Market Reactions to the Russian–Ukraine War: A Global Banking Stock Analysis

Abstract

Purpose– The purpose of this paper is to study the market reactions of the banking industry to the Russian–Ukraine war.

Design/methodology/approach– This paper uses an event study methodology, regression analyses and interaction effects to study the effect of the war on banks stock prices and analyze factors that explain the cumulative abnormal return.

Findings– First, this study finds a significant decline of almost 1.5% in return on the war date. Similar patterns were observed for all continents, but Europe had the most severe drop of about 4%. Second, after excluding the contemporaneous influence of the whole market using the market model, global bank equities returns fell by about 1% on the war date, indicating that bank stocks were more severely impacted by the war than the average stock market. Net-of-market return approach further reveals that bank stock prices decreased 1.4% more on the event day compared to the pre-war market average. Third, the impacts of the war and sanctions were persistent when the war continued. Banks stocks were most hit in Europe, Asia and North America.

Originality/value– This paper pioneers the study of the effect of the Russia–Ukraine war on the banking industry. This paper also analyzes the reaction pattern of bank stocks before, during and after the war to explain the behavior and expectations of investors toward the war.

Keywords: Russian–Ukraine war, Market reactions, Banking stocks, Financial crisis, International finance, Capital market

Paper type: Research paper

JEL codes: C23 • G01 • G21 • G28 • L50 • M4

1. Introduction

The Russia-Ukraine war[1] has heightened global financial stability risks[2] (ECB, 2022) as it harmfully and virtually affects all aspects of economic activities and financing conditions (e.g., energy prices, inflation, economic growth). The situation has worsened in the European countries since the war, and related sanctions further put more pressure on energy and commodity prices[3]. As this region relies heavily on the Russian energy supply, which accounts for approximately 43% of its natural gas and 27% of its crude oil imports in 2020, European financial stability is severely harmed by this rising inflation. Correspondingly, banks and creditors are now tightening their financing conditions, making them struggle with the increasingly indebted firms due to Covid–19 and lowering their own revenue and profits. The banking sector, especially in Europe, has therefore faced weaker profitability (ECB, 2022). In the US, BNY Mellon had a drop of 3% in fee revenue (equivalent to $3.2 billion) in the first quarter of 2022, and $88 million of this loss is caused by the sanctions against Russia[4]. Those banks inescapably confront an increasingly uncertain environment caused by the war, the volatile markets, and persistently higher inflations across countries.

Although there is some evidence of the market reaction to global stocks, we still find a gap in which we can provide new evidence and significantly contribute to the war-related literature. To our knowledge, existing evidence only focuses on non-financial firms' stocks (e.g., Tosun and Eshraghi, 2022; Boungou and Yatié, 2022; Boubaker et al., 2022; Umar et al., 2022b; Yousaf et al., 2022). Unfortunately, they **cannot** be applied to international banking institutions due to their unique intermediation model[5] and central role in some sanctions.

[1] February 24, 2022
[2] https://www.ecb.europa.eu/press/pr/date/2022/html/ecb.pr220525~fa1be4764d.en.html
[3] https://www.ecb.europa.eu/pub/financial-stability/fsr/html/ecb.fsr202205~f207f46ea0.en.html#toc4
[4] https://www.americanbanker.com/list/5-ways-the-ukraine-war-is-impact-the-banking-industry
[5] Mishkin (1999) underlined the crucial role of banks as intermediaries in ensuring the stability of financial markets. Furthermore, banking is a sector with a high level of risk contagion (Gorton, 1985; Iyer & Peydró, 2011;

Indeed what distinguishes banks from non-financial firms is the spill-over effect on global financial and commodity markets (Batten et al., 2022; Choudhury et al., 2022; Hassan et al., 2022b; Hassan et al., 2022b; Karim et al., 2022), as commercial banks play a facilitation role in transactions and providing credit in the modern economy. Under such high uncertainty and the nature of the war crisis, the banking system's ability to withstand the economic repercussions of systemic risk-induced adverse events is even more critical. Hence, severe instability in the banking sector due to the war may be a shock hitting the whole financial system and wreaking havoc on economies worldwide. The above-mentioned crucial role and special characteristics of banks during uncertain times motivate us to investigate the reaction of bank stocks to the war.

The event's impact on banks can be determined using accounting data. However, the mere availability of accounting data at low frequencies, such as quarterly, limits the flexibility to examine the effect pattern of events in a timely manner (Tinoco & Wilson, 2013). On the contrary, stock prices have the advantage of quickly reflecting the systemic risks (Rees, 1995), including information about risk and cash flows that are not included in the financial statements (Hillegeist et al., 2004; Beaver et al., 2005; Agarwal & Tafler, 2008). Therefore, in this study, we focus on the reaction of bank stock prices to the war event.

The market reactions of global banking stocks to the Russian-Ukraine war may be due to several factors, including investors' fear and expectations (Duxbury et al., 2020; & Galloppo, 2018; Liang, 2018) about the war's consequences and market outlook towards this sector [6] [7]. In addition, the literature emphasizes the impacts of inflation on banks' profitability expectations. Specifically, higher inflation heightens the possibility of interest rate

Kaufman, 1994; Slovin et al., 1999). Hence, the response of the banking system to the war event will reveal the financial system's vulnerability as a whole.

[6] https://cepr.org/voxeu/columns/sanctions-war-and-systemic-risk–1914-and-2022

[7] https://www.nytimes.com/2022/02/22/business/banks-russia-sanctions.html

adjustments. As a result, the values of bonds and stocks are expected to diminish following rising interest rates (Ehrmann & Fratzscher, 2004; Malkiel, 1962; Thorbecke, 1997; Tobin, 1978), hence decreasing the value of banks' assets and increasing their risk. The literature has long supported the negative impact of inflation on bank profitability (Kessel & Alchian, 1960; Dermine, 1985; Lajeri & Dermine, 1999).

The Russian-Ukraine war is worth researching because this current event has led to the global coordination of several influential sanctions from different areas, typically the European Union (J.J.Morgan [8]). To date, as mentioned earlier, little academic evidence focuses on the implications of the Russia-Ukraine war event and border disputes on stock markets (Tosun and Eshraghi, 2022; Boungou and Yatié, 2022; Boubaker et al., 2022; Umar et al., 2022b; Yousaf et al., 2022), or the effect of this crisis on the European stock market (Ahmed et al., 2022). However, those studies only cover the general (or non-financial) stock market indices and ignore the effects on banking, which is one of the most influenced sectors by the war. Our present study fills this critical void of war event study.

In addition, our study contributes to the psychological literature on responses to anticipated realities (e.g., Laurin, 2018; Kim & Verrecchia, 1991) by testing the hypothesis that bank stocks react to the anticipated event. By doing so, we found the different reactions of stock return and the war before and after the war event day. Particularly, we investigate if the bank stock market strongly reacts on the war day. The Ukraine-Russia war was not an unexpected event[9]. Brickman (1978) reveals that when an event is anticipated to occur, but its repercussions are still insignificant, people have little psychological conviction that the event will occur. In addition, Laurin (2018) claims that as the probability of an event increases, especially when its

[8] https://www.jpmorgan.com/insights/research/russia-ukraine-crisis-market-impact
[9] http://en.kremlin.ru/events/president/news/67828

consequences begin to emerge, psychological realism will boost rationalization. Consequently, the transition from anticipated feeling to real feeling should cause an increase in people's rational reactions. Hence, people will *strongly respond on the day of the occurrence*.

Our study, the main focus on global banking stocks, significantly contributes to the geopolitical literature and practice of the banking sector (Baur & Smales, 2020; Engle & Campos-Martins, 2023; Sharif et al., 2020). Substantial credit was given to our more in-depth and differential results compared to the studies on non-financial firms' stocks. First, we document a shred of new insightful evidence on the strong reaction of bank stock return to the war on the day of the war. Similar patterns were observed for all six continents, but Europe had the most severe drop in return on the first day of the war. That means we find that not all parts of the world had a similar experience right after the war was begun. Interestingly, we also show the different reactions of the banking sectors to the war news and its related events before, during, and after the war.

Second, we contribute to the current literature on war event and financial market (Tosun and Eshraghi, 2022; Boungou and Yatié, 2022; Boubaker et al., 2022; Umar et al., 2022b; Yousaf et al., 2022; Ahmed et al., 2022) by examining the *magnitude* and *coverage* of the war's effect on bank stocks by focusing on the significance of this fall when market risk is considered. This in-depth analysis shows the standard impact (signs) and, more importantly, the extent of the market reactions on the global banking stocks. To do this, we calculate the abnormal return of the bank stocks using two alternative approaches: the market model (AR1) (Białkowski et al., 2012; Brown & Warner, 1985) and net-of-market return (AR2) (Brown & Warner, 1985). Both methods help capture the performance of bank stocks *after* filtering out the *contemporary movement* of the whole stock market.

Third, we examine the reaction of bank stocks to war-related events from the perspective of behavioral finance, specifically, overreaction (Ardia et al., 2022; Bondt & Thaler, 1987; Lou & Polk, 2022). Europe was the region in which bank stock losses were the most severe. This is consistent with the fact that Europe's economy relies substantially on imports from Russia, particularly energy and commodities. In the event of a war, disruptions to international trade and increased energy costs will directly impact European consumption and production, diminishing the profitability and raising the risks of banks in these nations. The response pattern of European bank stocks mirrors this anxiety. Europe is the area with the strongest evidence of market overreaction on the day of the war and the most robust evidence of market reversal the next day. Our results are consistent with prior literature on investor sentiment and the overreaction hypothesis (Bondt and Thaler, 1985). Existing literature suggests that investor sentiment swings following major-specific events (Edmans et al., 2007; Kadiyala and Rau, 2004), and overreaction is an important part of the price behavior during the crash (Seyhun, 1990). There was also evidence of overreactions and reversals at times of heightened tensions before the war and when oil prices jumped after the war. This suggests that investors in this region are more sensitive to the development and ramifications of Russia and Ukraine tensions.

