent bond market reaction were observed. At the outset of hostilities, the dynamics of yields were driven by the perceived likelihood of escalation, while at later stages, the trade channel appears to have shaped the market response. The paper provides insights into the factors shaping the spillover effects of the war on fixed-income markets and quantifies the speed of market adjustment in response to an external shock.

## KEY WORDS:

sovereign debt, international trade, fixed-income analysis, systemic risks.

**JEL Classification:** F10, F34, F40.

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## 1. Introduction

The Russian invasion of Ukraine which started on February 24, 2022, has had profound consequences for the global economy. The sanctions imposed on Russia by the international community and the blockade of a significant part of maritime trade in commodities caused an increase in global inflationary pressure. The hostilities also contributed to an elevated systemic risk across a number of economies which were perceived as vulnerable to the potentially disruptive impact of the war.

Since both Ukraine and Russia are among the world's top exporters of agricultural commodities, and Russia is one of the most important exporters of energy commodities, the disruptive impact of the war on the global economy has been primarily operating through the trade channel (Fang & Shao, 2022). As the global dependence on fossil fuels remains high with alternative energy sources experiencing rapid growth from a low base (Boubaker et al., 2022), the supply bottlenecks in the commodity markets have had a profound impact on the implementation and priorities of fiscal and monetary policies.

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Prior empirical studies have shown that the Russo-Ukrainian war has exercised a profound impact on the global capital markets (Boubaker et al., 2022; Bassene et al., 2022; Ahmad et al., 2022), commodity markets (Fang & Shao, 2022; Cui et al., 2023), and even alternative investments (Goodell et al., 2022). The conflict has impacted the decision-making patterns of international investors (Patel et al., 2022; Glambosky & Peterburgsky, 2022; Sheth & Uslay, 2023) and precipitated a re-evaluation of systemic risks accompanying the cross-border flows of capital. The countries which either border Russia or are heavily dependent on Russia or Ukraine in their supply of agricultural or energy commodities have experienced an increase in the perceived level of systemic risk. The latter carries potentially disruptive consequences for their domestic economic policies.

The present study seeks to investigate the impact of the Russo-Ukrainian war on country-specific risks through the observation of war-associated cumulative abnormal returns of sovereign bonds.

By focusing on the determinants shaping the sovereign debt market reaction to the outbreak of hostilities, we attempt to elucidate the role of the trade channel in the propagation of systemic risk. Relying on a cross-sectional analysis of cumulative abnormal returns on sovereign bonds issued by 58 countries, we evidence that countries with a higher dependence on Ukraine in their supply of agricultural commodities experienced a relatively stronger uptick in sovereign bond yield. At the same time, the strength of the market reaction is shown to be contingent on the individual countries' macroeconomic conditions such as the baseline level of inflation and the general level of unemployment. Furthermore, we note that during the early stages of the conflict, the observed dynamics of the bond yields were strongly skewed by the perceived likelihood of a potential conflict escalation beyond the Ukrainian border.

## 2. Literature Review

Military conflicts exercise a profound impact on financial markets and carry repercussions for investors across all asset classes (Izzeldin et al., 2023; Pandey et al., 2023). The spillover effects operate across a number of transmission mechanisms (Qureshi et al., 2022; Taera et al., 2023). To start with,

military hostilities may cause market panic and a 'flight to safety' (Ahmed, 2023) response on the part of investors. As a result of an increase of expected risk premia (Granat et al., 2023), market valuations may tumble, while the assets perceived as less exposed to the possible repercussions of the conflict or likely to benefit therefrom may experience an additional inflow of capital (Singh et al., 2022). Within the countries bordering jurisdictions involved in the conflict, expectations of possible security problems, propagation of the conflict, and border accidents may also precipitate the reallocation of capital towards a safer environment (Kumari et al., 2023). The forecasting windows shrink, and investors may be inclined to postpone long-term capital allocation decisions.

The present study attempts to quantify the short-term treasury bonds market response to the outbreak of war and investigates the factors, which are associated with the magnitude of yield shifts. Thereby, we try to clarify, which factors may be guiding capital reallocation and pinpoint the determinants of risk premia under conditions of an open military conflict.

