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IMPACT OF RUSSIA-UKRAINE WAR ON AMERICAN STOCK MARKET - AN EVENT STUDY WITH REFERENCE TO DOW JONES INDUSTRIAL AVERAGE

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ABSTRACT

The world economy is barely recovering from the harsh hit of the Covid 19 pandemic and the Russia-Ukraine conflict has worsened the condition with inflation, high energy costs and global distress. For elucidating the impact of Russia-Ukraine war on US market, this study makes use of event study methodology in turn will reflect how the event of the Russia-Ukraine war has affected the US market returns beyond expectation. The data on the weekly DJIA index values are collected from Yahoo! Finance website for the event window which was tabulated and analysed using Microsoft excel and SPSS. The study concludes that Russia Ukraine war did impact on the DJIA index of US market resulting in fall in the Dow Jones Industrial average along with the decline in the index values of other stock markets around the world.

KEYWORDS

DJIA index, Russia Ukraine war, market expectations, influence.

JEL CODES

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INTRODUCTION

The hostility between Russia and Ukraine existed years ago as a cause of border demarcation, the situation of the Russian minority in Ukraine, the annexation of Crimea, the increasing eastward expansion of NATO (North Atlantic Treaty Organization) and so on (Naveenkumar K et al., n.d.). The animosity between Russia-Ukraine pronounced due to the launching of a full-scale military invasion by Russia into Ukraine on 25th February 2022. The massing of troops by Russia at Ukraine's border escalated confrontation not only around the countries bordering Russia and Ukraine but also extended to the rest of the world. The supply of military equipment from the European and Western allies enabled Ukraine to defy the war. On the other hand, severe sanctions from the allies of Ukraine particularly the United States imposed economic pain on Russia for its violent strike. ("Valuation of European Firms During the Russia-Ukraine War by Alexandros Bougias, Athanasios Episcopos, George N. Leledakis: SSRN," n.d.)

Wars raise uncertainty which lowers the predictability of future price movements thereby creating panic and perplexity among the investors. Analogously, Russia-Ukraine's geopolitical war induced the financial market reactions, the impact of which is reflected in the global stock price movements. The world economy is barely recovering from the harsh hit of the Covid 19 pandemic and the Russia-Ukraine conflict has worsened the condition with inflation, high energy costs and global distress. The United States which has a crucial interest in the restoration of Ukraine's sovereignty is not an exception to it. The Times of India report says the impact of the crisis could be felt in sundry ways in the USA, from the price of gasoline to a hit to household wealth ("Economic impact of Russia-Ukraine War," n.d.). Russia produces 10 million barrels of oil a day and is Europe's largest supplier of natural gas to fuel power plants and households ("Global economic implications of the Russia-Ukraine war - Economist Intelligence Unit," n.d.). Russia is also a major producer of wheat and the conflict took the food prices to a new height. Although the US imports significantly less amount of supplies from Russia, global scenarios and commodity crunch have alarmed the Americans to cut back on spending and investing activities resulting in a slowdown of economic activities. ("Economic spillovers from the war in Ukraine: The proximity penalty | VOX, CEPR Policy Portal," n.d.)

Eugene Fama in his Efficient Market Hypothesis explained how the market responds quickly and accurately to the information available, both favourable and unfavourable. Equivalently, American stock indices saw substantial volatile movements as a consequence of investors fearing in response to global reactions to the Russia-Ukraine crisis in the form of sanctions and other measures to pressure Russia. This study is an attempt to understand and elucidate the response of the American Stock market to the Russia-Ukraine conflict by taking into consideration of Dow Jones Industrial Average (DJIA) index movements. Dow Jones Industrial Average is one of the oldest and the most commonly followed price-weighted stock market index of 30 listed companies on the stock exchanges in the US ("https://en.wikipedia.org/wiki/Russo-Ukrainian_War - Google Search," n.d.).