Finally, we investigate how the war's repercussions have altered investor expectations for bank equities. We are primarily concerned with two war-related effects: the rise in energy costs and the change in currency strength. Our result suggests that, following the war, bank stocks become significantly more susceptible to oil price and exchange rate fluctuations. This finding contributes to the literature on the negative relationship between oil price and stock price during the post-war period (Jones & Kaul, 1996), the positive correlation between market returns and oil demand shocks, and the negative correlation between market return and oil supply shocks (Kilian & Park, 2009; Ready, 2018), the international evidence of oil shocks impacting stock markets (Basher and Sadorsky, 2006; Ftiti et al., 2016; Umar et al., 2022a), the impact of oil price on bank profitability (Poghosyan & Hesse, 2009; Ma el al., 2021). We also find evidence that bank stocks in Europe, Asia, and South America were more sensitive to the exchange rate swings following the war. This result is in line with the documented close association between stock performance and exchange rate risk in the literature (Dornbusch and Fischer, 1980; Phylaktis and Ravazzolo, 2005; Kinateder et al., 2021), the tightening relationship around the period of crisis (Phylaktis and Ravazzolo, 2005). We also provide more international evidence for the literature on banking exposure to exchange rate risk (Chamberlain et al., 1997; Martin and Meuer, 2003). Overall, our findings suggest that energy prices and fluctuations in exchange rates could be the channels for the effects of war and sanctions to spread to bank stocks.

The remainder of the paper is organized as follows. Section 2 describes the data and sample construction. Section 3 introduces the methodology and variable definitions. Sections 4 and 5 present our main findings and potential channels for transferring the war impact to bank stock returns. Section 6 concludes our paper.

2. Data and Sample

Our study employs data from four sources: media outlets, Refinitiv Datastream, Refinitiv Eikon, and Barchart. We acquire relevant information about the Russia-Ukraine war event from many trustful sources on the internet [10] and multiple-check for validation. Accordingly, we assume the official announcement time for the war is when Putin declared the "special military operation" against Ukraine via televised broadcasting just before 6 a.m., Moscow time, on February 24, 2022. At this time, the stock markets in Oceania and Asia are still open for trading on February 24, while the markets in North America, South America, Europe, and Africa are already closed for trading on February 23 and preparing to open for the next trading day. Hence, we define the first trading day following the war as February 24, 2022, across the globe.

[10] The New York Times, WHO, ...

Next, we obtain the commercial bank stock data from Refinitiv Datastream. This data source provides us with 2316 commercial banks from 90 markets covering six continents: Europe, Asia, North America, South America, Oceania, and Africa. We do not include Russian banks in our sample since we are primarily concerned with the impact of the war on bank stocks in countries that are not directly involved in this war. Table 1 reports the descriptive statistics of our sample, including investigated markets, their regions, continents, and the number of commercial banks examined in each market.

[Insert Table 1 about here]

To measure abnormal returns, we gather market returns data from Refinitiv Eikon. Market return for each market is proxied using the most commonly used benchmark index´s return in this market. Next, we control for the impact of coronavirus by employing the daily number of new data cases retrieved from the WHO website. Due to the timing of the Covid–19 outbreak and the war, we restrict our sample from January 2020 to April 2022. Further, we gather sanction information from the internet to examine the effects of the major sanctions. Our study also considers the impact of the war via the fluctuation in energy prices proxied by the WTI crude oil price and the ups and downs of currency power measured using the exchange rate for each market. The crude oil price and exchange rates data are collected from Barchart.com®.

3. Event study methodology and variable definitions

We follow the approach of Fama et al. (1969) to investigate the impact of the war event on bank stock returns. We measure each bank stock's abnormal return using two different methods: the market model (Białkowski et al., 2012; Binder, 1998; Campbell et al., 2012; Abudy et al., 2022) and the net-of-market return (Brown & Warner, 1985; Campbell et al., 2012; Abudy et al., 2022).

Following the market model approach, we estimate the expected returns by regressing each actual stock return series on the corresponding market return. To prevent the confounding effect of the covid–19 pandemic fear and vaccine distribution event at the end of 2020, we restrict our sample to start from March 2021. Specifically, the market model is estimated from 230 days to 11 days before the war. Based on the estimated result, the abnormal return of each stock is measured as follows:

$$AR_{i,t}^{(1)} = R_{i.t} - (\hat{\alpha}_i + \hat{\beta}_i . R_{m,t}) \tag{1}$$

where $R_{i.t}$ is the actual return of stock *i* and $R_{m,t}$ is the corresponding market return on the day *t*. $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the coefficients estimated from the market model.

The second method, net-of-market return, measures the abnormal returns as the difference between actual return against the average historical market return (Brown & Warner, 1985). The literature has documented potential day-of-week seasonality patterns in stock prices, such as the Monday effect (French, 1980; Kamara, 1997) or the weekday effect (Ke et al., 2007; Doyle & Chen, 2009). To account for this potential weekday effect, we measure the abnormal return of a stock as the difference between the actual stock return and the average corresponding historical market return on the same weekday. Formally, we calculate the following specification:

$$AR_{i,t}^{(2)} = R_{i.t} - \bar{R}_{m,\text{ same weekday between T}-11\text{ and T}-230} . \tag{2}$$

To reduce the idiosyncratic movement of each bank stock return, we compute the daily global or regional average abnormal return (AAR) as the average abnormal return of all bank stocks worldwide or in the examined region. Specifically,

$$AAR_t = \overline{AR}_{i,t} \tag{3}$$

Further, we also calculate the cumulative average abnormal return (CAAR) from the day t_1 to day t_2 as the sum of the daily average abnormal return within this time window. The CAAR analysis is necessary because it helps reveal how long the event influences bank stocks' returns.

$$CAAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AAR_t \tag{4}$$

4. Main results

4.1 Bank stocks' return movement following the war event.

We begin our analysis by examining the movement of the bank stock return throughout the sample period. We also employ the Hodrick-Prescott (HP) filter to better capture bank stocks' performance patterns and separate long-term trends from short-term fluctuations. Figure 1 depicts the movement of all commercial banks' returns for the entire world and each region from January 2020 to April 2022. The blue line shows the average bank stock return, while the red line represents the long-term trend obtained using the HP filter.

[Insert Figure 1 about here]

It can be seen from Figure 1 that the bank stock return around the world reacted to the war event. During 2020, global banking stocks witnessed a tumultuous period. From the beginning of 2021, the return volatility pattern appears more stable with a flatter long-term trend line. However, there was an abrupt drop in return on the day of the war. This average decline of almost 1.5 percent is severe compared to the market's moves at the beginning of 2022 and the pattern over the last year. This indicates that the market's precipitous decline on February 24, 2022, was most likely triggered by the day's incident.

Similar patterns were observed for all six continents. Amongst them, Europe had the most severe return decline on the first day of the war. The average return of bank stocks fell more than 4%, becoming the most profound fall since mid–2020. Notably, European banking stocks have relatively low volatility in 2021, with a maximum average drop of no more than 2%. Compared with other regions, Europe is the market with the strongest bank stocks' reaction in both magnitude and comparison with the preceding trend. The strong market reaction on the day of the war lends credence to the notion that expectations for European bank equities are highly sensitive to this war.

The fear of the war's repercussions might explain the strong reaction of European bank stocks. Western nations had threatened Russia with sanctions if the war materializes. These sanctions are anticipated to significantly impact numerous European banks conducting international banking activities related to Russia. In addition, war and sanctions increase concerns of disruptions in international trade, escalating commodity prices, and increasing financial instability. These factors potentially influence the future cash flow and risk of banks. The reaction of the market to bank stocks is not limited to Europe. Oceania and Asia also experienced a sharp drop in bank stocks' returns on the first day of the war. North American bank stocks showed a noticeable but weakest reaction across the region. South America and Africa also saw marked declines in bank stocks' performance on the day of the war. In general, bank stocks on the six continents all saw steep decreases on the day of the war. These losses are extreme compared to the trend of fluctuations over the preceding year. This suggests that the Russia-Ukraine war considerably impacts investor sentiment towards bank stocks. This impact has a worldwide scope and is strongest in the European region.

4.2 The magnitude and coverage of the war's effect on bank stocks worldwide.

The decline in actual bank stocks' returns implies the war's impact on the bank stocks. To facilitate this analysis, we calculate the bank stocks' abnormal return using the market model (AR1) and net-of-market return (AR2). Table 2 reports the average abnormal returns (AAR) of bank stocks on the first day of the war for the entire world and six continents. This table also presents the test result for whether the AARs for the globe and each area are different from 0.

[Insert Table 2 about here]

Panel A of Table 2 reports the average abnormal returns from the market model. On the war day, global bank stock returns plummeted by around 1%. This decline is statistically significant, with a t-stat of –8.85, implying that bank stocks, in general, were further affected by the war, adding to the effect of the overall market decline. Panel B of Table 2 displays the net-of-market abnormal return. The results show a similar result compared to the market model approach; bank stocks worldwide fell 1.4% deeper on the day of the war with a t-stat of –17.63. These results from the average abnormal return from both methods are consistent with the downward trend in bank stock returns in Figure 1.

