The reaction of G20+ stock markets to the Russia–Ukraine conflict "black-swan" event: Evidence from event study approach

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A B S T R A C T

In this paper we examine the impact of the breakout of the conflict between Russia and Ukraine on the G20 and other selected stock markets using the event study approach. The analysis of the abnormal returns (AR) before and after the launch of the 'special military operation' by Russian military forces on the 24th of February 2022 revealed a strong negative impact of this military action on a majority of the stock markets, especially on the Russian market. The aggregate stock market analysis indicates a significant and negative impact of the Russia–Ukraine conflict on the event day and post event days. The country-wise analysis demonstrated that the stock markets of Hungary, Russia, Poland, and Slovakia were first to react in anticipation of the military actions in Ukraine, showing negative returns in pre- event days already, whereas the stock markets of Australia, France, Germany, India, Italy, Japan, Romania, South Africa, Spain, and Turkey were adversely affected in the post-invasion days. Finally, the regional analysis indicates that the European and Asian regions are significantly and adversely affected by this event.

1. Introduction

On the 24th of February 2022 Russia has launched the 'special military operation' which manifested the beginning of the Russia–Ukraine military conflict. Notably, Russian authorities have never formally declared war on Ukraine, however, Russian offensive on Ukrainian territory has caused a huge loss of lives and the fastest-growing refugee crisis since the World War II in Europe.[1] It also had diverse negative financial effects on markets and global economy. In the academic literature, war is one of the most significant events among other 'black swan' events (e.g., financial crises, health crises, natural disasters, elections, and terrorism attacks) that influence the equity markets globally. Military conflicts increase the investor's uncertainty about the firm's future profitability, which leads towards the variations in stock prices (Leigh et al., 2003; Rigobon and Sack, 2005; Choudhry, 2010; Hudson and Urquhart, 2015; Brune et al., 2015). Defence spending increased in a wartime, which adversely affects the other sectors in economy. Furthermore, imports and exports relationships between war and non-war countries are also affected by the military conflicts (Harrison, 2000), causing negative effects on firm's production, profitability, expected cash flows, and share prices. The impact of wars on equity markets is particularly important topic for investors, portfolio managers, and regulators. Therefore, we aim to offer early empirical evidence of financial effects of Russia–Ukraine military conflict that can be used for making portfolio rebalancing decision, developing effective hedging strategies, as well as policy making decisions during the ongoing military actions.

The academic interest to the assessment of the adverse financial effects of black swan events have recently increased due to the unexpected COVID-19 health crisis, where the reaction and recovery of various financial markets from COVID-19 shock has been analysed widely (Yarovaya et al., 2021, 2022a,b; Yousaf, 2021). However, the literature on the impact of military operations on financial markets is still relatively scarce. Frey and Kucher (2000) report the negative impact of World War II news on the bonds markets of the countries involved in war. Choudhry (2010) observe various structural breaks in the returns and volatility of the US stock market during the various wartime-battle fields' events from 1939 to 1945. Hudson and Urquhart (2015) explored the effect of the World War II on the stock market of the UK and provide the evidence of weak linkages

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between war event and stock market returns. In their more recent work, Hudson and Urquhart (2022) further assessed the impact of naval disaster on the British stock markets, showing that only few politically significant naval disasters affected stock market performance. Fernandez (2008) analysed the impact of the invasion of Iraq and Israeli–Palestinian conflict showed that political instability in the Middle East had greater impact on developed financial markets at the beginning of the Iraq war. Rigobon and Sack (2005) find that Iraq war risk adversely affect the US equity market therefore war risk factor is useful in estimating the variations in the stock prices in war time. Adekoya et al. (2022) report the higher connectedness between oil and other financial markets during the Russia–Ukraine conflict then before it. Tosun and Eshraghi (2022) compare the impact of Russian–Ukraine conflict on the two types of companies, leaver companies and remaining companies. They find that the portfolios of the remaining companies in Russia underperform compared to the leaver companies. Umar et al. (2022a) provide the evidence of considerable increase in abnormal returns of renewable energy markets due to Russian–Ukraine conflict. Pandey and Kumar (2022) examine the impact of Russia–Ukraine conflict on the global tourism industry and report that the adverse effect of this conflict on European, Middle East, and African Tourism industries on the event day. Umar et al. (2022b) and Wang et al. (2022) estimate the connectedness between global financial markets during the Russia–Ukraine conflict and find the strong connectedness during this event compared to before event sample period. Our study is extending the above-mentioned literature by examining the impact of the Russia–Ukraine conflict on the G20 and other related stock markets using the event study approach. In this paper we particularly interested to identify markets that reacted to the event quicker and more severely in the short-term. For this purpose, the daily returns of the selected indices are analysed on the event day, and in both pre- and during the Russian invasion in Ukraine.