LITERATURE REVIEW

(Mbah and Wasum, 2022) Considerable studies have been published to delineate the relationship between wars and the stock market, throw light on the impact of wars on world stock market returns and enable the investors and policymakers to design effective strategies ("Why has Russia invaded Ukraine and what does Putin want? - BBC News," n.d.). Researchers have made use of empirical approaches for the comprehensive evaluation of the stock market response to some violent events like the World War and the pro-Russian conflict

("The impact of the Ukraine-Russia war on world stock market returns - ScienceDirect," n.d.) The Russia-Ukraine war 2022 became a crucial issue triggering the reactions from countries across the world. Reports suggest the intensity of the Russia-Ukraine crisis 2022 on the global economy ("How Russia's Invasion of Ukraine Could Affect the U.S. Economy - The New York Times," n.d.). The sanctions imposed on Russia, although intended to hurt Russia, had spillover effects on the global economy. There was an increase in the global Purchasing Manager's Index and an increase in the world price of food and food ingredients ("How Russia's Invasion

of Ukraine Could Affect the U.S. Economy - The New York Times," n.d.). This invasion generated negative cumulative abnormal returns for global stock market indices, but with heterogeneous effects (Stillman, 1986). It had different impacts on stock markets across countries and sectors, depending on how deeply the countries or industries are involved in the war (Stillman, 1986). Neighbouring countries, on average, incurred an abnormal decline in equity indices of 23.1% within the four weeks around the onset of the war ("Dow Jones Industrial Average - Wikipedia," n.d.). The war led to lower corporate security and higher asset volatility in European firms. European equities and Russian bonds are the net transmitters of shocks. Researchers have investigated the impact of geopolitical risk (GPR) generated by the Russian-Ukrainian conflict on European and Russian bonds, equity, and global commodity markets. Most Asian countries, being net oil importers will be able to absorb the effects in the long run. Studies indicated that industry plays an important role in the stock market reaction.

("The pro-Russian conflict and its impact on stock returns in Russia and the Ukraine | Request PDF," n.d.) Literature review on American stock markets depicts that there has been a study that focused on large shocks in the volatility of the DJIA index. Studies analyze the US market reactions to events like presidential elections [19]. Evidence exists on valuation effects of the event of WorldCom failure. Researchers have also elucidated the consequences of the Russia-Ukraine war on major global economic players like the USA, Canada, UK, and the EU and concluded that the impact of the conflict would be felt globally with soaring inflation, supply chain disruptions, etc.

As suggested by Fama, in his book "The Capital Markets: A Review of Theory and Empirical Work", in a semi-strong form of the efficient market all the information including historical data and public information is reflected quickly and precisely into share prices considering which investors cannot earn abnormal returns. An event study is an ideal tool for testing the efficiency of a semi-strong form of EMH. An event study offers a direct test of market efficiency and is the most widely used paradigm to understand the behaviour of stock markets in response to stock split announcements, earning announcements, takeovers, etc. Event study methodology is used to demonstrate the impact of Coronavirus on stock market. The event study methodology used to examine the impact of the breakout of the conflict between Russia and Ukraine on the G20 and other selected stock markets indicated a significant and negative impact on the event day and post-event days.

("Global Economic Consequence of Russian Invasion of Ukraine by Peterson K Ozili: SSRN," n.d.) These kinds of events provide us with an opportunity to learn more about the psychology of investors and human behaviour in the context of crises. This study tries to apply the event study methodology to reflect the relationship between the Russia-Ukraine war 2022 and the American stock market volatility by analyzing the fluctuations in the DJIA index.

