Diplomatic Associations and Exchange Rates : A Study on Russia-Ukraine War

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Abstract

Purpose : This paper aimed to analyze the impact of the Russia-Ukraine war on the currencies of two major groups of nations based on their diplomatic association with Russia, viz., those against invasion and the non-aligned group.

Methodology : The methodology adopted in this paper could be divided into two parts. In the first part, the event study method was used to analyze the aggregated impact of war on the currencies of the two groups of nations. In the second part, a dynamic conditional correlation–generalized autoregressive conditional heteroskedastic model (DCC-GARCH) was used to analyze the dynamic correlation between the two groups of currencies in aggregate.

Findings : From the first part of the analysis, it was found that the Russian ruble declined for both groups after the initial economic sanctions, but the recovery afterward was more robust against the currencies of the non-aligned group. The second part of the analysis revealed a significant increase in the time-varying dynamic conditional correlation between the returns of the two groups after the war, indicating a contagion.

Practical Implications : Managers are recommended to be cautious of the impact of the increased interrelation of exchange rates among the two diplomatic groups on international business transactions. Policymakers are recommended to consider the fact that economic sanctions not uniformly supported by all major nations cannot have their intended impact.

Originality : This paper is the first to examine the impact of the Russia-Ukraine war on foreign exchange rates from the perspective of diplomatic associations of nations.

Keywords : **diplomatic associations, Russia-Ukraine war, economic sanctions, foreign exchange rates, event study, DCC-GARCH**

JEL Classification Codes : F31, G14, G15

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On February 24, 2022, Russia launched a unilateral military campaign on Ukraine. The conflict between the two countries is witnessing a second escalation in less than 10 years since the annexation of Crimea by Russia in 2014. The economic cost of the ongoing Ukraine-Russia conflict is expected to increase global inflation by 3% while reducing global GDP by about 1% (Liadze et al., 2022). One factor differentiating the current conflict from the prior ones is the scale of economic sanctions on Russia. The earlier embargo on Russia

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(March 2014 and later) failed to produce the intended impact (Dreger et al., 2016; Korotin et al., 2019). During the past sanctions, the Russian economy was already suffering from falling oil price shocks (Korotin et al., 2019). Therefore, the sanctions were not the main reason behind the Russian ruble crisis of 2014 (Dreger et al., 2016). The current sanctions have excluded Russia from the SWIFT payment system and restricted its crude oil trade (in the open market). The sanctions on Russia have disrupted the global supply chain of essential commodities (e.g., food grains and sunflower oil), resulting in inflationary pressure on the worldwide economy (Liadze et al., 2022). The war affected stock markets adversely (Boungou & Yatié, 2022) and triggered a flight of capital from the ruble to safer assets (Mohamad, 2022).

Most NATO nations joined the US in aggressively sanctioning Russia. Most developing countries did not morally support the Russian invasion, but refrained from imposing economic sanctions on Russia, being non-aligned. Thus, even though Russia is now excluded from the international payment system, it continues to have trade relations with some of the major world economies.

Diplomatic equations play a vital role in the sanctions imposed. However, studies are yet to explore the relationship between diplomatic associations and exchange rate movement in this context, and thus, a research gap exists. Because of Russia's continued trade with some major nations worldwide, we anticipate asymmetries in the foreign exchange rate movement of the Russian ruble with major global currencies based on diplomatic relations. Therefore, we explore the impact of the conflict on the ruble exchange rate of two groups of countries, those that imposed sanctions on Russia ('against' group or AG) and those that did not impose any sanctions ('non-aligned' group or NA). We form equal-weighted currency portfolios of the two groups and use the portfolio returns for our analysis. We analyze how the war and ensuing sanctions impact the ruble and how the dynamics between the currencies of these groups of nations evolved.

Previous studies on similar lines (e.g., Chortane & Pandey, 2022) used the US dollar as the base currency for their research. We use the ruble as the quote currency for all currencies in our sample. Choosing the ruble as the common currency avoids the idiosyncrasies of the US dollar, which has recently been appreciating against major global currencies.