Table 2 also depicts the widespread impact of the war on various geographical areas. In all continents, significant drops in average abnormal returns were recorded. Regardless of the methods employed, Europe is always the hardest-hit region. Bank stock returns in Europe significantly fell 2.17% or –4.146% on the event day according to the market model or the net-of-market abnormal return approaches. This decline supports the view that investor sentiment towards European bank stocks is very vulnerable to war. Noticeably, the drops in returns in Europe were always about double Asia, the second-most affected region.

Furthermore, to investigate whether this event has a large-scale impact on most banks or only focuses on some banks, we calculate the percentage of banks with negative abnormal returns. Table 3 reports the results for all regions. The results reveal that over 94% of banks worldwide had returns below the market average in the pre-war period, and Europe is still the most affected region, with more than 90% of banks being hit on the war day. When the market influence is removed, 43% of banks had negative abnormal returns.

[Insert Table 3 about here]

4.3 How did bank stocks react to the war, war-related news, and the persistence of reaction?

The sharp drop in bank stock returns on the first day of the war illustrates the sensitivity of bank stocks to this event. However, there are some concerns over the market response. First, did fear of the war's consequences affect investor sentiment before the war started? Second, if this war is anticipated, is the reaction of bank stocks on the war event day purely an overreaction of the market or a correction of the expectation of bank stocks when the war materialized? To address these concerns, we calculate the abnormal return of bank stocks from 10 days before the war event to 10 days after. Table 4 reports the results for all areas.

[Insert Table 4 about here]

In the ten trading days before the war, bank stocks experienced both price increases and decreases. However, the average gains and losses in the global bank stocks over the ten days before the war are relatively small, ranging from –1.41% to 0.2%. This indicates that the drop on February 24 is not due to the continuation of the trend in the last ten days but is highly likely due to the day's event. The same pattern was observed in all six continents when the drops on the war day were extreme compared with the fluctuations in the last ten days.

The war between Russia and Ukraine does not come as a surprise to the market. Fear of this war existed already. Between late 2021 and January 2022, Russia sent troops close to the Ukrainian border, raising worries of an imminent war. From this time forwards, the United States and its Western allies warned about sanctions against Russia. In addition, the impasse over settling a diplomatic solution to the Russia-Ukrain conflict fueled fears of consequences if war started. On February 14, the United States closed its embassy in Kyiv, heightening concerns that war was inevitable. On the same day, the White House also broadcasted a message that the war could happen anytime. The prospect of this impending war severely impacted the markets on the same day. Table 4 demonstrates that bank stocks performed poorly in most areas on February 14. The AAR for European bank stocks was the lowest, at –0.71% (t-stat = –10.36), further than the impact of the whole market. The same day, Asia, North America, and South America also experienced significant negative abnormal returns. Due to being in the earliest time zone, Oceania's market reacted a day later, while African bank stocks exhibited no considerable reaction.

A similar reaction was witnessed on February 22. On February 21, tensions escalated when Russia recognized the independence of two regions in Ukraine, followed by a series of sanctions imposed by Western countries in late February 21 and the following days. Rising tensions and the series of sanctions made the market react more negatively on February 22. Energy prices surged on February 22 after Russia sent troops into eastern Ukraine. Europe and other regions that support imposing sanctions on Russia are under pressure from disruptions to international trade and inflation resulting from higher energy and commodity costs. These consequences are harmful to the profitability of banks. Pressure from rising commodity prices also affects regions with high importing levels, such as Asia. AARs of –0.5% (t-stat = –3.28) in Asia, –0.14% (t = –2.31) in Europe, and negative for all remaining areas reinforce the view that bank stocks reacted more severely than the market to the fear about the consequences of escalating tensions.

In Europe and North America, two regions confronting Russia in the wake of Russia-Ukraine tensions, the net-of-market return approach revealed predominantly negative abnormal returns in the ten days before the war. This demonstrates that investors hold a grim view of bank stocks relative to the prior market's average performance. In other regions, except for two conflict escalation events that caused adverse market reactions on February 14 and 22, bank stocks had outperformed average historical market benchmarks on many days. This indicates that investor sentiment is more persistently affected in regions implementing significant sanctions against Russia. The distinction between Europe and North America is that Europe is significantly dependent on the Russian energy supply and engages in a wide range of banking activities relating to Russia. A confrontation with Russia under these conditions might have devastating effects on the European banking sector. The findings indicate that after removing the market trend for ten straight days before the war, AAR in the European region was overwhelmingly bearish. In North America, the AAR derived from the market model swung between negative and positive values, showing that U.S. bank stocks largely followed the market. In the ten days before the war, Asian bank stocks did not have many worse-performing days than average market performance in the past, except for the market reaction on February 14 and 22. However, after excluding market movement, AAR has persistently negative values for eight days before the war. This shows that Asian banks are more sensitive to the effects of tensions between Russia and Ukraine than the entire stock market.

Shortly after the official commencement of the war, the removal of Russia from the SWIFT financial messaging system by the United States and Western nations caused a temporary interruption of the worldwide payment system with Russia. This disruption could impact the European banking sector as it becomes momentarily more difficult to get back the loans in Russia. This sanction was implemented on Saturday, February 26. During the weekend and market opening on Monday, several sanctions were implemented. The aggregated effect of these sanctions was reflected in the markets on February 28. On this day, Europe, Asia, North America, and Oceania all responded negatively to bank stocks. However, only Europe and Oceania had negative and statistically significant AARs from the market model at –0.38% (t-stat = –3.92) and –0.59% (t-stat = –2.27), respectively. This indicates that bank stocks in these two regions may be affected by the disruption in the payment system. However, the 0.38% decline in Europe is not as significant as the declines in prior days. This highlights the market's sustained confidence in the soundness of the European banking system. On the 1st and 2nd of March, all regions saw at least one day of negative AAR. The AAR of European banks was negative at –0.98% on March 2 (t-stat = –10.84). Asian banking stocks also have a negative AAR at –0.55% (t-stat = 5.29). These are the steepest price falls since the beginning of the war. On the two days of March 1 and 2, the majority of the sanctions announced were smaller than those introduced on the three days of February 26, 27, and 28. However, the decrease in the first two days of March was more remarkable. This indicates that bank stocks may not react directly to the sanctions.

Before the war, bank stocks reacted severely on the days when the conflict escalated. However, if the market had sufficient time to think about the conflict's repercussions, the continuous imposition of sanctions against Russia after the war might not heighten market anxiety. Notably, the decline in the first two days of March coincided with the sharp rise in energy prices. This association is comparable to when bank stocks dropped significantly around the war event day. This finding suggests that bank stocks may be susceptible to swings in energy prices, one of the most significant economic ramifications of the war. Figure 2 depicts the daily change in AARs from 10 days before the war event to 10 days following. We also plotted the yield on WTI oil front-month futures to proxy for the energy price change. AARs tend to move in a very similar direction across the regions. This indicates that the war might trigger a synchronized impact on global bank stocks. Before the day of the war, the opposite movements could be observed between the AARs and the oil price, but this pattern was not apparent. As soon as the war formally began, the movement of AARs in all regions became strongly connected to oil price variations. When the price of oil rose sharply, bank stocks fell significantly relative to the overall market level and vice versa. This result shows that energy prices may significantly explain investors' expectations for bank stocks.

[Insert Figure 2 about here]

The difference in the reaction of bank stocks before, during, and after the day of the war reflects the difference in investor reaction patterns at different times. We find that these results are well supported by the theory of response to anticipated realities introduced by Laurin (2018). As mentioned, this war is not an unexpected event for investors. Hence, what is the psychology of investors before the event occurs? Brickman (1978) suggests that, with predictable events, people initially have little psychological belief that the event will happen. People will tend to limit their response even if the possible consequences are predictable, especially when these consequences are unclear and the probability of the event occurring is still low. Psychological studies mention this response pattern as "status quo bias" (Kahneman et al., 1991). Laurin (2018) indicates that only when the event's probability increases, and the events' consequences become more significant, psychological realism make people more rational and promotes the response. This matches the market reaction when tensions between Russia and Ukraine escalate and, therefore, sharply increases the probability of war. Laurin (2018) also implies that when the event occurs, the feeling of the possibility of the event becomes irrefutable. As a result, on the event day, people no longer delay their responses from suspecting the occurrence and start to update their behavior following the rational expectation. After the event, people tend to react more rationally to updates on consequences. This explains the market's reaction to the sharp oil price increase following the war.

4.4 Reaction to the war event: short-term or persistent?

Table 5 presents the cumulative average abnormal return (CAARs) of bank stocks worldwide and on six continents. The CAARs (–10,–1) worldwide from the market model and net-of-market return are –1.11% (t-stat = –13.25) and –0.2% (t-stat=–0.779), indicating that that bank stocks in the ten days before the war did not significantly deviate from the market trend. Examining the performance trends of bank stocks across several areas reveals that they vary by region. European and Asian bank stocks underperformed the historical and overall market trends. South America and Oceania, meanwhile, outperformed both the historical market average and the current market performance.

[Insert Table 5 about here]

However, no matter how the bank stocks performed before the war, these stocks were still heavily hit when the war began. After subtracting market trends, CAARs between the first day of the war and the ten following days are negative for all regions. Statistically, this bearish pattern is significant only in Europe, Asia, North America, and South America, indicating that bank stocks had been severely affected only in these four regions by the war and sanctions. Observing the shift in CAAR when the time window is extended from 3 days to 5 days, 10 days, and 20 days after the war reveals the increasingly negative CAARs in Europe, Asia, and North America. This result suggests that investor sentiment towards bank stocks in these three areas worsened as the conflict continued. In contrast, according to the market model, South America, Oceania, and Africa have insignificant CAAR(0,20), implying that the prolonged conflict exerts no additional pressure on banking stock prices beyond the market movements in these three locations.