OBJECTIVE OF THE STUDY

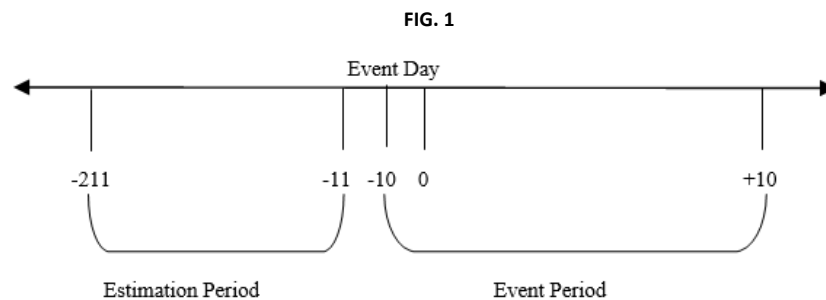
The volatility in DJIA is unambiguous since the market grasped the potential conflict between Russia and Ukraine. While higher oil prices benefited energy shares, they had an adverse effect on consumers and many businesses. The index which was around 36000 in January 2022 has never re-touched that peak till date. As specified in the NPR report there may be some influence from other factors like inflation in the US which is at a 40-year high, the Federal Reserve's decisions to fight inflation, Covid 19 lockdowns, etc. [25]. The purpose of this study is to evaluate the impact of the Russia-Ukraine war on the American Stock Market to demonstrate the comprehensive movement of the stock prices with a focus on the DJIA.

DATA AND METHODOLOGY

This study makes use of event study methodology to analyze the change in the index prices which in turn will reflect how the event of the Russia-Ukraine war has affected the US market returns beyond expectation. The data on the weekly DJIA index values are collected from Yahoo! Finance website for the event window. According to EMH, it is not possible for any participant in the market, to outperform the market by earning abnormal returns as the stock prices quickly adjust to all the publicly available information.

Event day is the day on which a particular event took place, in this study it is the date on which Russia invaded Ukraine (24th February 2022). The estimation period is said to be a normal period preceding the event day in which we believe nothing of significance has occurred in the market to influence the performance. In this study, the estimation period begins 211 days prior to the event date and ends 11 days before (from 26th April 2021 to 8th February 2022). The estimation period is taken as the base for obtaining the average returns in DJIA index values. The event period or the event period, on the other hand, is the period in which we suspect the influence of the event on market performance. Here the event period starts 10 days prior to the event and ends 10 days after (from 9th February 2022 to 10th March 2022).

EVENT STUDY TIMELINE



Hypotheses

For the statistical test conducted the hypotheses are stated as below:

H₀: There is no significant difference between the Abnormal Returns before and after the announcement Russia-Ukraine war in DJIA Index.

H₁: There is a significant difference between the Abnormal Returns before and after the announcement Russia-Ukraine war in DJIA Index.

The null hypothesis is tested for possible rejection, for which purpose Table 1 is used. The values in Table 1 are calculated as follows:

Daily Returns

$$R_t = (P_t - P_{t-1}) / P_{t-1} \tag{1}$$

Where,

R_t = Daily Returns

P_t = Closing DJIA index value of the current day

P_{t-1} = Closing DJIA index value of the previous day as on the table.

Average Abnormal Returns:

$$AAR = R_t - R_x \tag{2}$$

Where,

R_t = Daily Returns

R_x = Expected Returns

R_x = $\sum R_t / n$

Expected returns are calculated for the estimation period.

Cumulative Average Abnormal Returns

CAAR is the summation of all the AARs which depicts the total abnormal returns made before and after the event. CAAR acts as an effective tool of analysis in addition to the AAR by giving a comprehensive picture.

T value

T value (AAR) = AAR/Standard Deviation of AAR

(3)

T value (CAAR) = CAAR/Standard Deviation of CAAR

(4)

TABLE 1: AVERAGE ABNORMAL RETURNS (AAR) AND CUMULATIVE AVERAGE ABNORMAL RETURNS (CAAR) OF DJIA INDEX DURING ESTIMATION PERIOD AND OBSERVATION PERIOD