There are several direct quantifiable channels, through which the impact of the hostilities operates across the financial markets. The most important one, through which the war's effects spill over borders, is the trade channel (Estrada & Koutronas, 2022; Steinbach, 2023). Large-scale conflicts are always associated with a decline in international trade. As a result, the magnitude of possible repercussions for the countries not directly involved in the conflict depends on the composition of the disrupted trade flows (Markus, 2022). Commodity markets appear to be the most vulnerable to the disruptive impact of wars (Chishti et al., 2023; Cui et al., 2023). Supply contractions, which cannot be compensated without a significant time lag, exercise upward pressure on price, which in turn translates into a cascade of adjustments across the supply chains. After a certain period of time, these spillover effects become the principal engines of inflationary pressure prompting an adjustment to the macroeconomic policies of the affected countries.

Both Russia and Ukraine are systemically crucial exporters of commodities. Russia is a major producer of oil and natural gas, as well as a number

of agricultural commodities. Ukraine provides for a significant portion of agricultural commodity markets (Abay et al., 2023). Both energy and agricultural commodities have experienced a significant upshot in spot and futures prices following the outbreak of hostilities. Overall, during the initial months of the war, wheat prices increased by about 35%, and natural gas prices increased by about 20% from an already high base. Over time, these upshots partially subsided. Eventually, the perturbations on commodities markets trickled down through the supply chains (Umar et al., 2022) into inflation figures. As a result, following a stark increase in inflation projections after a certain time lag, central banks across numerous countries have initiated a wave of monetary policy tightening aimed at stifling the upsurge of inflation (Chibane & Kuhanathan, 2023). The resulting alterations in monetary policies combined with a change of investor sentiment and consumer expectations have led to an adjustment on the financial markets.

The present study focuses only on the short-term market reaction to the outbreak of hostilities. Within the studied time frame, only investor sentiment shapes the direction of readjustments across major asset classes. Price fluctuations are primarily driven by reallocation of capital guided by the shifts in the perceived levels of risk. The present study attempts to elucidate, which fundamental factors shaped those expectations, i.e., which *ex ante* factors correlate with the magnitude of short-term price shifts on the selected financial markets.

The extant empirical literature delineates several factors associated with the magnitude of the treasury market reaction to the outbreak of military conflict. To start with, the scale of the conflict appears to be strongly associated with investors' response. Both the size of economies involved in the conflict and the probability of conflict escalation appear to be driving the dynamics of treasury yields in both participating and non-participating countries. The magnitude of the response is documented to be larger in countries, which are perceived likely to be tangled in the conflict, suffer collateral damage, experience spillover effects such as refugee crises, increased arms traffic, illicit trade (Tong, 2024). The geographical proximity of the belligerent countries is also evidence to be an important factor (Silva et al., 2023). Prices

of treasuries are also likely to decrease if markets anticipate a substantial expansion in government expenditures in response to the conflict regardless of where the additional financing is likely to be directed.

The present study analyzes two other potential determinants of the treasury market reaction in response to the military conflict. The first one is the anticipated impact of the conflict on international trade flows, particularly of those countries, which are likely to be directly or indirectly affected by the outbreak of hostilities. The second factor is macroeconomic policy mix and macroeconomic settings prevailing in the affected countries prior to the war's outbreak.

Prior studies investigated the impact of trade flow disruptions on treasury yields. There is a statistically significant observable pattern, whereby bond yields may increase in response to the anticipated or factual disruption of trade flows (Chen et al., 2023). The magnitude of the yields increase is contingent upon a number of quantifiable factors. To start with, yields may react more strongly if the disrupted trade flows are comprised of commodities, in which the affected country is deficient (Nazlioglu et al., 2020). This is because the likelihood of shortages is associated with an anticipation of increased inflation, which in turn is likely to trigger a response on the part of monetary authorities in the form of increased interest rates (Abbas & Lan, 2020). The latter directly translate into bond valuations. The second factor which may be significantly associated with the magnitude of the market reaction is the perceived length of the conflict. If the disruption of trade is likely to be short-term, the temporary supply-side shortages may be compensated by other market participants or by targeted short-term rationing policies. However, long-term disruptions are likely to be associated with significant adjustment costs and market frictions (Ferguson & Ubilava, 2022; Zhou et al., 2023), all of which is likely to push up inflationary pressure. The third factor, which may be shaping the scale of treasury yield shifts following the outbreak of war, is the perceived impact of the conflict on the dynamics of GDP growth (Liadze et al., 2023). The mounting uncertainty (He, 2023) usually results in a reduction of aggregate consumption and investment expenditures, which may result in depressed economic activity. Whereas stagnation coupled with

deflation may be tackled with targeted fiscal stimulus and, whenever possible, monetary easing, stagflation is likely to result in monetary policy tightening and concomitant increase in treasury yields. The resulting net impact on treasury market depends on the combination of output and price dynamics.