5. Potential channels transferring the war impact to bank stocks' returns.

In this section, we will explore the impact of two significant war consequences: (1) fluctuations in energy prices due to sanctions aimed at Russia and (2) changes in currency values due to disruptions in international trade and rising inflation. The price of energy has the potential to alter banks' profit projections. First, increased energy prices will increase corporate expenses and fuel inflation. Inflation due to the supply side will likely lower consumption and increase corporate risk. These impacts will diminish the loan demand and increase the credit risk for banks. When inflation rises and international trade is hindered, imports and exports will be harmed, influencing the exchange rate. Exchange rate risk is one of the major concerns for banks, particularly those with active international banking operations. Since exchange rates are often difficult to predict, the market may be more sensitive to these rate fluctuations caused by the aftermath of this protracted war. The link between oil price fluctuations and stock prices is well documented in the literature (Basher & Sadorsky, 2006; Ftiti et al., 2016; Kilian and Park, 2009; Ready, 2018). Ready (2018) shows that the stock market reacts differently to oil price shocks from the supply and demand sides. Accordingly, demand-side shocks are positively correlated with market returns, while supply-side shocks exert opposing effects. Jones and Kaul (1996) also emphasize that world stock markets react more strongly to oil price shocks after the war. This corresponds to the change in real future cash flows and the updates in expected return. The literature also suggests the connection between stock prices and exchange rate shocks (Dornbusch and Fischer, 1980; Phylaktis and Ravazzolo, 2005). This association also becomes stronger at times of high market uncertainty, such as during periods of crisis (Phylaktis and Ravazzolo, 2005).

We employ the front-month WTI oil price return to proxy for the change in energy prices and the percentage change in exchange rates to reflect exchange rate risk. We use each country's domestic currency for the U.S. dollar exchange rate. Accordingly, an increase in the exchange rate implies an appreciation of the local currency relative to the U.S. dollar. For the U.S., we use the U.S. Dollar Index to gauge the strength of the U.S. dollar. As a result, the percentage change in the U.S. Dollar index will be used to replace the change in the exchange rate for the case of the U.S. To assess the sensitivity of bank stocks to energy prices and exchange rates, we regress bank stock returns on the oil return and percentage change in exchange rates. We include a post-war dummy variable to examine the overall decrease of bank stocks after the war and the interaction of this post-war dummy variable with oil return and the percentage change in the exchange rate to analyze the update in investor expectations after the war. The specific regression equation is as follows:

$$r_{i,t} = \alpha + \delta_1.war_t + \delta_2.post\_war_t + \beta_1.Mkt\_return_t + \beta_2.Mkt\_return_t.post\_war_t + \gamma_1.Oil\_return_t + \gamma_2.Oil\_return_t.post\_war_t + \theta_1.exrate\_change_t + \theta_2.exrate\_change_t.post\_war_t + F(control_t) + u_t \quad (5)$$

where war_t is the war event dummy taking the value of 1 on February 24; $post\_war_t$ is the dummy variable taking the value of 1 after February 24. Mkt_return_t is the return of the benchmark dedicated for each market. Oil_return_t and $exrate\_change_t$ are the return of the front-month WTI oil futures and the percentage change in the exchange rate corresponding to each market, respectively. In this function, we use a set of control variables. First, we control for the country-fixed, year-fixed and day-of-week fixed effects. Second, we add the covid–19 sensitivity of each market to filter out the impact of the covid–19 pandemic on bank stocks. To measure this variable, we employ the dynamic linear model to regress the market return on the number of new covid-case reported for the previous day in each country. By this method, we get each market's time-varying coefficient of new covid cases. This time-varying load help capture better how the market responded to the covid situation at different times. We run the regression for the period from January 2020 to April 2022.

Table 6 presents the regression results for the whole world and each region. For each area, we report the results of three regression models. Model (3) contains all variables represented in Equation (5). Model (1) substitutes the post-war dummy variable with the dummy for the second trading day. Neither Model (1) nor Model (2) contain interaction variables. Model (1) in Table 6 shows that the impact of the war event is comparable to the AARs reported in Table 2, with negative coefficients of the war dummy for all regions. The only region where this effect was not statistically significant was Oceania.

Similar to Table 2's findings, Europe was the most affected region on the first day of the war. Model (1) supports the results in Table 4 that Europe is the only region witnessing the overreaction of bank stocks when controlling for market movement. In Europe, the coefficient of the dummy variable for the second trading day is 0.733% (t-stat = 8.06). Looking at the results in Models (2) and (3), overall bank stock returns worldwide were about 0.13% lower after the war. Only Europe, Asia, and North America were the regions where the decline in banking stock returns was statistically significant after the war. Asia experienced the greatest fall of the three regions, 0.13% (t-stat = 3.70). Europe and North America suffered average drops of approximately 0.1%. The post-war dummy is not statistically significant in South America, Oceania, and Africa. This result implies that the war's outcome only changed the average expectations of bank stock returns in Europe, Asia, and North America. Examining the coefficient of the interaction variable between market returns and stock returns reveals that bank stocks in Asia, North America, and Africa are less correlated with the market after the war. Next, we will discuss the potential impacts of energy prices and exchange rates on bank stocks after the war.

[Insert Table 6 about here]

5.1. Energy price

Model (3) in Table 6 shows that banking stocks worldwide generally react negatively to oil return; the coefficient of oil return before the war is around –0.001 (t-stat = 3.68). However, this negative response level is not uniform across all regions. Europe, Asia, North America, and Oceania were regions that responded favorably to rising oil prices before the war. A 1% increase in oil return corresponds to a bank stock increase of approximately 0.002% in Europe, 0.005% in Asia, 0.004% in North America, and 0.016% in Oceania. This reaction of bank stocks is not neglectable because the oil price tends to swing much more than the stock prices.

In contrast, South America and Africa respond negatively to an increase in oil return. Europe, Asia, North America, and Oceania are regions where developed countries and large developing economies are concentrated. Therefore, the market's reaction might greatly influence the economy's outlook. In this analysis, we use the sample from January 2020, the same time as the pandemic's onset. In 2020, travel restrictions and lockdowns caused demand for energy to plummet, leading to a sharp drop in oil prices. Since the distribution of the covid vaccine started, these restrictions were also relaxed; businesses gradually returned to normal operations, boosting oil demand and prices. Before the war, when the covid crisis still influenced investor sentiment, rising oil prices indicated an economic recovery. This is beneficial for banks. Our result is consistent with Ready (2018) that oil price change induced from the demand side positively correlates with stock market performance.

However, since the war began, the increase in oil prices has not reflected the market's recovery but rather the war and sanctions. High oil prices raise prices in most countries and drive inflation. In the context of high inflation in most nations, a further rise in inflation will exacerbate financial instability and directly impact banks' outlook. Except for Africa, which has responded negatively to rising oil prices since before the war, other regions have experienced a substantial shift in the reaction of bank stocks to oil return since the beginning of the war. The coefficients of the interaction variable between the oil return and the post-war dummy are all negative and statistically significant in Europe, Asia, North America, and Oceania. Notably, this negative coefficient is several times more than the positive association before the war. This result indicates that, since the day of the war, all positive association between oil return and bank stock returns has been fully reversed. Furthermore, the substantial correction in the reaction of bank stocks to oil return suggests that this war has made bank stocks highly sensitive to swings in energy prices. This pattern is in line with the literature on oil price supply shock negatively impacting the stock markets (Kilian & Park, 2009; Ready, 2018).

5.2. Exchange rate

When examining the effect of exchange rate fluctuations on bank stocks, the results in Table 6 reveal different patterns across continents. Only Europe and Asia have statistically significant correlations between stock returns and exchange rate changes among the regions reported. There is no evidence supporting bank stocks' response to exchange rate changes before the war in other areas. After the war, however, bank stocks had a different relationship with the exchange rate, as shown by the regression results. The findings indicate that bank stocks worldwide became more susceptible to fluctuations in exchange rates following the conflict. The coefficient of the interaction variable at 0.485 (t-stat = 40.53) implies that a faster decrease in the value of the domestic currency will reflect negatively on the bank stocks' performance. This pattern is observed for most continents, with statistically significant adjustments in Europe, Asia, South America, and Africa. This result also implies that, since the war, bank stocks have become more sensitive to exchange rate changes. In other words, the war tends to increase the relevance of exchange rate risk for the outlook banking sector. Our finding highlights the importance of managing exchange rate risk in the banking system, adding to the literature on foreign exchange rate impacts on bank stocks (Choi et al., 1992; Wetmore & Brick, 1994; Chamberlain et al., 1997; Martin & Mauer, 2003). As the literature has documented the direct effect of exchange rate on expected future cash flows of banks via the change in international assets and liabilities, international service fees, and off-balance sheet activities (Martin & Meuer, 2003), and the indirect effects via the impacted cash flows of banks' customers and fund providers (Chamberlain et al., 1997; Martin & Meuer, 2003), the exchange rate is not only a story dedicated to banks engaging in international banking activities but also for all other domestic banks. Our finding implies that no conner in the banking system might be immune from exchange rate shocks caused by international adverse events.