Date	Day	DJIA	Actual Return	Expected return	AAR	CAAR	t value of AAR	t value of CAAR
Apr 26, 2021	-211	33981.57	-0.00182	0.000233	-0.00205	-0.00205	-0.08323	-0.08211
May 11, 2021	-200	34269.16	0.008463	0.000233	0.00823	0.006178	0.333824	0.247208
Jun 09, 2021	-180	34447.14	0.005194	0.000233	0.00496	0.011138	0.201205	0.445698
Jul 08, 2021	-160	34421.93	-0.00073	0.000233	-0.00097	0.010173	-0.03914	0.407084
Aug 05, 2021	-140	35064.25	0.01866	0.000233	0.018427	0.0286	0.74744	1.144437
Sep 02, 2021	-120	35443.82	0.010825	0.000233	0.010592	0.039192	0.429627	1.568266
Oct 01, 2021	-100	34326.46	-0.03152	0.000233	-0.03176	0.007434	-1.28817	0.297477
Oct 29, 2021	-80	35819.56	0.043497	0.000233	0.043264	0.050698	1.754877	2.028672
Nov 29, 2021	-60	35135.94	-0.01909	0.000233	-0.01932	0.03138	-0.78359	1.255656
Dec 28, 2021	-40	36398.21	0.035925	0.000233	0.035692	0.067072	1.447751	2.683869
Jan 26, 2022	-20	34168.09	-0.06127	0.000233	-0.0615	0.005569	-2.4947	0.222832
Feb 09, 2022	-10	35768.06	0.046826	0.000233	0.046593	0.052162	1.889924	2.087251
Feb 16, 2022	-5	34934.27	-0.02331	0.000233	-0.02354	0.028618	-0.955	1.145136
Feb 17, 2022	-4	34312.03	-0.01781	0.000233	-0.01804	0.010573	-0.73194	0.423073
Feb 18, 2022	-3	34079.18	-0.00679	0.000233	-0.00702	0.003554	-0.28472	0.142193
Feb 22, 2022	-2	33596.61	-0.01416	0.000233	-0.01439	-0.01084	-0.58383	-0.43376
Feb 23, 2022	-1	33131.76	-0.01384	0.000233	-0.01407	-0.02491	-0.57068	-0.99674
Feb 24, 2022	0	33223.83	0.002779	0.000233	0.002546	-0.02236	0.103261	-0.89487
Feb 25, 2022	1	34058.75	0.02513	0.000233	0.024897	0.002533	1.009876	0.101374
Feb 28, 2022	2	33892.6	-0.00488	0.000233	-0.00511	-0.00258	-0.20733	-0.10316
Mar 01, 2022	3	33294.95	-0.01763	0.000233	-0.01787	-0.02044	-0.72472	-0.8181
Mar 02, 2022	4	33891.35	0.017913	0.000233	0.017679	-0.00277	0.717117	-0.11066
Mar 03, 2022	5	33794.66	-0.00285	0.000233	-0.00309	-0.00585	-0.12518	-0.23415
Mar 10, 2022	10	33174.07	-0.01836	0.000233	-0.0186	-0.02445	-0.75432	-0.97829

Closing DJIA index values are recorded for the specified days in both the estimation as well as event period, on the basis of which daily returns are computed. The Average Abnormal Returns are obtained to know if there is any significant difference in abnormal returns between the estimation period and the event period. At the same time, to have a broad-spectrum view of the same Cumulative Abnormal Returns are also found.

The following tables (Table 2, Table 3 and Table 4) display the statistical indicators calculated for the purpose of statistical testing. The null hypothesis stated above was tested for rejection using paired t-test (p-value approach). The p-value and test statistic obtained are 0.062 and 2.056 respectively. As per the method of statistical testing, at a 0.1 (10%) level of significance, the null hypothesis is rejected when $p < 0.1$. The obtained p-value which is less than 0.1 paves the way for us to reject the null hypothesis and conclude that there is a significant difference between the Abnormal Returns of the estimation period and that of the event period on the DJIA Index. It is thus statistically evident that the event of the Russia-Ukraine war did have an impact on the American stock market.

