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DOES RUSSIAN-UKRAINIAN WAR IMPACT SUSTAINABLE INVESTMENT?

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ABSTRACT

PURPOSE: of the paper is to explore the reaction of sustainable investment markets to the Russian--Ukrainian war.

DESIGN/METHOD: The event study methodology was used within 30 countries, grouped by the regions – Asia, Europe, North and Central America, South America (Americas), Africa, and Oceania. The cross--sectional regression analysis was applied to identify country-driven factors which influence SRI markets during the war.

RESULTS/FINDINGS: It was confirmed that the Russian-Ukrainian war generated negative cumulative abnormal returns for 70% of the analyzed SRI markets. The cross-sectional regression analysis suggests that such country-driven factors as trade-to-GDP and pension assets-to-GDP have an impact on cumulative abnormal returns of sustainable stock indices and are influenced by the levels of masculinity/femininity during the Russian-Ukrainian war.

ORIGINALITY/VALUE: These findings inform policymakers, investors, and researchers about economic and cultural factors that influence SRI markets amid negative geopolitical events. There are two main innovations brought by the model: a similar analysis of SRI markets during the war conducted for the first time, and the model that includes financial and cultural factors.

KEYWORDS: sustainable investment, Russian-Ukrainian war, event study.

JEL: G140, G150, O16.

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1. INTRODUCTION

Sustainable and responsible investing is seen as a financial mechanism for redirecting investors' assets to address global challenges and achieve sustainable development (Liu et al., 2019). It is an investment which takes into account long-term value creation and is not a niche subfield anymore, but a mainstream practice and all stakeholders should take it seriously (Edmans, 2023).

Firstly, the COVID-2019 pandemic and currently the Russian-Ukrainian war have become a significant challenge to the achievement of the Sustainable Development Goals. On February 24, 2022, Russia started invasion of Ukraine, a catastrophic event, inflicting profound social and economic risks as it has disrupted regional stability, triggered mass displacement, and engendered severe economic consequences, demanding a nuanced exploration of the multifaceted challenges faced by the affected nations and the broader international community. Its two most significant consequences are: inflation and economic growth slowing, which have a long-term impact. The expected pressure on the inflation level in 2023 was 1.3% (0.9% expected in 2024) for OECD countries and 0.7% (0.4% is expected in 2024) for the world, while forecasted disruptions on GDP growth was estimated in 2023 at –1.4% (–0.8% in 2024) in OECD countries and –0.5% (–0.2% in 2024) in the world economy (OECD, 2024).

To mitigate negative impacts and hedge against current and future risks, significant financial resources should be allocated specifically to environmental, social and governance impacts (Lorente et al., 2021; Reboredo & Ugolini, 2018).

The remaining part of the paper is organized as follows. The next section is the literature review. The third section describes the research design and methods. The fourth section discusses the findings, and the last section concludes the paper.

2. LITERATURE REVIEW

Numerous studies have been devoted to the impact of wars and the pandemic on investor behavior, and the analysis of the factors that cause this impact to vary in strength. An analysis of publications covering the impact of Russia's war in Ukraine on financial markets in general and sustainable investments in particular allows generalizing the following areas of analysis: the heterogeneity of the war's impact on financial markets in different geographical regions (Boubaker et al., 2022; Clancey-Shang & Fu, 2023; Kumari et al., 2023; Umar et al., 2022); impact of country-specific factors on the stock markets (Boubaker et al., 2022; Kumari et al., 2023); analysis of risks and performance of green financial markets (Chen et al., 2022; Kick & Rottmann, 2022; Zhang et al., 2023); comparison of financial market's reaction to COVID-2019 and the Russian invasion of Ukraine (Brzeczszynski, 2022; Le et al., 2021; Lorente et al., 2023); vulnerability of stock markets and spillover effect on sustainable/ESG indexes/securities, gold, cryptocurrencies (Khoury et al., 2023); culture dimensions impact on economic development (Franke et al., 1991; Weber, 1947), and international trade in particular (Chung, 2007; Kandogan, 2016; Kristjánsdóttir et al., 2017; Munoz- Sepulveda et al., 2015; Nes et al., 2007).

The results obtained by Clancey-Shang and Fu (2023) show that the impact of the war on foreign companies' stocks (ADRs) is greater than that of US companies.

Boubaker et al. (2022) analyze the heterogeneity of the impact of the invasion of Ukraine on global equity markets. The authors have concluded that the negative impact of the war is differentiated depending on the level of economic openness (but also with differences) and the country's status in NATO.

The research of the EU stock market vulnerability demonstrated the adverse event day impact on the stock market indices (Kumari et al., 2023). The impact varies depending on geographical location (proximity to countries involved in the conflict), NATO membership and market efficiency. The authors concentrated

on the issue of the identifying the country-specific factors that exacerbate the negative effects of the war. Portugal, Denmark, and Poland also show positive cumulative anomalous returns after the incident. A few developed countries have little bearing on the war occurrence. The results can be attributed to both market efficiency and the geographical proximity to the conflict zone. Economic sanctions and the threat of lower exports negatively drive atypical returns during the post-event windows, while developed markets and NATO countries show positive returns.