While it seems clear that the scale of treasury market reaction to external shocks may be contingent on the initial macroeconomic conditions in the affected country (Moench & Soofi-Siavash, 2022), the actual empirical evidence in that regard appears scarce. Prior studies suggest that treasury markets of countries with weaker economies characterized by elevated levels of cyclical or structural unemployment are more vulnerable to external shocks and experience substantial fluctuations under unforeseen circumstances. The magnitude of this conditional relationship with key macroeconomic variables, however, remains unquantified. Elevated inflation, be it the result of supply-side shocks or of issues with the independence of the central bank (Zhang et al., 2023), is also contributing to the vulnerability of the treasury market. Under unstable macroeconomic conditions, treasury yields have been shown to experience significant shifts in response to signaling events (Ozbekler et al., 2021), including policy changes or reshuffles of senior public officials. The quantitative impact of an outbreak of military conflict has, however, not been a subject of empirical investigation. The present paper attempts to fill in this gap by studying how treasury bond yields react to an outbreak of war under heterogeneous macroeconomic conditions within the affected countries.

### 3. Methodology

In order to quantify the impact of the outbreak of the Russo-Ukrainian war on the sovereign debt market, we rely on event study methodology (Bradford & David-Robison, 1997; Guidolin & La Ferrara, 2010; Leigh et al., 2003). A detailed presentation of the methodology can be found in MacKinlay (1997) and Campbell et al. (1997). The principal objective of an event study consists in measuring the risk-adjusted return on an underlying security during a specific event window chosen by an investigator.

In this study, different event windows were used

to assess whether the choice of a particular time interval affects the results obtained in the empirical model. Day 0 (the event date) was assumed to be the day of the Russia's invasion of Ukraine, i.e. February 24, 2022. The longest event window adopted was  $[-40; 40]$  and the shortest was  $[-1; 1]$ . The longer event window, therefore, covers the period from December 30, 2021 to April 21, 2022, while the interval from January 5, 2021 (day -297) to December 29, 2021 (day -41) was adopted as the estimation window. The estimation window, therefore, includes 257 daily observations.

In line with event study methodology, we first calculated the actual daily changes in yields (YTM) on 10-year government bonds ( $ActR_{ij}$ ) of the selected countries:

$$ActR_{ij} = 10yYTM_{ij} - 10yYTM_{i-1,j} \quad (1)$$

where  $10yYTM_{ij}$  is 10-year YTM on treasury bonds for country  $j$  on day  $i$ , extracted from the database Cbonds. Due to lack of data for some countries or prolonged periods without any transactions in government bonds, some instruments were excluded from the study. Finally, data for 58 countries were used in the cumulative average abnormal returns (CAAR) calculation.

In the next step, abnormal changes in yields ( $AR_{ij}$ ) on each day of the event window, defined as the difference between the actual change ( $ActR_{ij}$ ) and the expected change ( $AvR_j$ ), were estimated.

$$AR_{ij} = ActR_{ij} - AvR_j \quad (2)$$

where  $AvR_j$  is average actual daily change of 10y YTM on bonds for country  $j$  observed during the estimation window:

$$AvR_j = \sum_{t_0}^{t_1'-1} ActR_{ij} / (t_1' - 1 - t_0) \quad (3)$$

where  $t_0$  marks the beginning of the estimation window (in this study,  $t_0 = -297$ ), while  $t_1' - 1$  is the day preceding the earliest event window (in this study,  $t_1' - 1 = -41$ ). In order to reduce the impact of outliers, the data were winsorized at 2,5th and 97,5th percentile.

The cumulative abnormal returns (CAR) on the bonds of country  $j$  over the interval  $[t_1; t_2]$  were esti-

mated as follows:

$$CAR_{[t_1; t_2], j} = \sum_{i=t_1}^{t_2} AR_{ij} \quad (4)$$

The cumulative average abnormal returns (CAAR) were then computed as follows:

$$CAAR_{[t_1; t_2]} = \frac{1}{N} \sum_{i=1}^N CAR_{[t_1; t_2], j} \quad (5)$$

where  $N$  is the total number of instruments considered in the event study.