This study is carried out in two steps. In the first step, we use an event study to analyze the impact of the Russian invasion and war on the returns of currency portfolios of both groups in three distinct periods. In the second step, we find the impact of the invasion on the estimated time-varying conditional correlation between the two groups with a dynamic conditional correlation – generalized autoregressive conditional heteroskedastic model (DCC-GARCH).

The results show that the economic sanctions had an initial impact, and the ruble declined against the two groups of currencies. Though the ruble recovered, the recovery trajectory was different against currencies of both groups of nations; it recovered much faster and significantly more against countries that did not sanction it. We also find a significant increase in the time-varying conditional correlation between the returns of both currency groups. The results suggest contagion among the two groups of currencies. The ruble has shown resistance to sanctions earlier (Logendran, 2015), and our results indicate that it may remain resilient against the current sanctions.

Literature Review

Wars are known for impacting global trade and economic welfare (Glick & Taylor, 2010). When the Russian invasion of Ukraine started for a second time in early 2022, it shocked the global economy trying to recover from the impact of COVID-19 (Orhan, 2022). In the earlier escalation between the two countries in 2014, Western nations imposed economic sanctions on Russia. However, despite having large external debts, Russia could meet its external payment obligations due to its adequate foreign exchange reserves and deft central bank policies

(Logendran, 2015). Most researchers (e.g., Havlik, 2014; Korotin et al., 2019; Logendran, 2015; Tyll et al., 2018) have shown the ineffectiveness of the earlier sanctions on the Russian ruble.

The current war and the subsequent economic sanctions on Russia have polarized the world (Guyer, 2022; Westwood, 2022; Xiaoming, 2022). While most NATO nations joined the US in aggressively sanctioning Russia, several significant economies refrained from imposing direct sanctions on Russia (e.g., China, India, UAE, Israel, Mexico, etc.) and remained nom-aligned. Though sanctions hampered Russian imports, exports have increased since the beginning of the war (Simola, 2022).

During periods of global crisis like war (or pandemic), exchange rates across nations co-move closely (Qureshi & Aftab, 2020). During uncertain times, recession concerns trigger a capital flight to safer currencies (Caballero & Krishnamurthy, 2008). A similar phenomenon was observed during the Russian invasion of Ukraine, where investors sold Russian rubles for safer assets (Mohamad, 2022). However, Simola (2022) showed that though Russian exports to the EU declined, other countries (e.g., India and China) increased imports of Russian commodities. Thus, similar to earlier sanctions, the current sanctions may not have significantly weakened the ruble.

Prior studies have used various methods to study the impact of sanctions on the Russian economy and currency. Dreger et al. (2016) used cointegrated vector autoregression (VAR) to analyze the impact of western sanctions on the ruble discussed earlier. Mamonov and Pestova (2021) used a Bayesian (S) VAR to examine the effects of western sanctions on the Russian economy. They found that the sanctions moderately impacted ruble exchange rates during the study period. Lyócsa and Plíhal (2022) used Google search trends and implied volatility to explain investor attention and expectation (respectively) for the ruble's value against the US dollar and British pound sterling and found that both investor attention and expectation have significant implications for the ruble.

Chortane and Pandey (2022) analyzed the impact of sanctions on the currency value of various countries (against the US dollar) based on their geographic locations. Their study showed that the sanctions negatively impacted the currencies of countries with geographical proximity to Russia. At the same time, the impact was positive on the currencies of Pacific nations. Sokhanvar and Lee (2022) found a significant impact of the increase in war-induced energy prices on exchange rate volatility.

In the Indian context, Tiwari et al. (2022) demonstrated an adverse impact of the war on the Indian rupee exchange rate and found the Indian rupee vulnerable to such events. Prior studies showed the impact of global crises on India's foreign exchange (Bhanumurthy et al., 2019). Due to the close interaction between exchange rates and stock markets in India (Ashwani & Sheera, 2018; Yadav, 2016), exchange rate vulnerabilities and political instabilities (Kaur & Vij, 2020) may be transmitted to financial markets. With a better understanding of foreign exchange rate behavior during turbulent periods such as wars, appropriate risk assessment models and mitigation tools (e.g., Bhat, 2015; Vasumathy, 2015) may be used by traders to mitigate their foreign exchange exposure risks.