Also, global financial markets under the Russian-Ukrainian war are investigated by Umar et al. (2022) from the point of the impact of war on the connectedness of regional and international financial markets across various asset classes: Russian, European, and the US equities and bonds markets, major commodities exported by Russia (oil, natural gas, and wheat), gold, and Bitcoin.

The U.S. equity funds were investigated during the war by Chen et al. (2022). Reverse trend in sustainable investment after rapid growth was concluded. The findings suggest that there is lower a demand for sustainability and a higher demand for fossil fuel stocks during the war. The authors have found that U.S. funds with higher involvement in weapon-related industries, lower sustainability ratings, and higher carbon risk earn significantly higher benchmark-adjusted returns during the war.

Apart from the investigation of stock market vulnerability under the war conditions, there is research focused on sustainable markets, which does not allow us to conclude about the homogeneous impact of geopolitical risk such the Russian-Ukrainian war particularly on the SRI markets and answer the questions whether the current crisis gives a further impulse for ESG investment or breaks transition to sustainability; and if SRI are safe-haven for investors during the crisis.

The analysis was conducted by Kick and Rottmann (2022) for 1452 companies of 15 European developed countries as used by MSCI in the index composition of the MSCI Europe-Index. Refinitiv's ESG-ratings were used as a measure of 'greenness', as well as the CO_2 intensity. It was analyzed by the authors whether and how Refinitiv's ESG-ratings, as well as the CO_2 intensity, influence the cumulative abnormal returns during different event windows. It was discovered that the pre- and post-event timeframe had a positive impact on the anomalous returns of businesses with high ecological scores. The impacts, however, have no bearing on the economy. The notion of a 'ESG-hedge' against such a drastic occurrence as war is not entirely supported by the results. If there is such an effect, additional characteristics that account for defensiveness and stability have overshadowed it.

Khoury et al. (2023) found heterogeneous spillover in their analysis of FinTech, ESG, and renewable energy indices before and after the conflict between Russia and Ukraine. While gold and renewable energy were net receivers before and during the war, FinTech, ESG, and MSCI were net transmitters in developed nations. FinTech, renewable energy, and gold became net receivers during both eras, whereas ESG and MSCI are net transmitters in emerging nations.

The conflict had a significant impact on the role of some assets, primarily in emerging economies, when the ten indicators were combined to achieve broader global representation. Emerging FinTech, gold, ESG, MSCI, and renewable energy were net transmitters during the war, whereas developed FinTech, renewable energy, gold, ESG, and MSCI were net receivers.

Recently, an emerging strand of the literature has highlighted the issue of risks and safety of SRI/sustainable financial markets during the periods of crises. The research was conducted by Zhang et al. (2023), Kick and Rottmann, during the COVID-2019 by Brzeczszynski (2022), and investigation on green bond markets as a safe haven or diversification benefits was carried out by Arif et al. (2021), Broadstock et al. (2020), Pham (2021), Pham and Nguyen (2021), Reboredo and Ugolini (2018). The studies provide different results. For example, according to Brzeczszynski SRI companies from the markets in East Asia demonstrated decreased systematic risk during the COVID-19 pandemic, which contrasts with substantial increases in the systematic risk of the SRI firms from the SRI indices in all other regions around the world.

Green bonds are regarded as an effective risk-hedging instrument. Green bonds have been effective in hedging cryptocurrencies since the COVID-19 pandemic, according to Le et al. (2021). Moreover, green bonds are the best hedging instrument for the US dollar, according to Naeem et al. (2021). In the opinion of Lorente et al. (2023), who came to the conclusion that clean energy, green financial assets, and the climate change index are powerful influencers in the financial markets and are essential to maintaining international peace by lowering geopolitical risk. The start of the Russia-Ukraine war only slightly alters the spillover effect of the lower- (returns and volatilities) and higher-order moments (skewness and kurtosis) of the green finance market (Zhang et al., 2023).

Sohag et al. (2022) and Flouros et al. (2022) conclude that geopolitical risk positively affects green investments and particularly green stocks.

Thus, research focused on sustainable markets during the periods of crises (COVID-2019 and war) provides different and diversified results. However, a wide strand of existing publications does not allow concluding unambiguously about a homogeneous impact of geopolitical risk such as the Russian-Ukrainian war particularly on the SRI markets, whether and which country-specific factors have an impact on SRI markets and whether investors could use sustainable investment to minimize risks under such geopolitical risk as war.

Thus, the present study focuses on testing two main hypotheses:

H1. The Russian-Ukrainian war has a statistically significant negative impact on the cumulative abnormal returns of SRI markets across different global regions.

H2. Country-specific factors significantly influence the cumulative abnormal returns of SRI markets during the Russian-Ukrainian war.

3. RESEARCH DESIGN AND METHOD

Our study employs the event study method, which is currently widely used and fits the analysis of the impact of critical events on financial and commodity markets (Bekiros et al., 2017; Boubaker et al., 2015, 2022; Clancey-Shang & Fu, 2023; Hassan et al., 2022; Kick & Rottmann, 2022; Kumari et al., 2023; Pandey & Kumari, 2021; Rai & Pandey, 2021; Yousaf, et al., 2022; Zoungrana et al., 2021). The cross-sectional regression was used for the analysis of country-specific factors which influence cumulative abnormal returns.