In order to verify the statistical significance of the CAAR, a parametric test founded on the variance estimated on the basis of the cross section of cumulative abnormal returns, was performed:

$$t_{CAAR} = \frac{CAAR_{[t_1; t_2]} \sqrt{N}}{\sigma_{CAAR_{[t_1; t_2]}}} \sim t_{N-1} \quad (6)$$

$$\sigma_{CAAR_{[t_1; t_2]}} = \left( \frac{1}{N-1} \sum_{i=1}^N (CAR_{[t_1; t_2], j} - CAAR_{[t_1; t_2]})^2 \right)^{\frac{1}{2}} \quad (7)$$

The study relies on the analysis of changes in bond yields (YTM) rather than of daily changes in bond prices due to the following factors:

the first objective of the study is to determine how the outbreak of war in Ukraine has affected the cost of financing for individual countries, rather than how the event under study has affected short-term yields earned by government bondholders,

the second, and key, objective of the study is to assess whether the degree of a country's economic linkage with Ukraine has an impact on the absolute change in the cost of funding. We are, therefore, interested in whether the magnitude of the absolute change in the cost of long-term debt depends on a country's economic relationship with Ukraine.

The second important methodological choice made in the study is the use of absolute changes in bond yields instead of relative changes. This choice is dictated by the need to eliminate the risk of attributing disproportionately large relative changes to countries with high credit ratings. For example, if one compares two countries where one is rated AAA and the other BB, for the first country, even small absolute changes in the yield rate will result in very large relative volatility, while for the second country, similar absolute shifts in yield will result in comparatively

low relative changes. Since market volatility at times such as the outbreak of war is typically significant, an analysis of relative changes in yields could result in attributing much larger increases in the cost of debt to countries with high credit ratings. Hence, in this study we focus on analysing the absolute changes in countries' long-run funding costs resulting from the outbreak of war in Ukraine.

At the second stage of empirical analysis, we attempt to establish which factors exercise a significant impact on the magnitude and direction of the sovereign debt market reaction to the outbreak of war. To that end, we run a set of linear regression models, where the explanatory variable is the cumulative changes in bond yields ( $CAR_{[t_1; t_2], j}$ ). The set of explanatory variables includes proxies for a country's size and principal macroeconomic parameters, such as the level of government debt, the baseline inflation rate, the unemployment rate, the budget deficit. The principal experimental variables subject to analysis relate to the subject countries' vulnerability to the systemic risks created by the outbreak of hostilities and propagating through the trade channel. In particular, we introduced variables encoding the geographical proximity of the studied countries to Ukraine and Russia (UkrBorder, RusBorder), their dependence on the supply of commodities and other products from Ukraine (Agr\_import%20), and other relevant geopolitical factors, which influence the perceived level of systemic risk of a given country. The last category of variables includes binary regressors which encode the country's being a member of the European Union (EU) and NATO. Data on GDP, inflation, budget balance and unemployment were extracted from the databases Cbonds and Our World in Data, while data on the scale of trade operations with Ukraine were obtained from the World Bank database.

The full list of variables used in the regression analysis is presented in Table 1. The summary statistics are presented in Table 2. The baseline regression model tested in this study has the following specification:

$$CAR_{[t_1; t_2], j} = \beta_0 + \beta_1 \ln GDP20_j + \beta_2 \ln Inflation20_j + \beta_3 Budget\_balance\_to\_GDP20_j + \beta_4 Debt\_to\_GDP20_j + \beta_5 Unemployment20_j + \beta_6 Agr\_import\%20_j + \beta_7 NATO_j + \beta_8 UkrBorder_j + \beta_9 RusBorder_j + \beta_{10} EU_j + \beta_{11} Develop_j + \epsilon_j \quad (8)$$

**Table 1**  
*Definitions of Explanatory Variables Used in a Linear Regression Model*

Variable name	Definition
lnGDP20	Natural logarithm of GDP (in USD bn.) for 2020
Debt_to_GDP20	Debt to GDP in 2020 (in %)
Inflation20	Inflation in 2020 (in %)
Budget_balance_to_GDP20	Budget balance (surplus or deficit) to GDP in 2020
Unemployment20	Unemployment in 2020 (in %)
Agr_import%20	The ratio of the value of imports of agricultural raw materials from Ukraine to the country's total imports of agricultural raw materials in 2020
NATO	Binary variable, where 1 indicates a NATO country
UkrBorder	Binary variable, where 1 indicates a country bordering Ukraine
RusBorder	Binary variable, where 1 indicates a country bordering Russia
EU	Binary variable, where 1 indicates a member country of the European Union
Developed	Binary variable, where 1 indicates a developed economy per the UN classification