Research Gap and Hypotheses

Though multiple studies highlight the impact of the Russia-Ukraine war on the exchange rate movements, some questions still need to be answered. No studies analyze the effect of political alliances with Russia (and against it) on exchange rate movements. Russia continues to trade with a select group of countries while being economically sanctioned by most developed nations. The politico-economic disequilibrium centered around Russia is expected to have an asymmetric impact on its foreign exchange rate dynamics with various groups of nations. An in-depth analysis of the foreign exchange rate dynamics of the Russian ruble with multiple groups of nations based on their position on sanctions may be of use to currency traders in their future trades and policymakers in assessing the impact of economic sanctions.

Based on the presented literature review and discussions, two research hypotheses are framed:

↳ **Ha1 :** The divergence of the movement of the currencies of two groups of countries (against Russian invasion and non-aligned) against the Russian ruble, measured by the difference of log returns of their exchange rates, show significant change after the war event as compared to before the war event.

↳ **Ha2 :** The conditional correlation of the log returns of the exchange rates of the currencies of two diplomatically divergent groups against the Russian ruble changes significantly after the war event compared to before the war.

Data and Methodology

Our study uses foreign exchange rates of 11 countries, all quoted in Russian rubles (i.e., rubles being the home currency). These 11 countries are the major economies and are most cited in news reports and discussions on this topic (e.g., Guyer, 2022; Westwood, 2022; Xiaoming, 2022). Among the 11 nations (and economic regions), six are against the Russian invasion of Ukraine and imposed economic sanctions on Russia (AG), that is, the United States, a group of European Union nations (those that adopted Euro), the United Kingdom, Switzerland, Japan, and Australia. The remaining five major nations are 'non-aligned' or neutral and did not impose economic sanctions on Russia (NA). They are China, India, United Arab Emirates, Mexico, and Israel.

We collected daily foreign exchange data for all the countries mentioned above from Thomson Reuter's Refinitiv Eikon database from April 3, 2017 – May 3, 2022. After matching the sample dates, we have 1,327 data points for each currency. We compute the logarithmic returns of all currency pairs. Then, we compute the group-wise equal-weighted average return (AR) of the currencies of the AG and NA nations. We then test the ARs with an augmented Dickey-Fuller (ADF) unit root test and find them stationary at a significance level of 1%. One sample student *t*-test with a null hypothesis of zero mean shows that the ARs have a statistically insignificant mean (μ) as the null hypothesis could not be rejected.

We begin our analysis with an event study of the currency portfolio ARs following the discussion of MacKinlay (1997), with February 24, 2022, as the event date (T). We do not estimate the abnormal returns of each portfolio as in MacKinlay (1997) since we do not have a currency index with the Russian ruble as the quote currency. Hence, no reference 'market index' is available to fit economic models like the capital asset pricing model (CAPM) or Single Index Model (SIM) and estimate abnormal or excess returns. Similarly, the zero means of the portfolio ARs mean that abnormal returns around the mean are statistically indistinguishable from the ARs themselves. Therefore, the remainder of the event study is carried out with the portfolio ARs computed.

We explore three different event windows: an extended window from 150 days before the event to 45 days after, a shorter symmetric window from 45 days before to 45 days after, and a post-event window from the event day up to 45 days after. We compute the cumulative average returns (CAR) of the portfolio ARs for each window and find the test statistic for several sub-periods within the window. We test the null hypothesis (H_0) of no event impact (i.e., CAR being statistically indifferent from zero) for each sub-period. We also test the difference in the CARs of the two portfolios and test for a null hypothesis of statistical insignificance to study the divergence pattern. For robustness, we fit the difference between ARs of AG and NA countries to regression with a time dummy for the period after the event. The regression equation used is:

$$(AR_{AG,t} - AR_{NA,t}) = a + bD_t + \epsilon_t \qquad (1)$$

where, $D_t = 0$ for $t < T$; $D_t = 1$ for $t >= T$; ϵ_t is the error term ; a and b are the coefficients of the equation.