The Russian-Ukrainian war started on the 24th of February 2022, and is the event date. The event window consists of 7 days ($t - 3$; $t + 3$). The estimation window is 140 days (from $t - 143$ to $t - 4$) which gave us 95-100 trading days for the analysis. The dates of the post event window had to be adjusted by us as some of the markets did not trade because of public holidays. As a result, the post-event window for the majority of markets is 25/02-01/03, for Brazil 25/02-03/03, and for Indonesia 25/03-02/03 (see Figure 1 for the event timeline). The research covered 30 countries (Table 1), which are grouped by the regions – Asia, Europe, North and Central America, South America (Americas), Africa, and Oceania. It could be logical to include Russia and Ukraine as well, but it is impossible, because the Russian SRI market stopped trading on February 24th 2022 for one month and the Ukrainian sustainable stock index does not exist. The Dow Jones Sustainability World Index (DJSI) was selected as the benchmark index.

Figure 1. Event timeline

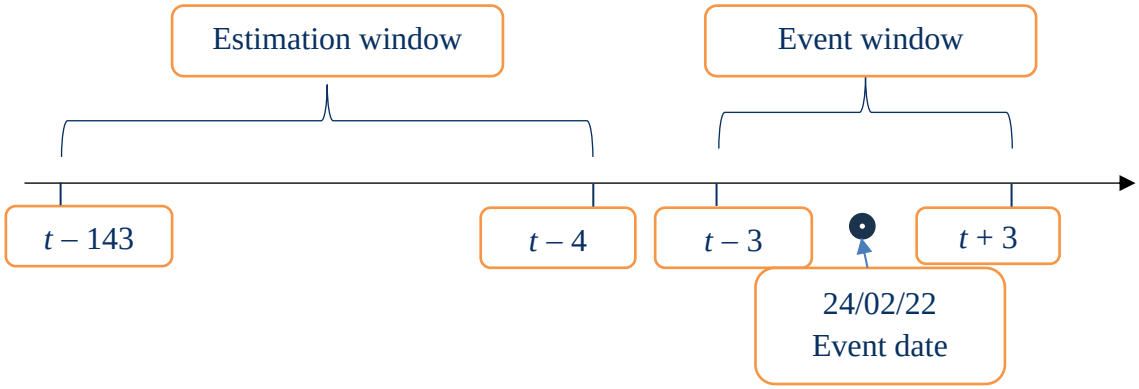

Table 1. List of SRI/ESG indices by countries

SRI / ESG Index	Country
Asia	
S&P Sustainable 300 China Index	China
HSI ESG	Hong Kong
S&P Japan 500 ESG Index	Japan
FTSE4GOOD Malaysia Index	Malaysia
iEdge SG ESG Leaders Index	Singapore
MSCI KOREA ESG Leaders Index	South Korea
MSCI Taiwan ESG Leaders Index	Taiwan
SRI KEHATI Index	Indonesia
BIST Sustainability Index	Turkey
S&P BSE 100 ESG	India
TA-MAALA Index	Israel
S&P/Hawkamah ESG UAE Index	United Arab Emirates
Europe	
VÖNIX Austrian Sustainability Index	Austria
Euronext BeNeLux ESG Leaders Index	BeNeLux
OMX GES Sustainability Finland Index	Finland
Euronext VIGEO France	France
MSCI Italy country ESG Leaders Index	Italy
FTSE4GOOD UK Index	United Kingdom
WIG ESG Index	Poland
FTSE4GOOD IBEX Spain Index	Spain
OMX Stockholm 30 ESG Responsible Index	Sweden
Dow Jones Sustainability Portugal Index	Portugal
AEX ESG Index	Netherlands
Americas	
North and Central America	
MSCI Mexico ESG Select Focus Index	Mexico
Dow Jones Sustainability U.S. Index	USA
MSCI Canada ESG Leaders Index	Canada
South America	
Bovespa Corporate Sustainability Index	Brazil
DJSI Chile Index	Chile
COLIR	Colombia
Africa	
MSCI South Africa ESG Leaders Index	South Africa
Oceania	
SP NZX ESG 50	New Zealand
DJSI Australia Index	Australia

Source: Own elaboration.

The normal returns are calculated by the data of the estimation window. For the calculation of the normal returns the market model is used widely, but also the application of the net-of-market return or CAPM models is reasonable.

If the market model is used, normal/expected returns $E(R_{it})$ can be calculated using the formula:

$$E(R_{it}) = a_i + b_i R_{mt} \quad (1)$$

where R_{it} is the actual daily return of the sample indices and the benchmark index; R_{mt} is the return of the benchmark index (DJSI) on day t; a and b are intercept and slope coefficients respectively, which are estimated with OLS.

$$R_{it} = ((P_{it} - P_{it-1})/P_{it-1}) \times 100 \quad (2)$$

where P_{it} is the price of the selected index I on day t; and P_{it-1} shows the price of the selected index i on the day before day t.