Following president Putin's address on the Russian state TV '*on conduction a special military operation*' Russia troops have entered Ukraine on the 24 February 2022.[2] However, earlier on the 21st of February 2022, Russia recognized the independence of two pro-Russian regions of Donetsk and Luhansk regions. Therefore, to assess the impact of Russia–Ukraine military conflict we hypothesize that financial markets would react to the first announcement in anticipation of the future economic sanctions and potential breakout of the armed conflict between two countries. Therefore, we selected the 24th of February as an event day four this study, and analyse the reaction of G20 financial markets and other related countries in pre- and after this date. Russian economy is strongly connected with rest of the world through trade of good and services, therefore the contagion effect originate in Russia will affect other financial markets i.e., Russia is the third biggest oil exporter to world and biggest gas and food exporter to Europe and other neighbours' countries. The major trade partners of Russia are China, European countries, and US[3] therefore we selected a sample stock markets of G20 and related countries. The investors of G20 and other relevant stock markets should not assume to be similarly reacted to the news about the Russia–Ukraine conflict, therefore it is necessary to explore which markets are more/less prone to this event. Thus, in this paper we add to the contagion literature and specifically, to literature considered contagion phenomenon originated by "black swan" events.[4]

We report three important results. First, analysis of the abnormal returns (ARs) show the negative reaction of the selected stock markets on the event date, while the reaction of the Russian market is particularly strong. Second, the countrywide cumulative abnormal returns (CAR) analysis reveals that Hungary, Russia, Poland, and Slovakia stock markets reacted negatively in both pre- and post- event days, whereas Australia, France, Germany, India, Italy, Japan, Romania, South Africa, Spain, and Turkey adversely affected in post- event days only. Finally, the regional cumulative abnormal returns (CAAR) analysis indicate that the European and Asian regions have been affected the most by the launch of the Russian special military operation in Ukraine. The remaining study is structured as follow: Section 2 explains the data and methodology, Sections 3 and 4 provides the results and conclusion of the study.

2. Data and research methodology

2.1. Data description

To perform the event study, we need to define the event, event date and event window. Since the war has never been formally declared we use 24th February 2022 as a breakout date of the Russian–Ukraine conflict.[5] The event window consists of 11 days from t_{-5} to t_{+5} days. The estimation window is of 120 days from $t-125$ to $t-6$ days. For daily data, MacKinlay (1997) and Sayed and Eledum (2021) suggest using estimation-window of 120 days because 120 days are sufficient in formulating a benchmark for normal returns. We only consider trading days in our analysis. The event has impacted many economics of the world; however, we focus on examining the impact on the stock exchanges of G20 and relevant economies. The G20 Economies are the world's largest economies, including both industrialized and developing nations, holds around 90% of gross world product (GWP), 75%–80% of international trade and two-thirds of the global population. Further, due to Russia–Ukraine conflict many neighbouring countries have been particularly affected, therefore along with G20 economies, we have examined the stock exchanges of Romania, Hungary, Netherlands, Slovakia, and Poland along with Ukraine stock exchanges. Belarus and Moldova are neighbouring countries but due to lack of data availability, we have not examined these two markets. Further, we divide the selected 26 countries stock markets regions (Asian, European, North American, Latin American, and Middle East and African) wise as well for the event study analysis.