TABLE 2: PAIRED SAMPLES STATISTICS

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Estimation period	.0196	13	.02188	.00607
	observation Period	-.0013	13	.02227	.00618

TABLE 3: PAIRED SAMPLES CORRELATIONS

		N	Correlation	Sig.
Pair 1	Estimation period & observation Period	13	-.383	.197

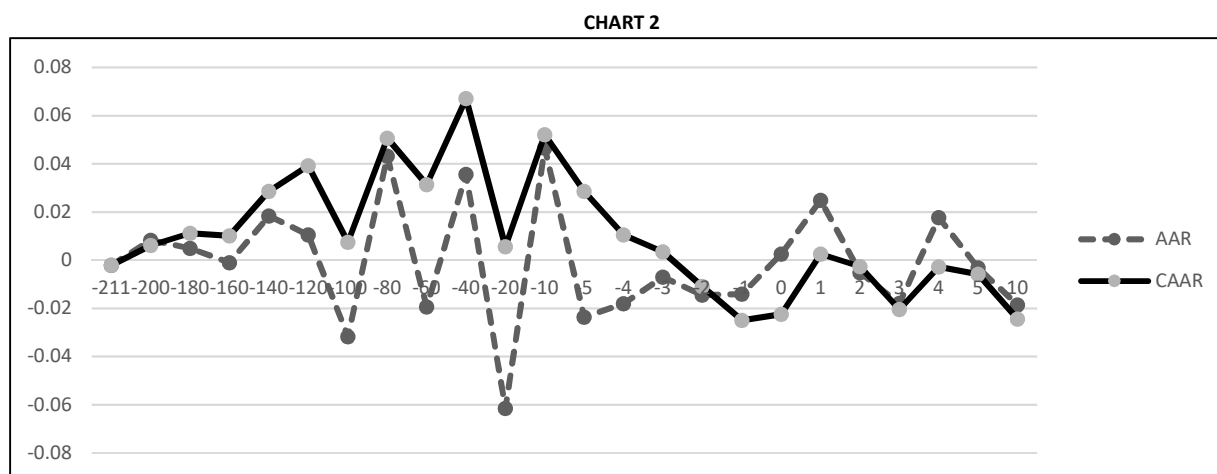
TABLE 4: PAIRED SAMPLES TEST

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	90% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	Estimation period- observation Period	.02093	.03671	.01018	.00279	.03908	2.056	12	.062



Chart 1 portrays the graphical up-down flow of the DJIA index. The horizontal axis represents the days while the vertical axis represents the closing index values. The downward flowing wave displays the plunging performance of the stock market. The index values which reached the height of 36000 in the estimation period collapsed to the range of 33000-34000 in the post-event period, markedly lower than those in the estimation period.

THE CHART SHOWING THE MOVEMENTS OF AAR AND CAAR DURING THE ESTIMATION PERIOD AND EVENT PERIOD



The graphical movements of AAR and CAAR in Fig.2 are a piece of clear evidence regarding the impact of the Russia-Ukraine war on the stock market. Both AAR and CAAR are on a downward trend implying that there are very less, zero or negative abnormal returns during the periods under study. Here the null hypothesis 'CAAR is equal to zero' is rejected at 0.1 (10%) level of significance, indicating that CAAR is not equal to zero and the event of the Russia-Ukraine crisis did impact the American Stock Market Index in a retreating and statistically evident manner.

CONCLUSION

Being the economic indicator of the biggest economy in the world the Dow Jones Industrial Average is affected by the Russia-Ukraine Geographical tensions. The animosity between Russia-Ukraine pronounced due to the launching of a full-scale military invasion by Russia into Ukraine which extended to the rest of the world. It is empirically elucidated in this study as the null hypothesis was rejected at 0.1 level of significance. The fall in the Dow Jones Industrial Average along with the decline in the index values of other stock markets around the world worsened the situation creating a panic among the investors. The fear of world war and the threat of resulting inflation impacted the global economies and stock market performances. As stated in EMH the markets do reflect the available information and change accordingly. In the study rejection of hypothesis and acceptance of alternative hypothesis implies that the Russia-Ukraine has pushed the US stock market to the lower ebb. Thus, it is an illustration of how a market response to the global events as we statistically understand the negative response of Dow Jones index values.

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