**Table 2**  
*Descriptive Statistics for Explanatory Variables*

Variable	Mean	St. deviation	Minimum	Maximum
lnGDP20	6.0066	1.5087	2.3571	9.9472
Debt_to_GDP20	78.516	44.722	24.8	266.2
Inflation20	1.8773	2.9304	-2.5403	13.246
Budget_balance_to_GDP20	-7.483	3.5862	-14.9	4
Unemployment20	6.9521	5.4974	0.14	33.3
Agr_import%20	0.011061	0.023175	0	0.12202
NATO	0.37931	0.48945	0	1
UkrBorder	0.068966	0.25561	0	1
RusBorder	0.051724	0.2234	0	1
EU	0.37931	0.48945	0	1
Developed	0.53448	0.50317	0	1

4. Empirical Findings

Table 3 and Figure 1 show the average abnormal changes (AAR) in bond yields for each day of the event window. Just before the outbreak of war, we observe a statistically significant increase in bond yields. It is worth noting, however, that there was an observable decrease in bond yields immediately after the outbreak of war in Ukraine (the average yield changes on days  $t = 2$  and  $t = 3$  are negative and statistically significant). On subsequent days,

however, bond yields started to increase markedly. Table 4 shows the CAARs estimated for different event windows, which confirm our initial findings. The outbreak of hostilities was associated with a statistically significant increase in sovereign bond yields across the analyzed countries.

The results of multivariate econometric analysis of the determinants of cumulative abnormal returns on government bonds are presented in Tables 5 and 6. In the regression equations summarized in

Table 3

*Average Abnormal Bond Yield Changes Within an Event Window*

Day	AAR	Test statistic	Day	AAR	Test statistic	Day	AAR	Test statistic
-40	0.00	-0.603	-13	0.02***	3.990	14	0.00	0.407
-39	0.00	-0.658	-12	0.03***	4.635	15	-0.01**	-2.211
-38	0.03***	4.605	-11	-0.03***	-3.780	16	-0.01**	-1.042
-37	0.03***	4.518	-10	0.03***	4.534	17	0.05***	6.133
-36	0.00	0.320	-9	0.01**	0.891	18	0.06***	7.919
-35	0.03***	7.428	-8	0.01**	1.689	19	0.01	0.560
-34	0.02***	4.750	-7	0.01**	1.913	20	0.05***	5.641
-33	0.02***	3.925	-6	-0.01**	-2.050	21	0.03***	4.991
-32	0.00**	-0.883	-5	-0.02***	-5.255	22	-0.01**	-0.731
-31	-0.03***	-4.909	-4	-0.02***	-3.192	23	-0.03**	-2.188
-30	-0.03***	-4.604	-3	0.00	0.086	24	-0.02**	-2.455
-29	0.02***	4.045	-2	0.02***	3.927	25	-0.06***	-5.301
-28	0.03***	5.748	-1	0.02***	3.033	26	0.02**	1.562
-27	0.02**	2.017	0	0.01	0.584	27	-0.02**	-2.198
-26	0.00	-0.081	1	0.00	-0.141	28	0.05***	6.617
-25	-0.04***	-4.499	2	-0.02**	-1.700	29	0.07***	6.009
-24	-0.03***	-5.905	3	-0.08***	-6.040	30	0.02***	3.768
-23	-0.01**	-1.112	4	0.04***	4.192	31	0.05***	5.148
-22	0.01**	1.055	5	0.01**	0.927	32	0.05***	7.081
-21	0.01**	1.929	6	0.01	0.547	33	-0.02**	-1.556
-20	0.02***	3.504	7	0.05***	3.287	34	-0.01**	-1.876
-19	0.00	-0.249	8	0.08***	5.860	35	0.02**	1.921
-18	0.01**	2.537	9	0.03**	2.327	36	0.01***	3.455
-17	-0.01**	-1.753	10	0.05***	5.372	37	0.01***	2.862
-16	0.00	-0.371	11	0.00	-0.013	38	0.04***	4.788
-15	0.03***	3.640	12	0.07***	7.881	39	-0.03***	-3.935
-14	0.04***	4.059	13	-0.02***	-3.482	40	0.02***	3.280

\*\*\*, \*\*, \* indicates statistical significance at the 1%, 5%, 10% level respectively. AAR – average abnormal change in bond yields.