6. Conclusion

Our research investigates the impact of the Russian and Ukrainian wars on global bank stocks. Using data from 2,341 commercial banks in 91 countries, we show that bank stocks globally fell by an average of 1.5% on the first day of the war. Europe is the most affected region, experiencing a decline of around 4%. This result suggests the extreme sensitivity of the European banking sector to the expected repercussions of the war. Additionally, our event study reveals that the war significantly influenced the bank's shares, with the decline being considerably more profound than the average stock market movement. Since banking is the sector that ensures the financial system's stability, the reaction of bank stocks indicates the market's expectation regarding the risk of bank stocks, consequently indicating the stability of the entire financial market. Further, the war between Russia and Ukraine could also serve as a stress test for the global banking system. According to our findings, Europe, Asia, and North America are the most susceptible to shocks from an international adverse event.

The reaction pattern of bank stocks before, during, and after the war also revealed the behavior and expectations of investors towards war-related developments. Before the war, we found that bank stocks reacted aggressively only when the likelihood of war soared. This reflects the psychological nature of investors against anticipated events. Before the war, investors tended to delay their responses based on their expectations. As a result, investors reacted forcefully on the day of the war to correct the price, as expected by the market. The response of investors following the war also demonstrates the markets' rational adjustments to the observable consequences of the war and related sanctions. From the behavioral finance perspective, our research also shows that investors overreact to associated events in the most affected areas, adding to the rational responses to the expected impacts of the war. This implies that adverse events also trigger market participants' behavioral biases.

Our research has several implications for investors, portfolio managers and policymakers when designing effective financial strategies by showing the close relationship between war, geopolitical risk, the banking sector, the energy sector and the stability of the whole financial system. First, Ukraine – Russia war has a significant implication for oil prices and exchange rates during the uncertain period, especially in the long term. As discussed above, we find that fluctuations in energy prices and exchange rates are two serious consequences of the war that could significantly impact market expectations for bank stocks, a proxy for the perceived soundness of the financial system. The findings reveal that since the beginning of the war, bank stocks have been highly susceptible to oil supply shocks that worsen inflation or exchange rate risks. This vulnerability could substantially impact the effectiveness of macroeconomic policies designed to curb inflation and stabilize financial markets. Observing the market's reaction to the war's consequences might be instructive for the financial system's risk management. Second, this paper also highlights the effect of oil-dependent of European countries on Russia during the uncertain time, addressing a need for less the EU's dependence on imported fossil fuels and more actions for affordable, secure energy. Third, the Ukraine-Russia war and its related sanctions also point out the need to consider business cycle implications of political disruptions and the possible damage to trade relationships between countries in general and banks in particular.

This study only considers investors' expectations of the banking system around the war event. The reaction of bank stocks to the war could imply public confidence in the banking system, which is an important factor in systemic risk management. Further research might continue to investigate the direct impact of the war and its consequences on the profitability and risk of banks using accounting data. We leave the question of how the sensitivity of the banking system reflects the vulnerability of the entire financial market to international adverse events for future studies.

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Figures

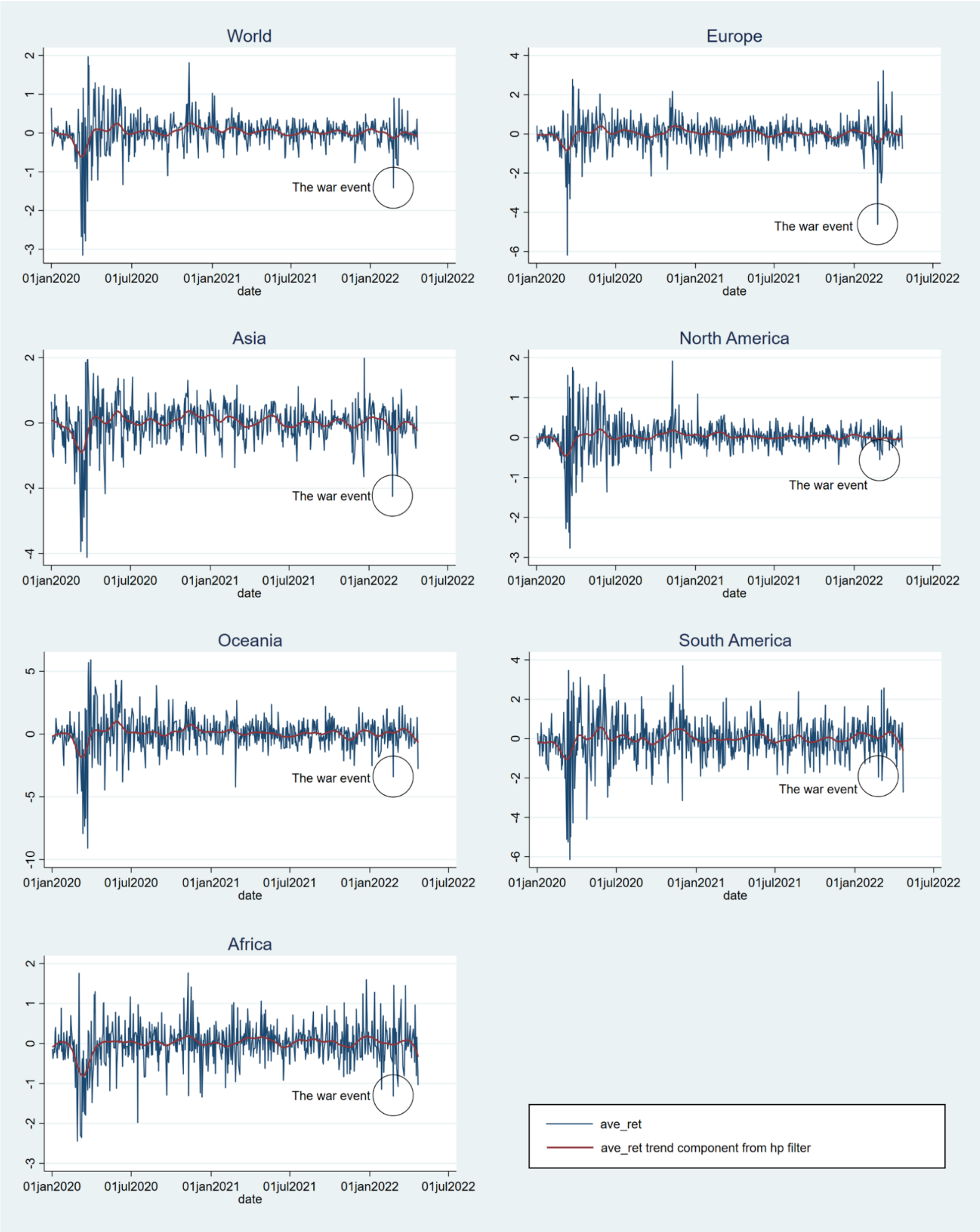

Figure 1: Bank stock returns movement around the world since 2020

This graph depicts bank stock returns´movements from January 2020 to April 2022 for six continents and the whole world. The blue line represents banks' average daily returns. The red line presents the movement of the long-term trend in the graph. We employ the Hodrick–Prescott filter to separate the long-term trend of stock returns from the short-term noise.

Figure 2: Oil returns and Average abnormal returns of bank stocks around the war.

This figure illustrates the association between the movement of crude oil return and the abnormal returns of bank stocks in six regions from 10 days before the war event to 10 days following. The graph above reflects the movement of oil return calculated for the WTI front month crude oil contract. The graph below shows the movement of average abnormal returns in bank stocks for six continents. The abnormal return in this graph is calculated from the market model.

Tables

Table 1: List of sampled markets, their locations, and the number of surveyed banks.

This table lists all markets included in this study's sample. For each market, we provide information about the respective continent, the corresponding geographical region in each continent, and the number of banks present in the sample. This study uses data from all commercial banks available on Refinitiv Datastream.

Market name	Continent	Region	No of banks	Market name	Continent	Region	No of banks
Kenya	Africa	Eastern Africa	2	Bulgaria	Europe	Eastern Europe	1
Mauritius	Africa	Eastern Africa	2	Czech Republic	Europe	Eastern Europe	3
Malawi	Africa	Eastern Africa	4	Hungary	Europe	Eastern Europe	2
Rwanda	Africa	Eastern Africa	1	Poland	Europe	Eastern Europe	14
Tanzania	Africa	Eastern Africa	3	Romania	Europe	Eastern Europe	3
Uganda	Africa	Eastern Africa	1	Slovakia	Europe	Eastern Europe	4
Zambia	Africa	Eastern Africa	2	Denmark	Europe	Northern Europe	22
Egypt	Africa	Northern Africa	4	Estonia	Europe	Northern Europe	1
Morocco	Africa	Northern Africa	3	Finland	Europe	Northern Europe	12
Tunisia	Africa	Northern Africa	3	United Kingdom	Europe	Northern Europe	19
Botswana	Africa	Southern Africa	2	Ireland	Europe	Northern Europe	2
Namibia	Africa	Southern Africa	2	Iceland	Europe	Northern Europe	5
South Africa	Africa	Southern Africa	8	Lithuania	Europe	Northern Europe	1
Benin	Africa	Western Africa	1	Norway	Europe	Northern Europe	35
Ghana	Africa	Western Africa	4	Sweden	Europe	Northern Europe	7
Nigeria	Africa	Western Africa	8	Bosnia and Herzegovina	Europe	Southern Europe	8
Togo	Africa	Western Africa	1	Spain	Europe	Southern Europe	24
Kazakhstan	Asia	Central Asia	11	Greece	Europe	Southern Europe	11
China	Asia	Eastern Asia	23	Croatia	Europe	Southern Europe	9
Hong Kong	Asia	Eastern Asia	6	Italy	Europe	Southern Europe	50
Japan	Asia	Eastern Asia	53	Montenegro	Europe	Southern Europe	5
South Korea	Asia	Eastern Asia	22	Macedonia	Europe	Southern Europe	4
Taiwan	Asia	Eastern Asia	14	Malta	Europe	Southern Europe	2
Indonesia	Asia	S.E. Asia	33	Portugal	Europe	Southern Europe	10
Malaysia	Asia	S.E. Asia	9	Serbia	Europe	Southern Europe	10
Philippines	Asia	S.E. Asia	12	Slovenia	Europe	Southern Europe	2
Singapore	Asia	S.E. Asia	7	Austria	Europe	Western Europe	13
Thailand	Asia	S.E. Asia	23	Belgium	Europe	Western Europe	5
Viet Nam	Asia	S.E. Asia	25	Switzerland	Europe	Western Europe	30
Bangladesh	Asia	Southern Asia	8	Germany	Europe	Western Europe	27
India	Asia	Southern Asia	32	France	Europe	Western Europe	21
Sri Lanka	Asia	Southern Asia	4	Luxembourg	Europe	Western Europe	2
Pakistan	Asia	Southern Asia	8	Netherlands	Europe	Western Europe	5
United Arab Emirates	Asia	Western Asia	8	Jamaica	N. America	Caribbean	1
Bahrain	Asia	Western Asia	4	Mexico	N. America	Central America	17
Cyprus	Asia	Western Asia	1	Canada	N. America	Northern America	9
Israel	Asia	Western Asia	4	United States	N. America	Northern America	1436
Iraq	Asia	Western Asia	11	Australia	Oceania	Australia	10
Jordan	Asia	Western Asia	2	Argentina	S. America	South America	9
Kuwait	Asia	Western Asia	4	Brazil	S. America	South America	26
Lebanon	Asia	Western Asia	1	Chile	S. America	South America	13
Oman	Asia	Western Asia	3	Colombia	S. America	South America	5
Qatar	Asia	Western Asia	1	Ecuador	S. America	South America	3
Saudi Arabia	Asia	Western Asia	6	Peru	S. America	South America	7
Turkey	Asia	Western Asia	17	Venezuela	S. America	South America	8