The next step is the abnormal returns which are measured as the difference between actual returns and expected (normal) returns:

$$AR_{it} = R_{it} - E(R_{it}) \quad (3)$$

Then cumulative abnormal returns (CARs) for index i over the event window from day $r1$ to $r2$ are calculated:

$$CAR_i = \sum_{t=r1}^{r2} (AR_{it}) \quad (4)$$

The common reaction of the sustainable stock indices to the event can be measured with the aggregation of abnormal daily returns per each day of each of the indices. Average abnormal returns are computed by the following equation:

$$AAR_t = 1/N \sum_{i=1}^{N} (AR_{it}) \quad (5)$$

Finally, the cumulative average abnormal return (*CAAR*) from the day $r1$ to $r2$ is calculated as the sum of the daily average abnormal return within the same time window.

$$CAAR_{(r1,r2)} = \sum_{r=r1}^{r2} (AAR_t) \quad (6)$$

At the next stage, the cross-sectional regression is used to examine whether some country-specific variables have an impact on *CARs*.

Our model is:

$$CAR_{iw} = a_{iw} + \beta_1 TGDP_{iw} + \beta_2 PAST_{iw} + \beta_3 EXRATE_{iw} + \beta_4 PAGDT_{iw} + \beta_5 NATO_{iw} + \beta_6 DEV_{iw} + \beta_7 M/F + \beta_8 TGDP_{iw} * M/F + \varepsilon_{iw} \quad (7)$$

The included variables are as follows:

- Trade-to-GDP because, on the one hand, war impacts investor's expectations, and economies which are more dependent on trade are expected to be affected more (Boubaker et al., 2022), and, on the other hand, the level of openness of the economy has an impact on the SRI market (as in Blowfield, 2005; Gjølberg, 2009ab; Grossman & Krueger, 1995; Scholtens & Sievänen, 2013).
- Past returns as a possible predictor of abnormal returns triggered by the event (as in Boubaker et al., 2022; Kumari et al., 2023).
- The Exchange rate because weaker currency may lead to institutional selling (as in Boubaker et al., 2022).
- Pension assets-to-GDP as a financial factor which influences positively SRI markets (as in Scholtens & Sievänen, 2013).

- Masculinity/femininity as a cultural factor according to Hofstede 6D framework which has an impact on SRI market development and according to Scholtens and Sievänen (2013); Shkura (2019) the more feminine the society is, the more developed SRI is. Because feminine societies could be expected to have leaders who emphasize the need for personal relationships, quality of life and caring for the elderly and conserving the environment (Hofstede, 1991, 2001). And, on the other hand, masculinity significantly and positively affects trade, with higher masculinity score tend to be more willing to consume foreign--imported goods (Yeniyurt & Townsend, 2003). The interaction between Trade-to-GDP and masculinity/femininity was included because cultural dimensions have an impact on economic development (Franke et al., 1991; Weber, 1947).
- Dummy variables such as NATO and DEV were also used to see whether the impact depends on membership in NATO and the level of country development as in Boubaker et al. (2022), Kumari et al. (2023). The error term, represented by ε_{iw}, captures the unobserved factors or random variation in the model that are not accounted for by the included independent variables.

The list and explanation of variables are shown in Table 2.

Table 2. Variables for the cross-sectional regression

Abbreviation	Variable	Explanation of indicator	Data Sources
TGDP	Trade to GDP	% of trade to GDP as of 2022	Trade (% of GDP) | Data (worldbank.org)
PAST	Past returns	Average returns of the last 20 days before the event date 24/02/22	Refinitiv EIKON database
EXRATE	Exchange rate	The 10 – day average of the country's exchange rate in terms of the US dollar before the event day	https://www.exchangerates.org.uk/
PAGDP	Pension assets-to-GDP	% of pension assets to GDP as of 2020	Global pension statistics – OECD Funded Pensions Indicators (oecd.org)
NATO	Membership in NATO	A dummy variable 1 – NATO member country, 0 – not a NATO member	NATO – Topic: NATO member countries
DEV	Developed or emerging economy	A dummy variable 1 – developed market country, 0 – emerging market	Market Classification – MSCI
M/F	Cultural dimension of masculinity or femininity (by Hofstede)	The higher the score, the more the level of masculinity and the less the level of femininity correspondingly	https://clearlycultural.com/geert-hofstede-cultural-dimensions/masculinity/

Source: Own elaboration.

4. RESULTS AND DISCUSSION

4.1. EVENT STUDY ANALYSIS

Table 3 includes cumulative abnormal returns by countries within the regions. As could be seen, the majority of SRI markets (21) reacted negatively to the start of the Russian-Ukrainian war, while, as an exception, positive *CARs* could be noted for 9 SRI markets including China, Israel and UAE (Asia), Portugal (Europe), Mexico and Colombia (Americas), South Africa (Africa), New Zealand and Australia (Oceania). A positive reaction could be explained by the geographical location far away from the war conflict. But for a more detailed analysis the regression analysis is required to find country-driven factors which could influence the SRI markets. That will be done further.