Next, we examine the time-varying dynamic conditional correlation (DCC) between the portfolio ARs to test any possible contagion due to the conflict. The DCC computation follows the multivariate generalized autoregressive conditional heteroscedasticity (M-GARCH) methodology proposed by Engle (2002). The DCC-GARCH model specification is as follows:

$$H_t = D_t R_t D_t \tag{2}$$

where, H_t is an $N \times N$ matrix of conditional variances for N time series, the vector of ARs (say, X_t) can be expressed as $X_t = \sqrt{H_t}\varepsilon_t$ (we ignore the mean as it is statistically insignificant shown earlier), where ε_t is a vector of independently and identically distributed standardized residuals for each series in N. D_t is a diagonal matrix of variances computed with a univariate volatility model for each AR series. We use the exponential GARCH (EGARCH) method (Nelson, 1991) to model the univariate volatilities ($\sigma^2_{N,t}$) of both AR series, obtaining a measure of unconditional volatility (ω), short-term volatility persistence (α), long-term volatility persistence (β), and asymmetric volatility (γ) analogous to EGARCH. The EGARCH model specification is as follows:

$$\ln(\sigma^2_{N,t}) = \omega_N + \beta_N \ln(\sigma^2_{N,t-1}) + \gamma_N \frac{\varepsilon^2_{N,t-1}}{\sqrt{\sigma^2_{N,t-1}}} + \alpha_N \left[\frac{|\varepsilon^2_{N,t-1}|}{\sqrt{\sigma^2_{N,t-1}}} - \sqrt{\frac{2}{\pi}} \right]; \forall (N = 1,2) \tag{3}$$

R_t, the time-varying conditional correlation among the ARs, is estimated recursively as below:

$$R_t = diag\{Q_t\}^{-1} \times Q_t \times diag\{Q_t\}^{-1} \tag{4}$$

$$Q_t = S(1 - A - B) + A(\varepsilon_{t-1}\varepsilon'_{t-1}) + BQ_{t-1} \tag{5}$$

where, Q_t is the time-varying covariance matrix of ε_t, and S is the 'unconditional' covariance matrix of ε_t estimated from the univariate EGARCH parameters. Parameters A and B are dynamic estimators of the conditional correlation, where A measures the impact of lagged errors (short-term effect) and B measures the persistence in lagged conditional correlation (long-term effect).

After obtaining R_t, we further analyze the impact of the war on the DCC between the ARs by fitting data from equation 4 to regression with a time dummy as below:

$$R_t = a + bD_t + \epsilon_t \tag{6}$$

where, D_t is identical to the one in equation 1.