Table 2: Average abnormal return of bank stocks worldwide and for each continent on the war event day.

This table reports the average abnormal returns of bank stocks on the first day of the war. We measure the abnormal returns in two approaches. Panel A shows abnormal returns from the market model, while Panel B displays the abnormal returns from the net-of-market return approach. For the whole world and each region, we test whether the corresponding average abnormal return is significant from 0. *, **, and *** indicate the significance level as 10%, 5%, and 1%, respectively. This analysis covers six continents: Africa, Asia, Europe, North America, Oceania, South America, and the whole world.

The expected returns from market model approach is calculated by regressing each actual stock return series on the corresponding market return. To prevent the confounding effect of the covid–19 pandemic fear and vaccine distribution event at the end of 2020, we restrict our sample to start from March 2021. Specifically, the market model is estimated from 230 days to 11 days before the war. Based on the estimated result, the abnormal return of each stock is measured as follows: $AR_{i,t}^{(1)} = R_{i.t} - (\hat{\alpha}_i + \hat{\beta}_i . R_{m,t})$, where $R_{i.t}$ is the actual return of stock i and $R_{m,t}$ is the corresponding market return on the day t. $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the coefficients estimated from the market model.

The market model measures the abnormal returns as the difference between actual return against the average historical market return (Brown & Warner, 1985). To account for the potential weekday effect, we measure the abnormal return of a stock as the difference between the actual stock return and the average corresponding historical market return on the same weekday. Specifically, we calculate the following specification:

$$AR_{i,t}^{(2)} = R_{i.t} - \bar{R}_{m,\text{ same weekday between T−11 and T−230}}.$$

Panel A: Abnormal return from the market model							
	World	**Africa**	**Asia**	**Europe**	**North America**	**Oceania**	**South America**
AAR	–1.036***	–0.814**	–1.033***	–2.173***	–0.759***	–0.775***	–0.901***
t-stat	–8.851	–2.120	–3.143	–13.779	–4.708	–4.352	–4.242
Panel B: Abnormal return as net of average market return							
	World	**Africa**	**Asia**	**Europe**	**North America**	**Oceania**	**South America**
AAR	–1.407***	–1.341***	–2.581***	–4.146***	–0.385***	–3.259***	–2.000***
t-stat	–17.626	–3.130	–7.358	–17.299	–7.640	–7.575	–7.883

Table 3: Proportion of banks with negative abnormal returns on the war event day.

This table reports the percentage of banks with negative abnormal returns on the first day of the war in five continents (Europe, Asia, North America, South America, Oceania, Africa), and the whole world. For each region, we calculate the ratio using the abnormal returns from two approaches: using the market model (AR1) and using the net-of-market return approach (AR2)

The expected returns from market model approach is calculated by regressing each actual stock return series on the corresponding market return. To prevent the confounding effect of the covid–19 pandemic fear and vaccine distribution event at the end of 2020, we restrict our sample to start from March 2021. Specifically, the market model is estimated from 230 days to 11 days before the war. Based on the estimated result, the abnormal return of each stock is measured as follows: $AR_{i,t}^{(1)} = R_{i.t} - (\hat{\alpha}_i + \hat{\beta}_i . R_{m,t})$, where $R_{i.t}$ is the actual return of stock i and $R_{m,t}$ is the corresponding market return on the day t. $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the coefficients estimated from the market model.

The market model measures the abnormal returns as the difference between actual return against the average historical market return (Brown & Warner, 1985). To account for the potential weekday effect, we measure the abnormal return of a stock as the difference between the actual stock return and the average corresponding historical market return on the same weekday. Specifically, we calculate the following specification:

$$AR_{i,t}^{(2)} = R_{i.t} - \bar{R}_{m,\text{ same weekday between T}-11\text{ and T}-230}.$$

	AR1	AR2
Europe	91.58%	98.91%
Eastern Europe	92.59%	100.00%
Northern Europe	90.29%	97.09%
Southern Europe	90.37%	99.26%
Western Europe	94.17%	100.00%
Asia	57.74%	86.01%
Eastern Asia	56.90%	81.03%
Southern Asia	61.54%	86.54%
Western Asia	72.55%	92.16%
Central Asia	90.00%	100.00%
South-eastern Asia	46.73%	86.92%
North America	25.54%	96.56%
Northern America	25.02%	96.87%
Central America	64.71%	70.59%
Caribbean	100.00%	100.00%
South America	60.32%	85.71%
Oceania	90.00%	100.00%
Africa	57.45%	72.34%
Eastern Africa	60.00%	60.00%
Northern Africa	40.00%	70.00%
Southern Africa	75.00%	83.33%
Western Africa	50.00%	80.00%
Total World	43.09%	94.58%

Table 4: Average abnormal return of bank stocks around the war event.

This table reports the daily average abnormal returns of the whole world and six continents (Europe, Asia, North America, South America, Oceania, Africa) from 10 days before to 10 days after the day of the war event. We calculate the abnormal returns using the market model (AAR1) and the net-of-market approach (AAR2). For each method of calculating abnormal returns and each day, we test whether the average abnormal return is significantly different from 0 and report the corresponding t-statistic to the right of the average abnormal return numbers.

The expected returns from market model approach is calculated by regressing each actual stock return series on the corresponding market return. To prevent the confounding effect of the covid–19 pandemic fear and vaccine distribution event at the end of 2020, we restrict our sample to start from March 2021. Specifically, the market model is estimated from 230 days to 11 days before the war. Based on the estimated result, the abnormal return of each stock is measured as follows: $AR_{i,t}^{(1)} = R_{i.t} - (\hat{\alpha}_i + \hat{\beta}_i . R_{m,t})$, where $R_{i.t}$ is the actual return of stock i and $R_{m,t}$ is the corresponding market return on the day t. $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the coefficients estimated from the market model.

The market model measures the abnormal returns as the difference between actual return against the average historical market return (Brown & Warner, 1985). To account for the potential weekday effect, we measure the abnormal return of a stock as the difference between the actual stock return and the average corresponding historical market return on the same weekday. Specifically, we calculate the following specification:

$$AR_{i,t}^{(2)} = R_{i.t} - \bar{R}_{m,\text{ same weekday between T−11 and T−230}}.$$

		World				Europe				Asia			
Date	**Day**	**AAR1**	**t-stat**	**AAR2**	**t-stat**	**AAR1**	**t-stat**	**AAR2**	**t-stat**	**AAR1**	**t-stat**	**AAR2**	**t-stat**
10–Feb	**–10**	0.197	4.018	0.040	1.118	0.313	5.532	0.262	4.290	0.064	0.505	0.108	0.848
11–Feb	**–9**	0.170	2.656	–0.064	–1.190	–0.075	–1.099	–0.238	–3.553	0.167	1.766	0.029	0.294
14–Feb	**–8**	–0.292	–6.325	–0.578	–17.809	–0.705	–10.364	–1.516	–16.385	–0.328	–2.529	–1.011	–6.592
15–Feb	**–7**	–0.145	–1.405	0.338	10.738	0.138	2.012	0.761	9.753	–0.596	–6.082	0.028	0.252
16–Feb	**–6**	–0.097	–1.571	–0.004	–0.126	–0.165	–2.062	–0.226	–2.821	–0.027	–0.133	0.311	1.584
17–Feb	**–5**	0.054	1.161	–0.226	–8.384	–0.016	–0.242	–0.443	–5.806	–0.023	–0.221	0.029	0.275
18–Feb	**–4**	0.009	0.205	–0.057	–1.783	0.009	0.128	–0.161	–2.418	–0.358	–2.352	–0.201	–1.434
21–Feb	**–3**	–0.035	–0.481	–0.297	–3.659	–0.002	–0.038	–0.517	–6.502	–0.037	–0.233	–0.110	–0.637
22–Feb	**–2**	–0.126	–3.216	–0.243	–8.063	–0.135	–2.130	–0.138	–2.092	–0.501	–3.281	–0.981	–6.343
23–Feb	**–1**	0.048	1.014	–0.213	–5.957	–0.077	–1.274	–0.482	–7.578	–0.022	–0.105	0.200	0.867
24–Feb	0	–1.036	–8.851	–1.407	–17.626	–2.173	–13.779	–4.146	–17.299	–1.033	–3.143	–2.581	–7.358
25–Feb	**1**	0.171	1.205	0.968	12.237	1.128	4.121	2.959	9.411	–0.135	–0.672	0.815	3.979
28–Feb	**2**	–0.190	–2.313	–0.240	–3.395	–0.392	–3.917	–0.691	–5.860	–0.259	–1.240	–0.190	–0.878
1–Mar	**3**	–0.397	–6.676	–0.685	–11.642	–0.876	–5.477	–2.050	–10.725	–0.018	–0.088	0.332	1.564