2.2. Methodology

The normal returns are calculated using the data of the estimation window, a time period before the event window. Among all the models, the OLS market model reveals better results for event study analysis (Dyckman et al., 1984). Hence, we used the OLS Market Model. The normal/expected return, E (R_{it}), can be calculated using below given formula:

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

Where, R_{mt} is the return of the benchmark index ACWI (All Country World Index)[6] on day t. Further, we use following formula to calculate the actual daily return of the sample indices and the benchmark index:

$$R_{it} = \text{LN}[(P_{it} - P_{it-1})/P_{it-1}] \times 100 \qquad (2)$$

Where, P_{it} shows the price of the selected index i on day t; and P_{it-1} shows the Price of selected index i on day before day t.

2.2.1. Abnormal returns (AR) and cumulative abnormal returns (CAR)

The abnormal returns derived by comparing the actual returns with the estimates of the daily returns (normal returns). The abnormal return, AR_{it} is calculated using below given formula:

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

Where, AR_{it} shows the abnormal return on index i on day t. R_{it} shows the actual return on the index i on day t. We calculated the cumulative abnormal return (CARs) for index i over the event window from day Γ_1 to Γ_2:

$$CAR_i(\Gamma_1, \Gamma_2) = \sum_{t=\Gamma_1}^{\Gamma_2} AR_{it} \qquad (4)$$

2.2.2. Aggregate of abnormal returns (AAR) and cumulative aggregate of abnormal returns (CAAR)

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

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

Where, $AARt$ shows the average abnormal returns on day 't'. N is the number (#) of indices. Finally, we use AAR to calculate the cumulative average abnormal returns (CAARs) for the event window.

3. Results

Fig. 1 illustrates the average change in prices of all stock markets following the announcement of the 'special military operation'. The results reveal the highest loss is evident in Russian stock market (32.22%). Stock markets of Poland, Hungary, and Turkey record the losses greater than ten, nine, and eight percent, respectively on the event day. Moreover, remaining markets also experienced the losses, except Canada, Mexico, Slovakia, and USA. Table 1 provides the abnormal returns and their statistical significance for all stock markets on the event day. The results reveal that the abnormal returns (−31.601%) are highest and significant in the Russian stock markets. The abnormal stock market returns of Poland (−10.374%), Hungary (−9.488%), Turkey (−8.262%), India (−4.325%), Romania (−3.869%), UK (−3.642%), Italy (−3.607%), Germany (−3.428%), France (−3.330%), Japan (−3.088%), Australia (−2.672%), Spain (−2.429%), South Korea (−2.252%), Netherlands (−2.075%), Saudi Arabia (−1.845%), China (−1.548%), and Indonesia (−1.436%) are negative and significant on the conflict-breakout day. Majority of the markets which have witnesses abnormal negative returns are the European markets. The stock markets of Ukraine, Canada, Mexico, Slovakia and USA

Table 1
Abnormal returns on event day.

Markets	Abnormal returns (AR)	t stat$_{AR}$
Argentina	−2.519	−1.201
Australia	−2.672	−3.070*
Brazil	−0.046	−0.036
Canada	0.531	1.358
China	−1.548	−2.024**
France	−3.330	−3.916*
Germany	−3.428	−3.955*
Hungary	−9.488	−8.920*
India	−4.325	−5.004*
Indonesia	−1.436	−2.091**
Italy	−3.607	−3.924*
Japan	−3.088	−2.810*
Mexico	0.486	0.681
Netherlands	−2.075	−2.687*
Poland	−10.374	−8.919*
Romania	−3.869	−4.621*
Russia	−31.601	−20.767*
Saudi Arabia	−1.845	−1.877***
Slovakia	0.668	1.238
South Africa	−1.379	−1.486
South Korea	−2.252	−2.065**
Spain	−2.429	−2.450**
Turkey	−8.262	−4.210*
UK	−3.642	−5.167*
Ukraine	0.007	0.080
USA	2.183	6.145*

Notes: *Significant at p-value of 0.01 (1% level) **Significant at p-value of 0.05 (5% level). ***Significant at p-value of 0.10 (10% level).

Table 2
Aggregate stock market's AARs and CAARs.