Table 5, the explained variable is the cumulative abnormal return (CAR) observed over event windows preceding the outbreak of hostilities. In Table 6, we present the findings of regression models featuring the cumulative abnormal returns following the commencement of the war as the explained variable. All models exhibit satisfactory econometric properties (F-statistic) and can serve as a basis for valid statistical inference. It is worth noting that we ran regressions for a number of different event win-

dows. Since the results were qualitatively similar across the majority of event windows, only selected results were included in the final version of the paper with the remainder available for review.

We document a significant role of the trade channel in shaping the market reaction to the outbreak of war. The variables measuring the studied countries' dependence on the supply of commodities from Ukraine exhibit a persistently significant positive associative link with the cumulative abnormal

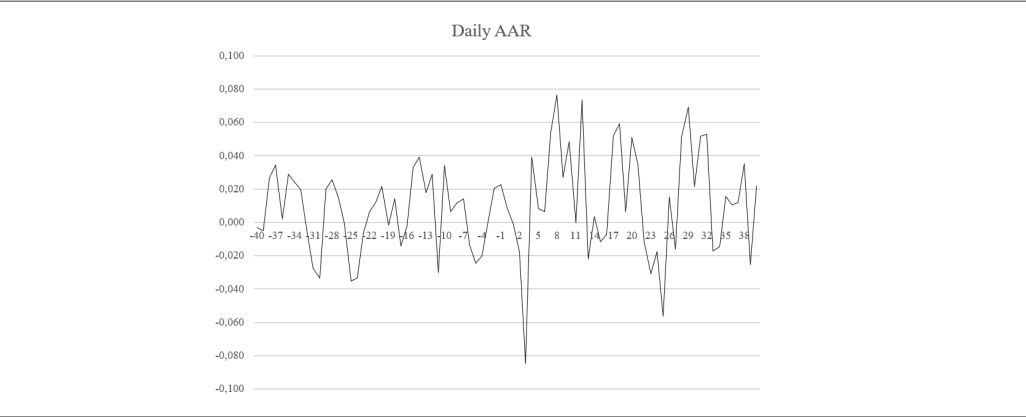


**Table 4**  
*CAARs for Various Event Windows.*

Event window	CAAR	Test statistic	Event window	CAAR	Test statistic
[-40; 40]	0.795***	10.260	[-1; 30]	0.453***	10.437
[-40; 30]	0.653***	10.328	[-1; 40]	0.595***	13.824
[-40; 20]	0.593***	10.574	[-5; 10]	0.164***	3.903
[-40; 10]	0.388***	7.129	[-5; 20]	0.369***	6.822
[-40; 5]	0.175***	3.305	[-5; 30]	0.429***	10.056
[-40; 1]	0.23***	4.307	[-5; 40]	0.571***	13.124
[-30; 30]	0.557***	9.696	[-10; 20]	0.422***	7.813
[-30; 20]	0.497***	9.952	[-10; 30]	0.481***	10.970
[-30; 10]	0.292***	6.242	[-10; 40]	0.624***	13.378
[-30; 5]	0.079**	1.769	[-20; 30]	0.587***	11.995
[-30; 1]	0.134***	2.919	[-20; 40]	0.73***	12.899
[-20; 20]	0.528***	10.677	[-30; 40]	0.699***	10.092
[-20; 10]	0.322***	7.943	[-40; -1]	0.223***	3.718
[-20; 5]	0.109***	3.689	[-40; -5]	0.2***	3.314
[-20; 1]	0.164***	5.222	[-40; -10]	0.206***	3.548
[-10; 10]	0.216***	5.064	[-30; -1]	0.127***	2.460
[-10; 5]	0.003	0.133	[-30; -5]	0.104**	2.004
[-10; 1]	0.058***	3.310	[-30; -10]	0.11**	2.240
[-5; 5]	-0.049**	-1.890	[-20; -1]	0.157***	4.441
[-5; 1]	0.006	0.354	[-20; -5]	0.134***	3.823
[-1; 1]	0.03**	1.770	[-20; -10]	0.14***	4.196
[-1; 5]	-0.025	-0.995	[-10; -1]	0.051***	3.404
[-1; 10]	0.188***	4.580	[-10; -5]	0.028**	2.025
[-1; 20]	0.393***	7.139			

\*\*\*, \*\*, \* indicates statistical significance at the 1%, 5%, 10% level respectively.

**Figure 14**  
*Daily AARs Over the Observation Window.*



returns on the underlying sovereign bonds. The respective regression coefficient of the variable *Agr\_import%20* is persistently positive across an overwhelming majority of the analyzed event windows and statistically significant at conventional levels. Our results point to the salient role of the trade channel in the propagation of systemic geopolitical risks with concentration of international trade being perceived as the vulnerability of an importing country to external shocks (Estrada & Koutronas, 2022; Saadaoui et al., 2022).