2–Mar	**4**	–0.349	–3.044	–0.129	–3.116	–0.978	–10.835	–0.975	–10.453	–0.550	–5.293	–0.995	–8.605
3–Mar	**5**	0.181	3.936	0.094	2.947	0.519	8.017	–0.260	–3.555	0.199	2.399	0.378	4.142
4–Mar	**6**	–0.408	–8.616	–0.800	–17.112	–0.699	–7.263	–2.271	–13.910	–0.531	–3.335	–0.879	–5.645
7–Mar	**7**	–0.233	–3.078	–0.916	–20.736	–1.016	–8.274	–1.735	–12.652	–0.576	–4.774	–1.629	–11.767
8–Mar	**8**	–0.015	–0.338	–0.075	–1.953	0.268	2.980	0.492	4.801	–0.468	–2.650	–0.988	–4.736
9–Mar	**9**	0.004	0.031	0.778	15.658	1.073	10.532	2.997	16.117	0.016	0.124	0.483	3.540
10–Mar	**10**	–0.044	–0.687	–0.071	–1.317	0.229	3.397	–0.556	–6.818	–0.048	–0.368	0.515	3.585

Table 4 (continued)

		North America				South America			
Date	**Day**	**AAR1**	**t-stat**	**AAR2**	**t-stat**	**AAR1**	**t-stat**	**AAR2**	**t-stat**
10–Feb	**–10**	0.160	2.357	–0.097	–2.370	0.886	3.416	1.045	3.691
11–Feb	**–9**	0.253	2.703	–0.035	–0.452	–0.033	–0.159	0.154	0.685
14–Feb	**–8**	–0.179	–2.891	–0.257	–15.509	–0.619	–2.265	–0.691	–2.413
15–Feb	**–7**	–0.133	–0.839	0.295	9.316	0.483	1.351	0.990	2.591
16–Feb	**–6**	–0.114	–1.386	–0.050	–3.607	0.200	0.995	0.557	2.591
17–Feb	**–5**	0.077	1.185	–0.248	–9.812	0.247	1.127	–0.320	–1.376
18–Feb	**–4**	0.065	1.126	–0.015	–0.469	0.594	2.926	0.553	2.463
21–Feb	**–3**	0.032	0.102	–0.063	–0.228	–0.042	–0.151	–0.112	–0.392
22–Feb	**–2**	–0.015	–0.322	–0.094	–4.639	–0.303	–1.274	–0.041	–0.197
23–Feb	**–1**	0.079	1.439	–0.248	–12.253	0.043	0.161	–0.045	–0.155
24–Feb	0	–0.759	–4.708	–0.385	–7.640	–0.901	–4.242	–2.000	–7.883
25–Feb	**1**	–0.040	–0.199	0.488	6.750	0.033	0.211	0.490	2.484
28–Feb	**2**	–0.111	–0.989	–0.144	–1.581	0.202	0.384	0.736	1.267
1–Mar	**3**	–0.372	–5.525	–0.570	–10.140	–0.601	–1.630	–0.822	–1.671
2–Mar	**4**	–0.075	–0.427	0.336	7.296	–1.516	–4.718	–0.681	–2.281
3–Mar	**5**	0.024	0.379	0.019	0.608	1.788	6.629	2.412	8.762
4–Mar	**6**	–0.268	–4.906	–0.361	–10.668	–1.665	–4.279	–2.003	–4.489
7–Mar	**7**	0.033	0.304	–0.553	–13.938	0.360	1.779	–0.573	–2.063
8–Mar	**8**	0.009	0.169	–0.013	–0.798	–0.208	–0.815	–0.190	–0.788
9–Mar	**9**	–0.363	–1.730	0.200	6.683	1.808	3.776	2.489	4.493
10–Mar	**10**	–0.085	–0.913	–0.071	–0.980	–0.871	–3.966	–0.777	–3.002

Table 4 (continued)

		Oceania				Africa			
Date	**Day**	**AAR1**	**t-stat**	**AAR2**	**t-stat**	**AAR1**	**t-stat**	**AAR2**	**t-stat**
10–Feb	**–10**	1.942	4.828	2.165	5.218	0.069	0.225	0.181	0.567
11–Feb	**–9**	–0.176	–0.582	–0.954	–3.518	–0.071	–1.419	–0.170	–3.776
14–Feb	**–8**	0.409	0.932	0.488	1.085	0.069	0.430	0.052	0.278
15–Feb	**–7**	–0.421	–1.203	–0.480	–1.353	–0.226	–1.227	–0.050	–0.228
16–Feb	**–6**	–0.618	–2.205	0.378	1.432	0.196	1.151	0.163	0.937
17–Feb	**–5**	0.861	4.010	1.039	4.288	–0.010	–0.052	0.170	0.850
18–Feb	**–4**	0.269	2.234	–0.353	–2.358	–0.159	–0.374	–0.369	–0.818
21–Feb	**–3**	0.647	2.962	0.842	4.002	–0.446	–1.469	–0.454	–1.642
22–Feb	**–2**	–0.366	–1.696	–0.729	–3.047	–0.522	–1.979	–0.548	–2.164
23–Feb	**–1**	–0.241	–1.398	0.187	1.150	0.554	2.203	0.164	0.606
24–Feb	0	–0.775	–4.352	–3.259	–7.575	–0.814	–2.120	–1.341	–3.130
25–Feb	**1**	0.433	0.953	1.314	3.446	1.188	1.987	1.457	2.250
28–Feb	**2**	–0.590	–2.272	0.107	0.499	–0.695	–1.639	–0.550	–1.317
1–Mar	**3**	0.162	0.652	0.522	2.017	0.339	1.305	0.305	1.157
2–Mar	**4**	–1.569	–3.479	–1.051	–2.607	–0.429	–0.902	–0.488	–1.044
3–Mar	**5**	–0.396	–0.787	0.395	0.777	0.246	0.384	0.305	0.457
4–Mar	**6**	0.048	0.267	0.195	1.072	0.030	0.051	–0.663	–1.154
7–Mar	**7**	–0.303	–0.851	–1.546	–4.383	–0.796	–1.006	–1.121	–1.422
8–Mar	**8**	0.361	1.243	–0.610	–2.078	0.375	1.532	0.230	0.910
9–Mar	**9**	0.380	3.691	1.482	5.614	0.176	0.654	0.423	1.406
10–Mar	**10**	1.067	2.888	2.290	4.592	–0.032	–0.230	0.028	0.206

Table 5: Cumulative average abnormal return of bank stocks worldwide and by region

This table reports the cumulative average abnormal returns of the whole world and five continents (Europe, Asia, North America, South America, Oceania, Africa) for different time windows. We calculate cumulative abnormal returns using the market model (AR1) and the net–of-market approach (AR2). For each calculation of abnormal returns and each time window, we test to see if the cumulative average abnormal returns have significant differences from 0 and report the corresponding t-statistic to the right of the average abnormal return numbers. *, **, and *** indicate the significance level as 10%, 5%, and 1%, respectively.

The expected returns from market model approach is calculated by regressing each actual stock return series on the corresponding market return. To prevent the confounding effect of the covid–19 pandemic fear and vaccine distribution event at the end of 2020, we restrict our sample to start from March 2021. Specifically, the market model is estimated from 230 days to 11 days before the war. Based on the estimated result, the abnormal return of each stock is measured as follows: $AR_{i,t}^{(1)} = R_{i.t} - (\hat{\alpha}_i + \hat{\beta}_i . R_{m,t})$, where $R_{i.t}$ is the actual return of stock i and $R_{m,t}$ is the corresponding market return on the day t. $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the coefficients estimated from the market model.