Days	AAR	t stat$_{AAR}$	CAAR	t stat$_{CAAR}$
$t-5$	−0.043	−0.104	−0.043	−0.047
$t-4$	−0.054	−0.131	−0.096	−0.118
$t-3$	−0.954	−2.329**	−1.051	−1.480
$t-2$	0.294	0.718	−0.757	−1.305
$t-1$	0.357	0.871	−0.400	−0.975
t	−3.821	−9.321*	−4.220	−10.296*
$t+1$	1.590	3.879*	−2.630	−6.417*
$t+2$	0.171	0.418	−2.459	−4.242*
$t+3$	−0.541	−1.319	−3.000	−4.226*
$t+4$	−0.144	−0.351	−3.144	−3.835*
$t+5$	−0.404	−0.987	−3.548	−3.871*

Notes: *Significant at p-value of 0.01 (1% level) **Significant at p-value of 0.05 (5% level). ***Significant at p-value of 0.10 (10% level).

have not witnessed any negative impact of the conflict breakout on the mean returns. It is particularly interesting that though the stock market of Ukraine has not been negatively affected on the conflict breakout day, even though this country has been affected the most by the military actions. The possible reason can be very rare variation in the Ukraine index over longer period of time. Overall, this event negatively and significantly affected the majority of the stock markets on the event day.

Secondly, we calculate the AARs and CAARs for the aggregate stock market for pre- and post- event periods, see Table 2. The AAR of aggregate stock markets are negative and significant on window day $t-3$, t, and $t+1$. Moreover, the empirical results of CAAR show the negative and significant CAARs on event days and post events days. These results indicate that the global stock market reacted strongly to Russian–Ukrainian conflict breakout news on the event day and post event days. Russia is the big trading partner of many of the countries around the world therefore the subsequent economic sanctions on Russia had definite impact on other connected stock markets and economies.

Thirdly, we analyse the impact of Russian–Ukrainian on the CAR of every sample country's stock markets separately during pre-announcement and post- periods using 1 day, 3 days
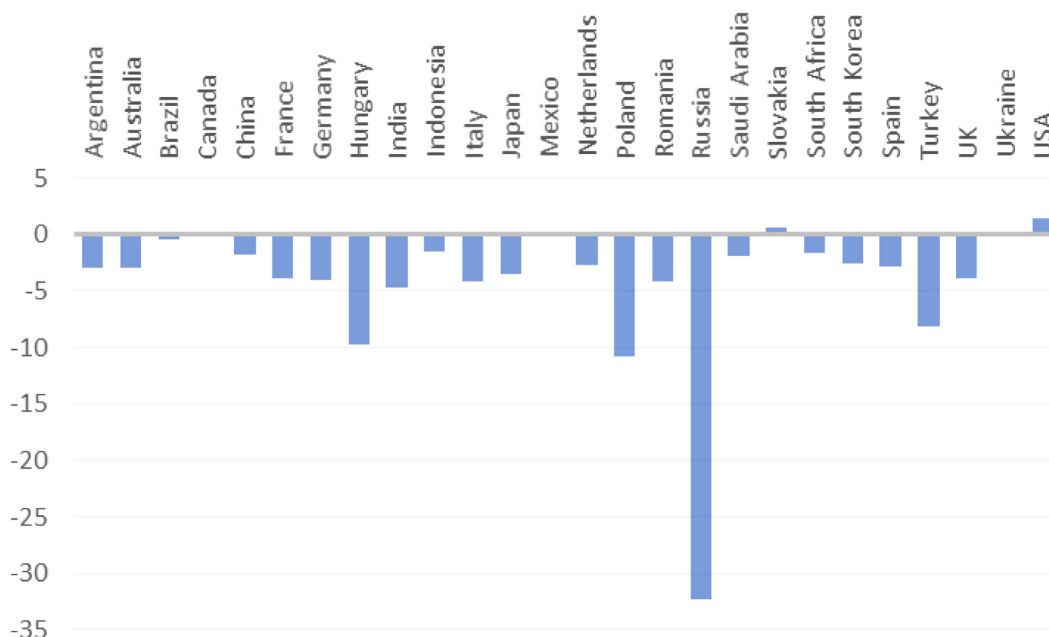
Fig. 1. The average change in prices of various stock markets on event day.