Table 3. *CAR* by countries grouped by regions

SRI / ESG Index	Country	*CAR*
Asia		
S&P Sustainable 300 China Index	China	0,0022
HSI ESG	Hong Kong	–0,0662
S&P Japan 500 ESG Index	Japan	–0,0112
FTSE4GOOD Malaysia Index	Malaysia	–0,0090
iEdge SG ESG Leaders Index	Singapore	–0,0400
MSCI KOREA ESG Leaders Index	South Korea	–0,00141
MSCI Taiwan ESG Leaders Index	Taiwan	–0,0294
SRI KEHATI Index	Indonesia	–0,0190
BIST Sustainability Index	Turkey	–0,0273
S&P BSE 100 ESG	India	–0,0539
TA-MAALA Index	Israel	0,0124
S&P/Hawkamah ESG UAE Index	United Arab Emirates	0,0163
Europe		
VÖNIX Austrian Sustainability Index	Austria	–0,1578
Euronext BeNeLux ESG Leaders Index	BeNeLux	–0,0579
OMX GES Sustainability Finland Index	Finland	–0,0796
Euronext VIGEO France	France	–0,1127
MSCI Italy country ESG Leaders Index	Italy	–0,0827
FTSE4GOOD UK Index	United Kingdom	–0,0362
WIG ESG Index	Poland	–0,1275
FTSE4GOOD IBEX Spain Index	Spain	–0,0281
OMX Stockholm 30 ESG Responsible Index	Sweden	–0,0383
Dow Jones Sustainability Portugal Index	Portugal	0,0528
AEX ESG Index	Netherlands	–0,0225
Americas		
North and Central America		
MSCI Mexico ESG Select Focus Index	Mexico	0,0122
Dow Jones Sustainability U.S. Index	USA	–0,0098
MSCI Canada ESG Leaders Index	Canada	–0,0078
South America		
Bovespa Corporate Sustainability Index	Brazil	–0,0001
DJSI Chile Index	Chile	–0,0236
COLIR	Colombia	0,0289
Africa		
MSCI South Africa ESG Leaders Index	South Africa	0,0214
Oceania		
SP NZX ESG 50	New Zealand	0,0180
DJSI Australia Index	Australia	0,0019

Source: Author's calculations based on Refinitive database.

The results (Table 4) indicate that the European SRI markets reacted negatively to the pre-event news about the potential conflict (recognition of the Donetsk and Luhansk regions by the Russian Government on February 21, 2022[1], informing by the USA that invasion was possible within the next days)[2].

Table 4. Average and cumulative average abnormal returns within the regions during the event window

Days	Asia		Europe		Americas		Africa		Oceania		Developed		Emerging	
	AAR	*CAAR*	*AAR*	*CAAR*	*AAR*	*CAAR*	*AAR*	*CAAR*	*AAR*	*CAAR*	*AAR*	*CAAR*	*AAR*	*CAAR*
$t-3$	0,0057		–0,0281		0,0036		0,0250		0,0165		–0,0123		0,0032	
$t-2$	0,0031		–0,0048		0,0066		0,0203		0,0113		–0,0011		0,0060	
$t-1$	–0,0013		0,0162		–0,0025		–0,0121		–0,0014		0,0035		0,0053	
t	**–0,0237**		**–0,0351**		**–0,0074**		**–0,0025**		**–0,0313**		**–0,0234**		**–0,0258**	
$t+1$	0,0064		–0,0003		0,0012		0,0060		0,0074		0,0031		0,0023	
$t+2$	–0,0083		0,0037		0,0034		–0,0025		–0,0016		–0,0009		–0,0013	
$t+3$	–0,0008	–0,0189	–0,0151	–0,0635	–0,0051	–0,00003	–0,0128	0,0214	0,0093	0,0103	–0,0063	–0,0374	–0,0061	–0,0163

Source: Own calculations.

Abnormal returns on the event day SRI markets displayed negative abnormal returns, with Europe, particularly Poland, experiencing the lowest (that could be explained by the closest geographical location and common border with Ukraine). This sensitivity contrasts with conventional markets, as noted by Boubaker et al. (2022), where Asian, African, and pan-American markets exhibited positive abnormal returns on the event day. Despite some initial recovery on the second day, volatility persisted, with Europe and the Americas seeing positive abnormal returns. However, by the third day, negative abnormal returns across all SRI markets were observed, except for Oceania. This may be attributed to the realization that the conflict could extend beyond initial ex-pectations, as early assumptions of a swift resolution were challenged by ongoing military developments and international responses.

Comparison with conventional markets allows making a conclusion concerning the heterogeneous effect, the bigger sensitivity of the SRI markets in Americas, Middle East and Africa, and Pacific regions. While results obtained by Boubaker et al. (2022) showed a positive return, the European and Asian SRI markets demonstrated smaller negative *CAAR* than those of conventional ones.

The impact on developed and emerging markets during the event window is volatile, although on the basis of cumulative average abnormal returns it could be concluded that developed SRI markets are more affected by this extreme event than emerging SRI markets that is consistent with Boubaker et al. (2022); Wang and Wang (2021). For SRI investors investing in New Zealand, Australian and African markets could be less risky during the Russian-Ukrainian conflict.

The results of conducted event study analysis show that hypothesis 1 can be accepted. The Russian--Ukrainian war generated negative cumulative abnormal returns for 70% of the analyzed SRI markets.

4.2. IMPACT OF COUNTRY-SPECIFIC FACTORS ON SRI MARKETS

The heterogeneous results obtained during the event study analyses indicated that some country--specific factors could influence the SRI markets during the start of the Russian-Ukrainian war. The eight variables were considered in the model, including a financial factor like Pension assets-to-GDP and a cultural factor such as masculinity/femininity which differs from the cross-sectional regression analysis from the published earlier results of research of the impact of the Russian-Ukrainian war on the stock market. The interaction between Trade-to-GDP and a cultural factor (masculinity/femininity) was included in accordance with the results previously obtained by Franke, Hofstede and Bond (1991), Kristjánsdóttir et al. (2017), Yeniyurt and Townsend (2003), which proved the hypothesis that international trade is affected differently according to different national cultural dimensions (see formula 7 and Table 5).