The market model measures the abnormal returns as the difference between actual return against the average historical market return (Brown & Warner, 1985). To account for the potential weekday effect, we measure the abnormal return of a stock as the difference between the actual stock return and the average corresponding historical market return on the same weekday. Specifically, we calculate the following specification:

$$AR_{i,t}^{(2)} = R_{i.t} - \bar{R}_{m,\text{ same weekday between T−11 and T−230}}.$$

	World		Europe		Asia		North America	
	AR1	**AR2**	**AR1**	**AR2**	**AR1**	**AR2**	**AR1**	**AR2**
CAAR(–10,–1)	–0.202	–1.109***	–0.716***	–2.714***	–1.653***	–1.619***	0.194	–0.749***
	(–0.779)	(–13.254)	(–3.341)	(–10.319)	(–4.970)	(–4.803)	(0.490)	(–11.838)
CAAR(–3,–1)	–0.093	–0.560***	–0.214**	–1.138***	–0.547**	–0.902***	0.065	–0.343***
	(–1.370)	(–11.182)	(–2.311)	(–9.082)	(–2.536)	(–3.612)	(0.743)	(–10.750)
CAAR(0,0)	–1.036***	–1.407***	–2.173***	–4.146***	–1.033***	–2.581***	–0.759***	–0.385***
	(–8.851)	(–17.626)	(–13.779)	(–17.299)	(–3.143)	(–7.358)	(–4.708)	(–7.640)
CAAR(0,3)	–1.427***	–1.339***	–2.280***	–3.857***	–1.386***	–1.769***	–1.282***	–0.612***
	(–5.209)	(–12.127)	(–10.320)	(–12.883)	(–3.638)	(–4.640)	(–3.064)	(–5.132)
CAAR(0,5)	–1.598***	–1.375***	–2.741***	–5.091***	–1.754***	–2.419***	–1.334**	–0.257*
	(–3.921)	(–11.073)	(–12.008)	(–16.197)	(–4.419)	(–5.862)	(–2.107)	(–1.924)
CAAR(0,10)	–2.285***	–2.443***	–2.855***	–6.113***	–3.275***	–4.778***	–2.009**	–1.056***
	(–3.950)	(–16.924)	(–9.828)	(–16.154)	(–6.891)	(–9.970)	(–2.227)	(–6.978)
CAAR(0,20)	–3.562***	–1.898***	–2.968***	–3.763***	–3.238***	–3.718***	–4.114**	–1.291***
	(–2.870)	(–11.742)	(–8.017)	(–11.032)	(–6.272)	(–6.173)	(–2.106)	(–7.326)

Table 5 (continued)

	South America		Oceania		Africa	
	AR1	**AR2**	**AR1**	**AR2**	**AR1**	**AR2**
CAAR(–10,–1)	1.457**	2.085***	2.307**	2.583**	–0.535	–0.830
	(2.369)	(3.262)	(2.370)	(2.991)	(–0.689)	(–1.016)
CAAR(–3,–1)	–0.304	–0.196	0.040	0.300	–0.414	–0.838***
	(–0.604)	(–0.383)	(0.094)	(0.842)	(–1.365)	(–2.750)
CAAR(0,0)	–0.901***	–2.000***	–0.775***	–3.259***	–0.814**	–1.341***
	(–4.242)	(–7.883)	(–4.352)	(–7.575)	(–2.120)	(–3.130)
CAAR(0,3)	–1.014***	–1.541***	–0.770	–1.315	–0.098	–0.265
	(–4.620)	(–5.533)	(–0.983)	(–1.678)	(–0.171)	(–0.462)
CAAR(0,5)	–0.828**	0.075	–2.735**	–1.971*	–0.302	–0.474
	(–2.228)	(0.176)	(–2.821)	(–2.242)	(–0.437)	(–0.646)
CAAR(0,10)	–1.404**	–0.979	–1.183	–0.160	–0.508	–1.439
	(–2.428)	(–1.494)	(–1.057)	(–0.159)	(–0.496)	(–1.445)
CAAR(0,20)	0.476	3.015***	0.682	5.860***	–0.139	–0.873
	(0.748)	(3.545)	(0.570)	(4.936)	(–0.100)	(–0.606)

Table 6: Returns of bank stocks and the association with oil price, exchange rate, and market return movement

This table presents the regression results of bank stock returns against the war-related times and periods. We perform three regression models for the whole world and for each region. In model (1), we use two dummy variables representing the first and second trading days following the war event to test the market reaction in these two days. To better capture the effect of the war event on bank stock returns, we control for the effect of market returns, market sensitivity to covid daily new cases, oil return, and exchange rate changes. This model controls for country-fixed effects, time-fixed effects and market-fixed effects. In model (2), we replace the second trading day dummy with a dummy representing the post-war period. We also use the same independent and control variables as in model (1). To further examine the difference in the correlation between bank stock returns and market return, oil return, and exchange rate changes after the war, we estimate model (3) as the model (2), adding the interaction between the dummy variable after the war and each of the test variables above. *, **, and *** indicate the significance level as 10%, 5%, and 1%, respectively.

$r_{i,t} = \alpha + \delta_1.war_t + \delta_2.war_{t+1} + \beta_1.Mkt\_return_t + \gamma_1.Oil\_return_t\theta_1.exrate\_change_t + F(control_t) + u_t$ (1)

$r_{i,t} = \alpha + \delta_1.post\_war + \beta_1.Mkt\_return_t + \gamma_1.Oil\_return_t\theta_1.exrate\_change_t + F(control_t) + u_t$ (2)

$r_{i,t} = \alpha + \delta_1.war_t + \delta_2.post\_war_t + \beta_1.Mkt\_return_t + \beta_2.Mkt\_return_t.post\_war_t + \gamma_1.Oil\_return_t + \gamma_2.Oil\_return_t.post\_war_t + \theta_1.exrate\_change_t + \theta_2.exrate\_change_t.post\_war_t + F(control_t) + u_t$ (3)

	World			Europe			Asia			North America		
Model	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
1st trading day	–1.258***	–1.325***	–1.323***	–2.016***	–2.070***	–2.083***	–0.572***	–0.641***	–0.646***	–0.657***	–0.708***	–0.706***
	(–30.029)	(–31.406)	(–31.371)	(–22.161)	(–22.598)	(–22.714)	(–3.823)	(–4.248)	(–4.281)	(–13.922)	(–14.884)	(–14.840)
2nd trading day	0.077*			0.733***			–0.310*			–0.023		
	(1.824)			(8.064)			(–1.936)			(–0.488)		
Post_war ()		–0.126***	–0.144***		–0.105***	–0.091***		–0.132***	–0.102***		–0.093***	–0.087***
		(–13.078)	(–14.949)		(–5.059)	(–4.365)		(–3.727)	(–2.853)		(–8.641)	(–8.003)
Mkt_return	0.306***	0.307***	0.306***	0.363***	0.366***	0.365***	0.535***	0.535***	0.539***	0.194***	0.195***	0.198***
	(277.183)	(278.251)	(267.270)	(139.122)	(140.455)	(133.768)	(112.392)	(112.453)	(109.217)	(152.278)	(152.825)	(150.484)
Mkt_return × P_war			–0.008*			–0.014			–0.075***			–0.086***
			(–1.804)			(–1.452)			(–3.908)			(–12.672)
Oil_return	–0.002***	–0.002***	–0.001***	0.001	0.001	0.002**	0.003**	0.003**	0.005***	0.004***	0.004***	0.004***
	(–4.607)	(–4.820)	(–3.682)	(0.737)	(0.697)	(2.486)	(2.498)	(2.469)	(3.377)	(10.930)	(10.776)	(10.310)
Oil_return × P_war			–0.008***			–0.019***			–0.022***			–0.011***
			(–5.789)			(–6.140)			(–4.164)			(–6.440)
Exrate_change	–0.000	–0.000	–0.000	0.500***	0.500***	0.487***	0.107***	0.106***	0.083***	0.006	0.008*	–0.000
	(–1.237)	(–1.238)	(–1.241)	(65.591)	(65.535)	(61.428)	(8.359)	(8.234)	(6.235)	(1.323)	(1.715)	(–0.047)
Exrate_change × Postwar			0.485***			0.124***			0.302***			–0.016
			(40.529)			(4.070)			(6.258)			(–0.785)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Market FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covid–19 sensitivity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R–squared	0.062	0.063	0.064	0.178	0.178	0.178	0.093	0.093	0.094	0.033	0.033	0.033

Table 6 (continued)

	South America			Oceania			Africa		
Model	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
1st trading day	–0.945***	–0.953***	–0.960***	–0.622	–0.683	–0.679	–0.818**	–0.836**	–0.846**
	(–2.785)	(–2.789)	(–2.811)	(–1.116)	(–1.217)	(–1.211)	(–2.255)	(–2.288)	(–2.318)
2nd trading day	–0.201			0.319			1.252***		
	(–0.593)			(0.574)			(3.309)		
Post_war		–0.020	–0.028		–0.112	–0.076		–0.012	0.020
		(–0.253)	(–0.354)		(–0.872)	(–0.588)		(–0.137)	(0.240)
Mkt return	0.492***	0.492***	0.488***	0.720***	0.721***	0.721***	0.329***	0.330***	0.325***
	(82.357)	(82.358)	(80.098)	(41.193)	(41.196)	(40.884)	(27.822)	(27.896)	(26.314)
Mkt return × Post–war			0.014			–0.089			–0.098**
			(0.310)			(–0.649)			(–2.075)
Oil return	–0.010***	–0.010***	–0.007**	0.013***	0.013***	0.016***	–0.006*	–0.006*	–0.007**
	(–3.274)	(–3.267)	(–2.344)	(2.770)	(2.760)	(3.388)	(–1.939)	(–1.937)	(–2.058)
Oil return × Post–war			–0.038***			–0.055***			0.012
			(–3.154)			(–2.846)			(0.912)
Ex rate change	–0.000	–0.000	–0.000	0.007	0.008	0.008	0.005	0.005	0.004
	(–0.878)	(–0.879)	(–0.883)	(0.162)	(0.179)	(0.188)	(1.578)	(1.581)	(1.150)
Ex rate change × Post–war			0.190**			0.045			0.544***
			(2.151)			(0.194)			(8.147)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Market FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covid–19 sensitivity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R–squared	0.180	0.180	0.181	0.339	0.339	0.340	0.036	0.035	0.038