Analysis and Results

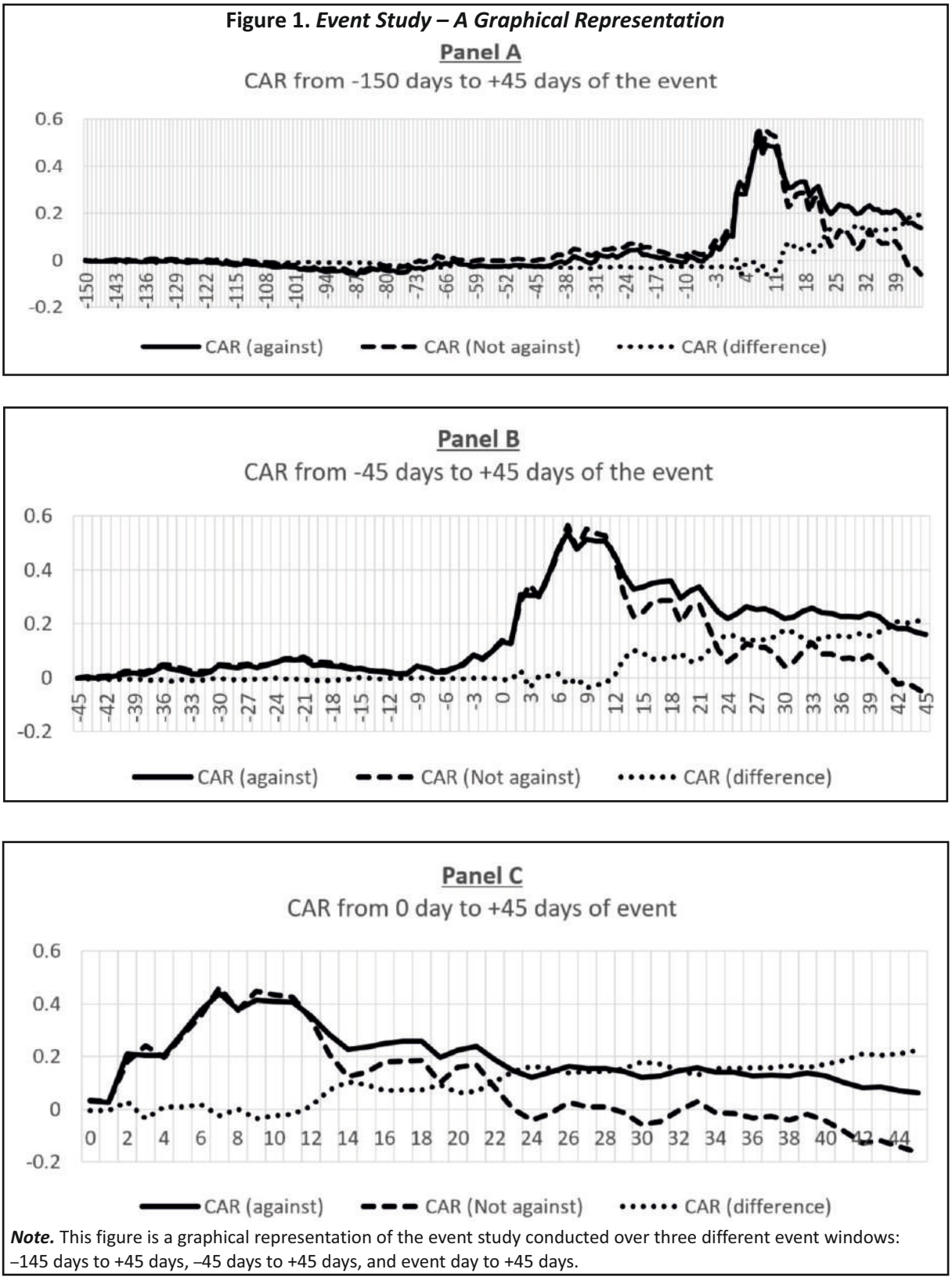
The event study results are presented in Table 1, with a visual description in Figure 1. The tables (and the figures) show a significant appreciation (significant at a 1% level) of the ruble against currencies of both groups of nations between –150 to –45 days of the event. The appreciation is higher for AG nations (as seen from the significant difference in Table 1 and Figure 1). The trend reverses 30 days before the event due to anticipation of the same, and the ruble depreciates significantly (at a 1% level) against both groups. Once the event happens and subsequent sanctions come in, the ruble's depreciation against both groups of currencies reaches its peak and halts about 15 days after the event. After that, the ruble recovers significantly (significant at a 1% level) against both groups of countries. However, there is a substantial divergence in the recovery pattern between the two groups. The ruble