Table 5. Cross-sectional regression analysis taking into account interaction between Trade-to-GDP and cultural factor (masculinity/femininity)

Variables	Estimate	Std. error	*t* – value	*Pr* > *t*
(Intercept)	–1.280e-01	6.820e-02	–1.877	0.0733
TGDP	1.897e-03	7.477e-04	2.537	0.0184*
M/F	2.087e-03	1.166e-03	1.789	0.0868
PAST	5.752e-01	8.867e-01	0.649	0.5229
EXRATE	7.905e-07	2.897e-06	0.273	0.7874
PAGDP	3.344e-04	1.616e-04	2.070	0.0499*
NATO	–1.908e-02	1.662e-02	–1.148	0.2627
DEV	–1.968e-02	1.685e-02	–1.168	0.2549
TGDP:M/F	–3.783e-05	1.358e-05	–2.787	0.0105*

Notes: Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Residual standard error: 0.03904 on 23 degrees of freedom
Multiple R-squared: 0.4787, Adjusted R-squared: 0.2974
F-statistic: 2.64 on 8 and 23 DF, p-value: 0.03262

Source: Own calculations.

The cross-sectional regression model suggests that incorporating the interaction term between Trade--to-GDP and masculinity/femininity has a significant impact on the model's explanatory power. This implies that the relationship between the openness of the economy (Trade-to-GDP ratio) and cumulative abnormal returns is moderated by the levels of masculinity/femininity. The negative interaction term suggests that the positive impact of trade openness on cumulative abnormal returns of sustainable stock indices is dampened or reversed in cultures with higher levels of masculinity. In other words, in countries with higher masculinity scores, the positive effect of trade openness on SRI/ESG index returns may be attenuated or even turn negative due to the potentially adverse consequences such as increased environmental degradation, exploitation of labor, or prioritization of profit over social and environmental concerns. That indicates a complex interaction between economic elements associated with the openness of the economy and cultural aspects. Thus, the hypothesis 2 can be accepted.

There are two main innovations brought by the model: similar analysis for SRI markets during the war was conducted for the first time to our knowledge; the model in contrast to the basic one (Boubaker et al., 2022; Kumari et al., 2023) includes financial and cultural factors. Based on the regression model results, the variables Trade-to-GDP and Pension Assets-to-GDP have been identified as statistically significant factors influencing the cumulative abnormal returns of sustainable stock indices during the Russian-Ukrainian war. Both variables have a positive impact on cumulative abnormal returns of sustainable stock indices. And the relationship between Trade-to-GDP and the cumulative abnormal returns is influenced by the levels of masculinity/femininity. The negative estimate suggests a moderation effect, implying that the impact of Trade-to-GDP on the CAR is influenced by the varying levels of the cultural factor (masculinity/femininity).

It should be noted that for conventional stock markets the Trade-to GDP ratio has a negative impact on the CARs (Boubaker et al., 2022). It means that the SRI markets with higher openness and a lower level of masculinity could be safer than the conventional stock markets during the periods of geopolitical instability.

5. CONCLUSIONS

The study aimed to explore the impact of the Russian-Ukrainian war on the global SRI markets. Utilizing the event study methodology, 30 SRI markets worldwide have been examined. While the start of the Russian-Ukrainian war has led to negative cumulative abnormal returns in most SRI markets, nine, including China, Israel, UAE, Portugal, Mexico, Colombia, South Africa, New Zealand, and Australia, have exhibited positive reactions, likely due to their geographical distance from the conflict. The European SRI markets

reacted negatively earlier, influenced by pre-event news. Abnormal returns were consistently negative, with Europe, notably Poland, experiencing the lowest ones. The SRI markets displayed heightened sensitivity compared to the conventional markets. The cross-sectional regression analysis identified Trade-to-GDP and Pension Assets-to-GDP as significant factors influencing cumulative abnormal returns during the Russian-Ukrainian war. Higher openness in the SRI markets, measured by Trade-to-GDP, was associated with greater safety compared to the conventional markets. Cultural dimensions play a crucial role in shaping the relationship between trade openness and sustainable index returns, highlighting the importance of considering cultural factors in sustainability and investment research. Considering regional, economic, and cultural factors in investment decisions can mitigate risks for investors during the war, providing nuanced insights into the complex dynamics of the SRI markets during geopolitical events.

[1] Ukraine: Putin announces Donetsk and Luhansk recognition – BBC News.

[2] Ukraine conflict: US warns Russia of consequences if it invades Ukraine – BBC News; Exclusive: U.S. Warns Ukraine of Full-Scale Russian Invasion Within 48 Hours (newsweek.com).