At the same time, our findings demonstrate that the magnitude of the market reaction to the outbreak of war was contingent upon individual countries' macroeconomic conditions. In particular, we observe a statistically significant negative link be-

tween the pre-event level of baseline inflation and the magnitude of the cumulative abnormal returns during event windows preceding the event. This may be due to the fact that elevated inflation was already priced in by the sovereign debt markets. Within post-event observation windows, inflation becomes a factor exhibiting a positive and statistically significant associative link with cumulative abnormal returns. The outbreak of war appears to be regarded by the markets as a factor of upward inflationary pressure. In conjunction with elevated inflation, unemployment may be perceived as a factor of systemic risk making the country's sovereign debt market more volatile. However, we evidence that the link between CAR and the pre-war levels of unemployment in the studied countries is non-

**Table 5**

*Results of Cross-sectional Regression Analysis of CARs Preceding the Event (N=57).*

Model	(1)	(2)	(3)	(4)	(5)	(6)
R <sup>2</sup>	<b>0.458</b>	<b>0.470</b>	<b>0.406</b>	<b>0.316</b>	<b>0.453</b>	<b>0.444</b>
F	<b>5,923***</b>	<b>6,199***</b>	<b>4,782***</b>	<b>3,238***</b>	<b>5,801***</b>	<b>5,583***</b>
Dependent variable	CAR (-40_10)	CAR (-30_10)	CAR (-20_10)	CAR (-10_1)	CAR (-5_5)	CAR (-5_1)
Constant	0.478 ** (0.2206)	0.498 ** (0.2045)	0.477 ** (0.196)	0.135 (0.1216)	0.116 (0.113)	0.044 (0.0718)
lnGDP20	-0.033 (0.0273)	-0.048 * (0.0281)	-0.047 * (0.0261)	-0.024 (0.0183)	-0.027 (0.0177)	-0.013 (0.0101)
Inflation20	-0.072 *** (0.0165)	-0.055 *** (0.0151)	-0.022 (0.0163)	-0.001 (0.0045)	0.011 (0.0074)	0.007 (0.0046)
Budget_balance_to_GDP20	-0.022 (0.0142)	-0.012 (0.0107)	-0.005 (0.0092)	-0.001 (0.0032)	0.003 (0.0042)	0.005 (0.0033)
Unemployment20	0.000 (0.0108)	-0.001 (0.0095)	0.001 (0.0106)	0.005 (0.0033)	0.004 (0.0059)	0.007 ** (0.0031)
Agr_import%20	3.467 *** (1.2648)	3.301 *** (1.0872)	4.887 *** (1.2359)	2.668 *** (0.8496)	4.116 *** (0.8629)	2.503 *** (0.5139)
NATO	-0.019 (0.0985)	0.037 (0.0772)	0.062 (0.0666)	-0.022 (0.0441)	-0.060 (0.047)	-0.015 (0.0316)
EU	0.177 * (0.0907)	0.168 * (0.0835)	0.142 * (0.0739)	0.019 (0.0439)	-0.137 *** (0.0428)	-0.037 (0.0273)

Note: The table presents cross-sectional regression results for CARs over different event windows. t-values are reported beneath each respective regression coefficient. Statistical significance at 1%, 5% and 10% levels are indicated with \*\*\*, \*\* and \*, respectively. Source: own elaboration.