and 5 days windows. The results reveal that the CAR values are positive and significant on any pre-event days in Argentina, China, India, Indonesia, Mexico, South Korea, whereas negative and significant on any pre-event days in Hungary, Poland, Russia, and Slovakia. These results indicate that the stock markets of Hungary, Poland, Russia, and Slovakia reacted negatively to the pre-event news about the potential conflict, for example, the press release of the USA about the expected Russian invasion on 18th February 2022.[7] and the recognition of the Donetsk and Luhansk by Russian Government on 21st February 2022.[8] Moreover, the post events results show that the CAR values are negative and significant in any window day in Australia, France, Germany, Hungary, India, Italy, Japan, Poland, Romania, Russia, Slovakia, South Africa, Spain, and Turkey, reflecting that the 'black swan' event adversely affect the stock markets of these countries in the post- event days. The most adversely affected countries are belong to European region. As Russia was very important trading partner with many European countries and trade linkages with Russia have been affected by the economic sanctions,[9] ultimately the stock markets of the closely connected countries were also affected. (See Table 3.)

To add to aggregate stock market and country level stock market analysis, we further examine the impact of Russian–Ukraine conflict on regional stock markets (i.e. Asian, European, North American, Latin American, and Middle East and African), see Table 4. On the event day, the AAR coefficients are found to be negative and significant in Asian, European, and Middle East regions, reflecting the impact of event day on these three regions. The AAR is negatively significant at $t+3$ window day in Asian and European region, indicating that the stock markets of Asian and European region also responded adversely to the pre-event news of recognition of the Donetsk and Luhansk by Russian Government. Furthermore, the AAR coefficient is significantly negative in European region at $t+2$ and $t+3$ window days,

indicating the strong impact of this military conflict on the 2nd and 3rd days after the event. The CAAR values are highly negative and significant on event day and post- event days compared to the pre-event days in the Asian and European regions, whereas CAAR values are not negatively significant in North American, Latin American, and Middle East & African regions in pre and post event window days. These results indicates that European and Asian regions adversely affected and reacted to the news of Russian–Ukraine conflict outbreak.

4. Conclusion

This study aims to examine the impact of the breakout of Ukraine–Russia conflict on the G20 and other selected stock markets. We apply the event study analysis on event day, pre-event window, and post event window days. The empirical results of country wise abnormal returns (AR) reveals that the announcement of the 'special military operation' (event day) has significant and negative impact on the majority of the markets, with highest impact on Russia. The aggregate stock market' CAAR coefficients are negatively significant on event day and post event days, indicating the world stock markets adversely reacted to the Russian–Ukraine conflict news on the event day and post event days. The country wise analysis of the CARs show that Hungary, Russia, Poland, and Slovakia stock markets reacted negatively in both pre- and post- event days, whereas Australia, France, Germany, India, Italy, Japan, Romania, South Africa, Spain, and Turkey adversely affected in post event days only. Finally, the regional CAAR analysis indicate that the European and Asian regions are significantly and adversely affected on the event day and few post event days. Overall, our results show that investors can consider investing in North American, Latin American, and Middle East & African regions during the on-going Russian–Ukraine conflict because these regions have been less affected by the event. Investors are suggested to consider war/conflicts risk while making international stocks-based portfolios. The policymakers are suggested to consider the adverse effect of financialization/globalization of stock markets in terms of wars/conflicts while making policies to stabilize equity markets. In the current study, we only focus

Table 3
Country wise CARs.