Table 1. ***Event Study***

Day from	Day to		AG	NA	AG – NA
Sub-Period 1: From –145 days to +45 days					
–150	–45	CAR	–0.0267***	–0.0012	–0.0255***
		(*t*-stat)	(–4.8475)	(–0.2253)	(–9.6653)
–150	–30	CAR	0.0223***	0.0483***	–0.026***
		(*t*-stat)	(3.5049)	(8.0244)	(–9.3433)
–150	–15	CAR	0.0115*	0.0348***	–0.0233***
		(*t*-stat)	(1.7269)	(5.4664)	(–8.5242)
–150	0	CAR	0.1082***	0.1377***	–0.0294***
		(*t*-stat)	(12.661)	(16.6003)	(–10.7508)
–150	15	CAR	0.3119***	0.2442***	0.0677***
		(*t*-stat)	(14.3009)	(9.5456)	(6.3896)
–150	30	CAR	0.1966***	0.0433	0.1533***
		(t-stat)	(8.765)	(1.5475)	(13.1035)
–150	45	CAR	0.1377***	–0.0609**	0.1986***
		(*t*-stat)	(6.2935)	(–2.1846)	(16.7204)
Sub-Period 2: From 45 days to +45 days					
–45	–30	CAR	0.0462***	0.0486***	–0.0024
		(*t*-stat)	(4.5171)	(5.2348)	(–0.6531)
–45	–15	CAR	0.0353***	0.0351***	0.0003
		(*t*-stat)	(3.6832)	(3.8282)	(0.0815)
–45	0	CAR	0.1321***	0.1379***	–0.0058*
		(*t*-stat)	(10.2424)	(10.9824)	(–1.9667)
–45	15	CAR	0.3358***	0.2444***	0.0913***
		(*t*-stat)	(9.557)	(5.8592)	(5.3174)
–45	30	CAR	0.2204***	0.0436	0.1768***
		(*t*-stat)	(6.4739)	(1.0151)	(9.968)
–45	45	CAR	0.1615***	–0.0607	0.2222***
		(*t*-stat)	(5.109)	(–1.4928)	(12.9644)
Sub-Period 3: From event day (zero-day) to +45 days					
0	15	CAR	0.2363***	0.1423*	0.094**
		(*t*-stat)	(3.573)	(1.761)	(2.8023)
0	30	CAR	0.121**	–0.0586	0.1796***
		(*t*-stat)	(2.3383)	(–0.8831)	(6.5437)
0	45	CAR	0.0621	–0.1629***	0.2249***
		(*t*-stat)	(1.4421)	(–2.8994)	(9.4499)

Note. This Table presents the results of the event studies for various lengths for the Against Group of Countries (AG), Not-Against Countries (NA), and their difference (AG-NA). '*', '**', and '***' refers to significance at the 10%, 5%, and 1% levels, respectively. Data were collected from Refinitiv Eikon (Thomson-Reuters).

Figure 1. ***Event Study – A Graphical Representation***



Note. This figure is a graphical representation of the event study conducted over three different event windows: –145 days to +45 days, –45 days to +45 days, and event day to +45 days.

Table 2. ***Regression Output for $AR_{AG} - AR_{NAG}$ as a Dependent Variable***

	Coefficient	Std. Error	*p*-value
Intercept	2.12×10^{-05}	0.00015	0.8857
War Dummy	0.00504***	0.00077	6.73×10^{-11}
F-statistic = 43.3037 (*p*-value = 6.73×10^{-11}); Adjusted *R*-Square = 0.0309.			

Note. This table shows the results of the regression equation 1. '*,' '**,' and '***' refers to significance at the 10%, 5%, and 1% levels, respectively.

recovers much faster and appreciates more vis-à-vis the NA currencies. We believe that the discrepancy is due to the increased trade between this group and Russia (e.g., the purchase of Russian crude oil by China and India) and payment agreements made with Russia. The divergence is statistically significant (at a 1% level) for all three studied periods, therefore, Ha1 is accepted at a 1% significance level.

Results from regression equation 1 (in Table 2) show that the divergence between the portfolio ARs increases significantly (significant at 1% level) after the event. This finding further confirms the results of the event study.

Further analysis of the correlation between the two groups of currencies with the DCC-EGARCH model is reported in Table 3. Significant DCC parameters (*A* and *B*) suggest strong persistence. The results of regression equation 6 are reported in Table 4. The results show that after the war, the conditional correlation between the log returns of currency portfolios of both political groups increased significantly (significant at a 1% level), indicating a contagion; therefore, Ha2 is accepted at a 1% level of significance.