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REFERENCES

Arif, M., Alawi, S., & Naeem, M. (2021). COVID-19 and time-frequency connectedness between green and conventional financial markets. *Global Finance Journal, 49*, 100650. https://doi.org/10.1016/j.gfj.2021.100650

Bekiros, S., Boubaker, S., Nguyen, D. K., & Uddin, G. S. (2017). Black swan events and safe havens: The role of gold in globally integrated emerging markets. *Journal of International Money and Finance, 73*, 317–334. https://doi.org/10.1016/j.jimonfin.2017.02.010

Blowfield, M. (2005). Corporate social responsibility: Reinventing the meaning of development? *International Affairs, 81*(3), 515–524. https://doi.org/10.1111/j.1468-2346.2005.00483.x

Boubaker, S., Farag, H., & Nguyen, D. K. (2015). Short-term overreaction to specific events: Evidence from an emerging market. *Research in International Business and Finance, 35*, 153–165. https://doi.org/10.1016/j.ribaf.2014.10.002

Boubaker, S., Kumari, V., & Padney, D. (2022). Heterogeneous impacts of wars on global equity markets: Evidence from the invasion of Ukraine. *Finance Research Letters, 48*(3), 102934. https://doi.org/10.1016/j.frl.2022.102934

Brzeczszynski, J. (2022). Has the risk of socially responsible investments (SRI) companies stocks changed in the COVID-19 period? *Finance Research Letters, 49*, 102986. https://doi.org/10.1016/j.frl.2022.102986

Broadstock, D. C., Chatziantoniou, I., & Gabauer, D. (2020). Minimum connectedness portfolios and the market for green bonds: Advocating socially responsible investment (SRI) activity. *SpringerLink*. https://link.springer.com/article/10.1007/s10551-020-04616-5

Chen, L., Chen, Y., & Zhang, C. (2022). Sustainable investing during the war in Ukraine. *SSRN*. https://ssrn.com/abstract=4183829 or http://dx.doi.org/10.2139/ssrn.4183829

Chung, Y. (2007). The relationship between export marketing negotiation and national cultures in Hofstede and Hall's perspectives. *Journal of International Area Studies, 11*(1), 253–290. https://doi.org/10.2139/ssrn.4183829

Clancey-Shang, D., & Fu, C. (2023). The Russia–Ukraine conflict and foreign stocks on the US market. *Journal of Risk Finance, 24*(1), 6-23. https://doi.org/10.1108/JRF-07-2022-0179

Edmans, A. (2023). The end of ESG. *Financial Management, 52*(1), 11–42. https://ssrn.com/abstract=4221990

Flouros, F., Pistikou, V., & Plakandaras, V. (2022). Geopolitical risk as a determinant of renewable energy investments. *Energies, 15*(4), 1498. https://doi.org/10.3390/en15041498

Franke, R. H., Hofstede, G., & Bond, M. (1991). Cultural roots of economic performance: A research note. *Strategic Management Journal, 12*, 165–173. https://doi.org/10.1002/smj.4250120207

Gjølberg, M. (2009a). Measuring the immeasurable? Constructing an index of CSR practices and CSR performance in 20 countries. *Scandinavian Journal of Management, 25*, 10–22. https://doi.org/10.1016/j.scaman.2008.05.001

Gjølberg, M. (2009b). The origin of corporate social responsibility: Global forces or national legacies? *Socio-Economic Review, 7*, 605–637. https://doi.org/10.1093/ser/mwp010

Grossman, G. M., & Krueger, A. B. (1995). Economic growth and the environment. *Quarterly Journal of Economics, 110*(2), 353–377. https://doi.org/10.2307/2946658

Hassan, M. K., Kamran, M., Djajadikerta, H. G., & Choudhury, T. (2022). Search for safe havens and resilience to global financial volatility: Response of GCC equity indexes to GFC and COVID-19. *Pacific Basin Finance Journal, 73*, 101768. https://doi.org/10.1016/j.pacfin.2022.101768

Hofstede, G. (1991). *Cultures and organizations: Software of the mind*. McGraw-Hill.

Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations*. Sage.

Kandogan, Y. (2016). Economic development, cultural differences, and FDI. *Applied Economics, 48*(17), 1545–1559. https://doi.org/10.1080/00036846.2015.1136618

Khoury, R. E., Nasrallah, N., Hussainey, K., & Assaf, R. (2023). Spillover analysis across FinTech, ESG, and renewable energy indices before and during the Russia–Ukraine war: International evidence. *Journal of International Financial Management & Accounting, 34*(1), 279-317. https://doi.org/10.1111/jifm.12179

Kick, A., & Rottmann, H. (2022). Sustainable stocks and the Russian war on Ukraine: An event study in Europe. *CESifo Working Paper Series, No. 9798*. https://www.cesifo-group.de/DocDL/cesifo1_wp9798.pdf

Kristjánsdóttir, H., Guðlaugsson, P. Ö., Guðmundsdóttir, S., & Aðalsteinsson, G. D. (2017). Hofstede national culture and international trade. *Applied Economics, 49*(58), 5792-5801. https://doi.org/10.1080/00036846.2017.1343446

Kumari, V., Kumar, G., & Padney, D. (2023). Are the European Union stock markets vulnerable to the Russia–Ukraine war? *SSRN*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4186271

Le, T.-L., Abakah, E. J. A., & Tiwari, A. K. (2021). Time and frequency domain connectedness and spill-over among fintech, green bonds and cryptocurrencies in the age of the fourth industrial revolution. *Technological Forecasting and Social Change, 162*, 120382. https://doi.org/10.1016/j.techfore.2020.120382