**Table 6**  
*Results of Cross-sectional Regression Analysis of CARs Following the Event*

Model	(1)	(2)	(3)	(4)	(5)	(6)
R <sup>2</sup>	0.458	0.470	0.406	0.316	0.453	0.444
F	5,923***	6,199***	4,782***	3,238***	5,801***	5,583***
Dependent variable	CAR (-1_1)	CAR (-1_10)	CAR (-1_20)	CAR (-1_30)	CAR (-10_20)	CAR (-10_30)
Constant	-0.006 (0.0547)	0.241 (0.1586)	0.366 (0.1354)	*** 0.418 (0.1354)	*** 0.503 (0.1755)	*** 0.554 (0.1301)
lnGDP20	-0.009 (0.0073)	-0.030 (0.0216)	-0.022 (0.0216)	-0.006 (0.0246)	-0.039 (0.0254)	-0.023 (0.0218)
Debt_to_GDP20	0.000 (0.0003)					
Inflation20	0.018 (0.0057)	*** 0.041 (0.0165)	** 0.063 (0.0235)	*** 0.041 (0.0199)	** 0.045 (0.0241)	* 0.023 (0.0205)
Budget_balance_to_GDP20	0.004 (0.0041)	0.003 (0.0077)	0.007 (0.0092)	0.007 (0.0083)	0.001 (0.0092)	0.001 (0.0082)
Unemploy-ment20	0.009 (0.0037)	** 0.001 (0.0116)	-0.005 (0.0117)	-0.016 (0.0091)	* -0.009 (0.0132)	-0.019 (0.0097)
Agr_import%20	2.965 (0.5329)	*** 6.211 (1.816)	*** 8.992 (2.0563)	*** 6.303 (1.6183)	*** 9.462 (1.8126)	*** 6.773 (1.4254)
NATO	0.003 (0.0276)	0.079 (0.068)	0.170 (0.0978)	* 0.167 (0.0704)	** 0.131 (0.1076)	* 0.128 (0.0743)
UkrBorder	-0.081 (0.0533)					
RusBorder	-0.020 (0.02 43)					
EU	-0.062 (0.0327)	* -0.094 (0.0742)	-0.116 (0.0925)	0.051 (0.0742)	-0.055 (0.1)	0.112 (0.0779)
Developed	0.052 (0.0376)					

Note: The table presents cross-sectional regression results for CARs over different event windows. t-values are reported beneath each respective regression coefficient. Statistical significance at 1%, 5% and 10% levels are indicated with \*\*\*, \*\* and \*, respectively. Source: own elaboration. beneath each respective regression coefficient. Statistical significance at 1%, 5% and 10% levels are indicated with \*\*\*, \*\* and \*, respectively. Source: own elaboration.and \*, respectively. Source: own elaboration.

persistent. While model (6) in Table 5 and model (1) in Table 6 show a positive association, models (4) and (6) in Table 6 contain negative coefficients at the Unemployment20 variable (significant at 10% level).  
As the EU shares a border with both Russia and Ukraine, the conflict outbreak has become a signifi-

cant factor shaping the perceived level of systemic risks in the constituent sovereign debt markets. For some event windows, we observe a divergence in the reaction of the sovereign bond markets of EU countries compared to the remainder of the research sample. Models (1), (2) and (3) in Table 5 point to higher pre-event CARs observed in EU

countries (the respective coefficients are significant at 10% level). Model (5), however, demonstrates a negative variation in CARs. For post-event CARs, there is no consistent evidence pointing to a difference in CARs between EU and non-EU markets.

Importantly, the impact of trade channel on the sovereign bond market response to the outbreak of war is much stronger than the impact of other analyzed factors. With time, the said impact of the trade channel is evidenced to become stronger.

## 5. Conclusions

The purpose of this study was to quantify the change in government bond yields in response to the Russian invasion of Ukraine across 58 countries and investigate the determinants of the magnitude and direction of yield fluctuations. The empirical findings obtained from an event study highlight the primordial role of trade channel in shaping the response of the sovereign debt market to sudden shifts in systemic risks and in fueling contagion across interconnected markets. The relative increase in government bond yields was the highest among countries which were more dependent on the import of agricultural commodities from Ukraine. The spillover effects of trade on the sovereign debt markets are shown to gradually accumulate over time. At the same time, the magnitude of the response is evidenced to be contingent on individual countries' macroeconomic situation with weaker economies experiencing larger upticks in the cost of servicing their public debt.

The findings reported in the paper highlight the spillover effects of external shocks, such as an outbreak of a military conflict, across the world economy. Exogenous events are shown to exercise a statistically significant impact on the key parameters of sovereign debt markets of countries, whose economies are connected with those of the conflict's participants through the trade channel. A number of important implications ensue. The diversification of international trade (both imports and exports) may contribute to lowering the systemic risks and securing the country's key markets against external shocks. This is particularly true with regards to the trade in commodities, where no substitutes are available and where temporary shortages may en-

tail severe repercussions across supply chains. Both Ukraine and Russia are systemically important exporters of agricultural and energy commodities. Even transient unpredictable shortages of either are capable of shifting inflationary expectations and launching cascade adjustments in manufacturing and service sectors necessitating regulatory intervention. The diversification of systemic risks stemming from the trade channel is also more important if a country experiences transient or systemic macroeconomic problems, such as elevated inflation or weak labor market.

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