The different diplomatic standpoints of these two groups have resulted in their different stance on trade with

Table 3. ***DCC-EGARCH Parameters for AR_{AG} and AR_{NA}***

Series	Parameters	Estimate	Std. Error	*p*-value
AR_{AG}	μ_1	0.00012	0.00017	0.456
	ω_1	0.3729***	0.03197	0.000
	α_1	0.1288***	0.03385	0.000
	β_1	0.9606***	0.00273	0.000
	γ_1	0.2557***	0.06726	0.000
AR_{NA}	μ_2	0.00018	0.00016	0.263
	ω_2	0.2534***	0.04725	0.000
	α_2	0.1260***	0.03413	0.000
	β_2	0.9729***	0.00512	0.000
	γ_2	0.2470***	0.07618	0.001
Joint DCC	*A*	0.0203**	0.00945	0.032
	B	0.9707***	0.02361	0.000
Log Likelihood	10556.42			
AIC	–15.903			
BIC	–15.852			

Note. This table shows the parameter values for the DCC-EGARCH and their statistical significance. '*', '**', and '***' refers to significance at the 10%, 5%, and 1% levels, respectively.

Table 4. ***Regression Output for Dynamic Conditional Correlation (DCC) as a Dependent Variable***

	Coefficient	Std. Error	*p*-value
Intercept	0.90059***	0.00073	0.00000
War Dummy	0.05345***	0.00379	3.47×10^{-42}
F-statistic = 198.9087 (*p*-value = 3.47×10^{-42}); Adjusted *R*-Square = 0.12995.			

Note. This table shows the results of regression equation 6. '*,' '**,' and '***' refers to significance at the 10%, 5%, and 1% levels, respectively.

Russia post-commencement of the conflict. It resulted in a different impact on two groups of countries, the AG and NA, which is evident in the performance of the respective currencies of these groups of countries compared to the ruble. However, we find strong evidence favoring a contagion and volatility increase in the forex market.

Managerial and Theoretical Implications

Managers should be cautious about the volatile foreign exchange environment and significant correlation among currencies of multiple diplomatic groups. Such a global foreign exchange scenario may affect international business transactions, and managers must devise appropriate hedging measures to counter any adverse effects of currency movements. This paper contributes to the extant literature by examining the exchange rates from the perspective of diplomatic associations of nations on the currency value of the nation targeted with economic sanctions, viz, Russia. Though several studies have analyzed the impact of this important event on foreign exchange rates, they have yet to look at the issue from a diplomatic association perspective. Further, this study demonstrates the decline and recovery path of the Russian ruble vis-à-vis two diplomatic groups of nations. It reveals the divergence that earlier studies have not highlighted. Future studies may note the findings of this study and analyze the effectiveness of future economic sanctions from a multi-country diplomatic perspective.

Conclusion, Limitations of the Study, and Scope for Future Research

From a global economic standpoint, our study sheds light on the effect of the gradual polarization of nations based on ideological, political, and diplomatic considerations on economic outcomes like exchange rates. Economic sanctions on Russia may not fully succeed if all significant countries are not on board, and we may see a repeat of the ineffectuality of the older sanctions. In conclusion, the results demonstrate that the Russian ruble has strengthened (and will likely remain strong) compared to the currencies of nations that were not aligned (NA) in the conflict. Thus, this paper demonstrates that diplomatic relationships play a crucial role in determining the exchange rate of two countries, especially during a severe political event like war. From the Rothschild family in the Napoleonic wars to George Soros in 1992, traders have profited hugely from betting against exchange rates in the backdrop of political or diplomatic crises.

This study is limited by its exclusive sample of major economies under two diplomatic groups of nations based on their diplomatic stand on the war. We have yet to include several smaller economies and regional groups that could be included in subsequent research to analyze the impact of the war on the exchange rates of a more significant number of economies. This paper also documents a considerable profit opportunity for traders that may be further evaluated through large-scale studies.

Authors' Contribution

The idea of the paper and its research hypotheses were conceptualized jointly by both authors. Dr. Sayantan Kundu analyzed the relevant literature, identified the research methodology and framework, and framed the hypotheses. Dr. Aditya Banerjee collected the required data from the Refinitiv Eikon database. Dr. Sayantan Kundu completed the event study analysis. Dr. Aditya Banerjee used the R program to conduct the DCC-GARCH and related analysis. Then, Dr. Aditya Banerjee prepared the first complete draft of the research paper in consultation with Dr. Sayantan Kundu. After that, Dr. Sayantan Kundu edited and refined the draft further, leading to the final version of the paper.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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