Markets	t − 5		t − 3		t − 1		t + 1		t + 3		t + 5	
	CAR	t-value	CAR	t-value	CAR	t-value	CAR	t-value	CAR	t-value	CAR	t-value
Argentina	0.505	0.135	1.262	0.436	4.265	2.553**	−1.551	−0.928	3.393	1.173	−1.295	−0.347
Australia	0.895	0.456	0.643	0.422	1.313	1.494	−2.451	−2.788*	−0.331	−0.218	0.294	0.150
Brazil	−0.641	−0.259	−1.609	−0.840	−0.232	−0.209	−0.219	−0.198	2.317	1.210	−0.998	−0.404
Canada	0.161	0.094	1.024	0.767	0.545	0.707	0.763	0.990	1.316	0.986	2.141	1.242
China	0.386	0.219	1.324	0.969	1.761	2.232**	0.372	0.471	1.786	1.307	1.546	0.877
France	1.008	0.467	−0.320	−0.192	1.329	1.378	−0.667	−0.692	−4.835	−2.895*	−5.481	−2.542**
Germany	0.605	0.281	−1.917	−1.150	−0.796	−0.828	−2.647	−2.750*	−6.007	−3.604*	−7.757	−3.605*
Hungary	−0.206	−0.095	−5.288	−3.135*	−5.825	−5.982*	−10.257	−10.553*	−25.107	−14.885*	−18.367	−8.435*
India	0.803	0.393	1.205	0.761	1.798	1.966**	−1.762	−1.927*	−1.535	−0.969	−3.857	−1.886***
Indonesia	0.032	0.019	1.096	0.834	1.641	2.163**	0.537	0.708	0.381	0.290	0.102	0.060
Italy	0.154	0.069	−1.201	−0.694	0.239	0.239	−2.110	−2.114**	−6.371	−3.685*	−8.406	−3.766*
Japan	0.127	0.055	−0.277	−0.156	1.109	1.083	−1.571	−1.534	0.742	0.418	−0.429	−0.187
Mexico	−1.007	−0.549	42.857	30.144*	42.713	52.036*	43.921	53.507*	45.813*	32.223*	46.220	25.182*
Nether lands	0.369	0.175	−1.378	−0.844	0.340	0.361	−1.258	−1.335	−1.894	−1.160	−3.279	−1.556
Poland	−0.894	−0.381	−5.078	−2.794*	−5.231	−4.985*	−8.575	−8.172*	−7.692	−4.232*	−5.871	−2.502**
Romania	−0.739	−0.383	−1.562	−1.046	1.003	1.163	−2.320	−2.692*	−5.007	−3.354*	−8.893	−4.614*
Russia	−2.262	−0.763	−14.908	−6.491*	−12.812	−9.663*	−26.649	−20.098*	–	–	–	–
Saudi Arabia	−0.045	−0.022	0.611	0.393	0.436	0.485	0.559	0.622	1.076	0.691	2.060	1.025
Slovakia	−0.242	−0.159	−0.548	−0.463	−1.148	−1.682***	−1.360	−1.992**	−0.992	−0.839	−3.903	−2.557**
South Africa	0.399	0.188	0.168	0.102	0.580	0.611	−1.883	−1.984**	2.990	1.819***	2.906	1.370
South Korea	1.208	0.552	1.878	1.107	2.026	2.069**	0.011	0.011	1.776	1.047	2.261	1.033
Spain	0.281	0.128	−0.996	−0.586	−0.104	−0.106	−0.718	−0.732	−3.245	−1.910***	−5.571	−2.539**
Turkey	−1.352	−0.399	−0.163	−0.062	−1.154	−0.762	−5.056	−3.338*	−4.287	−1.634	−2.297	−0.678
UK	−0.216	−0.121	−0.469	−0.338	0.607	0.757	−0.369	−0.460	−1.942	−1.399	−3.441	−1.614
Ukraine	0.002	0.001	0.018	0.018	0.110	0.194	0.149	0.262	0.163	0.166	0.191	0.150
USA	−0.443	−0.222	0.885	0.573	−0.325	−0.364	1.299	1.457	1.087	0.704	2.015	1.011

Notes: *Significant at p-value of 0.01 (1% level) **Significant at p-value of 0.05 (5% level). ***Significant at p-value of 0.10 (10% level).