Liu, J., Zhang, D., Cai, J., & Davenport, J. (2019). Legal systems, national governance, and renewable energy investment: Evidence from around the world. *British Journal of Management, 32*(3), 579–610. https://doi.org/10.1111/1467-8551.12377

Lorente, D., Mohammed, K., Cifuentes-Faura, J., & Shahzad, U. (2023). Dynamic connectedness among climate change index, green financial assets, and renewable energy markets: Novel evidence from a sustainable development perspective. *Renewable Energy, 204*, 94–105. https://doi.org/10.1016/j.renene.2022.12.085

Munoz-Sepulveda, J. A., & Rodriguez, D. (2015). Geographical and industrial spillovers in entry decisions across export markets. *Applied Economics, 47*(39), 4168–4183. https://doi.org/10.1080/00036846.2015.1035877

Naeem, M. A., Farid, S., Ferrer, R., & Shahzad, S. J. H. (2021). Comparative efficiency of green and conventional bonds pre- and during COVID-19: An asymmetric multifractal detrended fluctuation analysis. *Energy Policy, 153*, 112285. https://doi.org/10.1016/j.enpol.2021.112285

Nes, E., Solberg, C., & Silkoset, R. (2007). The impact of national culture and communication on exporter-distributor relations and on export performance. *International Business Review, 16*(4), 405–424. https://doi.org/10.1016/j.ibusrev.2007.01.008

Pandey, D. K., & Kumari, V. (2021). An event study on the impacts of COVID-19 on the global stock markets. International *Journal of Financial Markets and Derivatives, 8*(2), 148–168. https://doi.org/10.1504/IJFMD.2021.115871

Pham, L. (2021). Frequency connectedness and cross-quantile dependence between green bond and green equity markets. *Energy Economics, 98*, 105257. https://doi.org/10.1016/j.eneco.2021.105257

Pham, L., & Nguyen, C. P. (2021). Asymmetric tail dependence between green bonds and other asset classes. *Global Finance Journal, 50*, 100669. https://doi.org/10.1016/j.gfj.2021.100669

Rai, V. K., & Pandey, D. K. (2021). Does privatization of public sector banks affect stock prices? An event study approach on the Indian banking sector stocks. *Asian Journal of Accounting Research, 7*(1), 71–83. https://doi.org/10.1108/AJAR-06-2021-007

Reboredo, J. C., & Ugolini, A. (2018). The impact of energy prices on clean energy stock prices: A multivariate quantile dependence approach. *Energy Economics, 76*, 136–152. https://doi.org/10.1016/j.eneco.2018.10.012

Sohag, K., Hammoudeh, S., Elsayed, A. H., Mariev, O., & Safonova, Y. (2022). Do geopolitical events transmit opportunity or threat to green markets? Decomposed measures of geopolitical risks. *Energy Economics, 111*, 106068. https://doi.org/10.1016/j.eneco.2022.106068

Scholtens, B., & Sievanen, R. (2013). Drivers of socially responsible investing: A case study of four Nordic countries. *Journal of Business Ethics, 115*(3), 605–616. https://doi.org/10.1007/s10551-012-1410-7

Shkura, I. (2019). Assessment of Ukrainian potential for socially responsible investment development based on cultural values. *Journal of Modern Economic Research, 27*, 75–95. https://doi.org/10.22367/jem.2017.27.05

Umar, Z., Polat, O., Choi, S., & Teplova, T. (2022). The impact of the Russia-Ukraine conflict on the connectedness of financial markets. *Finance Research Letters, 48*(4), 102976. https://doi.org/10.1016/j.frl.2022.102976

Wang, J., & Wang, X. (2021). COVID-2019 and financial market efficiency: Evidence from an entropy-based analysis. Finance *Research Letters, 42*, 101888. https://doi.org/10.1016/j.frl.2021.101888

Weber, M. (1947). *The theory of social and economic organization*. Free Press.

Yeniyurt, S., & Townsend, J. (2003). Does culture explain acceptance of new products in a country? An empirical investigation. *International Marketing Review, 20*(4), 377–396. https://doi.org/10.1108/02651330310487823

Yousaf, I., Patel, R., & Yarovaya, L. (2022). The reaction of G20+ stock markets to the Russia-Ukraine conflict 'black-swan' event: Evidence from event study approach. *SSRN*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5406955

Zhang, W., He, X., & Hamori, S. (2023). The impact of the COVID-19 pandemic and Russia-Ukraine war on multiscale spillovers in green finance markets: Evidence from lower and higher order moments. *International Review of Financial Analysis*. https://doi.org/10.1016/j.irfa.2023.101940

Zoungrana, T. D., Toé, D. L. T., & Toé, M. (2021). COVID-19 outbreak and stocks return on the West African Economic and Monetary Union's stock market: An empirical analysis of the relationship through the event study approach. *International Journal of Finance & Economics*. https://doi.org/10.1002/ijfe.2484

OECD. (2023). *War in Ukraine: The policy challenges*. https://www.oecd.org/ukraine-hub/en/ (Accessed August 8, 2024)

Dow Jones Sustainability World Index. (2023). *S&P Dow Jones Indices*. https://www.spglobal.com/spdji/en/indices/esg/dow-jones-sustainability-world-index/#overview (Accessed August 8, 2024)