Table 4
Region wise AAR and CAARs.

	t − 5	t − 4	t − 3	t − 2	t − 1	t	t + 1	t + 2	t + 3	t + 4	t + 5
Panel A. Asia											
AAR	−0.020	0.104	−1.234	−0.304	0.914	−6.898	2.867	0.410	0.798	−0.275	0.145
t stat$_{AAR}$	−0.037	0.188	−2.22**	−0.546	1.644	−12.405*	5.155*	0.737	1.435	−0.494	0.260
CAAR	−0.020	0.084	−1.150	−1.454	−0.540	−7.438	−4.571	−4.161	−3.364	−3.638	−3.494
t stat$_{CAAR}$	−0.016	0.076	−1.194	−1.85***	−0.970	−13.376*	−8.220*	−5.292*	−3.493*	−3.272*	−2.810*
Panel B. Europe											
AAR	0.011	−0.250	−1.465	0.635	0.207	−3.779	1.901	−0.699	−2.282	0.125	−0.839
t stat$_{AAR}$	0.020	−0.456	−2.678*	1.160	0.379	−6.907*	3.474*	−1.278	−4.172*	0.229	−1.534
CAAR	0.011	−0.238	−1.704	−1.069	−0.861	−4.640	−2.739	−3.439	−5.721	−5.595	−6.434
t stat$_{CAAR}$	0.009	−0.218	−1.80***	−1.381	−1.575	−8.481*	−5.007*	−4.444*	−6.037*	−5.114*	−5.260*
Panel C. North America											
AAR	−0.141	0.034	1.061	−0.658	−0.186	1.357	−0.437	−0.040	0.210	0.598	0.278
t stat$_{AAR}$	−0.528	0.128	3.977*	−2.47**	−0.698	5.085*	−1.636	−0.149	0.789	2.241**	1.043
CAAR	−0.141	−0.107	0.955	0.297	0.110	1.467	1.031	0.991	1.202	1.800	2.078
t stat$_{CAAR}$	−0.236	−0.200	2.065**	0.786	0.414	5.499*	3.863*	2.626*	2.600*	3.372*	3.482*
Panel D. Latin America											
AAR	−0.381	−0.170	−0.138	1.393	0.019	−0.693	−0.838	1.960	1.164	−1.577	−0.956
t stat$_{AAR}$	−0.383	−0.171	−0.139	1.399	0.019	−0.696	−0.842	1.969**	1.169	−1.584	−0.960
CAAR	−0.381	−0.551	−0.690	0.703	0.723	0.029	−0.809	1.151	2.315	0.738	−0.218
t stat$_{CAAR}$	−0.171	−0.277	−0.400	0.500	0.726	0.029	−0.813	0.818	1.342	0.371	−0.098
Panel E. Middle East and Africa											
AAR	0.177	0.479	−0.266	0.117	0.002	−1.612	0.442	1.652	1.043	0.241	0.209
t stat$_{AAR}$	0.259	0.700	−0.390	0.171	0.002	−2.357**	0.646	2.415**	1.526	0.352	0.306
CAAR	0.177	0.656	0.389	0.507	0.508	−1.104	−0.662	0.990	2.033	2.274	2.483
t stat$_{CAAR}$	0.116	0.480	0.329	0.524	0.743	−1.614	−0.968	1.023	1.716***	1.663***	1.624

Notes: *Significant at p-value of 0.01 (1% level) **Significant at p-value of 0.05 (5% level). ***Significant at p-value of 0.10 (10% level).

on the impact of Russia–Ukraine conflict on the stock markets, therefore, for future studies, we suggest investigating the impact of Russia–Ukraine conflict on the energy, metal, grain, fiat currency, bonds, green, and cryptocurrency markets. Finally, this study only applies the event study analysis to examine the impact of war, whereas the future studies can examine the connectedness, efficiency, safe haven feature, and other financial aspects of markets by applying various kind of analysis to gauge the impact of Russia–Ukraine conflict.

CRediT authorship contribution statement

Imran Yousaf: Conceptualization, Formal analysis, Methodology, Software, Writing - original draft, Writing - review & editing. **Ritesh Patel:** Conceptualization, Data collection, Writing original draft. **Larisa Yarovaya:** Conceptualization, Writing original draft, Writing - review & editing, Supervision, Resources, Funding Acquisition.

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