Spill over effects of Geopolitical risk on the banking sector of CIS countries

Roberta Adami[1] Issam Malki[2] Dildora Ibragimova[3] Sheeja Sivaprasad[4] Feruza Yodgorova[5]

Abstract

This study examines the spill over effects of geopolitical risks (GPR) and extreme shocks on Commonwealth of Independent States (CIS) economies, as result of the Russia – Ukraine war, with particular focus on financial institutions. Further, we investigate whether the performance of CIS banks has been impacted by economic sanctions imposed on Russia since the start of the conflict. Understanding GPR transmission mechanisms and consequences on Russia's neighbouring countries allows policymakers and financial institutions to formulate and implement risk management strategies. For a global measure of geo-political risk, we employ the global GPR index from Caldara and Iacoviello (2022) and we use the Diebold-Yilmaz (2012) connectedness model to estimate the spill over effect. First, we investigate the spill over effect of the recent conflict on the returns of banks for a sample of CIS countries. Further, we examine the spill over effect on macro-economic indicators of our sample of countries. Our preliminary results do not show significant GPR transmissions in terms of returns and risk within the banking sectors of the CIS countries examined.

[1] Glasgow Caledonian University, London, E1 6PX. Email: Roberta.Adami@gcu.ac.uk
[2] University of Westminster,35 Marylebone Road, NW1 5LS. Email: I.Malki@westminster.ac.uk
[3] Westminster International University in Tashkent, 12 Istikbol Street, Tashkent 100047. Email: dibragimova@wiut.uz
[4] University of Westminster,35 Marylebone Road, NW1 5LS. Email: sivaprs@westminster.ac.uk
[5] Westminster International University in Tashkent, 12 Istikbol Street, Tashkent 100047. Email: f_yodgorova@wiut.uz

1. Introduction

The stability of the banking system of a country is of paramount importance owing to the key role of financial institutions in a country's economic growth and development. Conversely, the fragility of the banking system can affect the soundness of a country's financial system, with consequences for international investors and lead to sub-optimal allocation of resources. As a result, the study of the performance and risk levels of financial institutions have garnered a lot of interest and attention from researchers and academia. The wave of bank collapses during the not-too-distant 2008 global financial crisis (GFC, hereafter) saw global economies experiencing a deep recession because of the fragility of the financial system (Zheng and Wu,2023). Furthermore, the more recent COVID-19 pandemic also had an impact on the banking sector (Colak and Oztekin, 2021; Duan *et al.,* 2021). Studies also show that risks brought about by geo-political events can also adversely impact the fragility of the banking system (Shabir *et al.,* 2023; Salisu, Cunado and Gupta, 2022; Tabash *et al.,* 2022).

The pivotal role played by the banking sector has fuelled the need to gain a better understanding of its role in the face of the many crises affecting the Commonwealth of Independent States (CIS, thereafter) in recent years. The CIS countries, former constituent states of the former Soviet Republic, represent an important part of the Asia's GDP and they

show some similarities in terms of language and culture despite each state's uniqueness regarding importance of financial systems and inclusion, as well as economic and financial development since they opened their economies in the 1990s. However, the understanding of their economies, financial institutions, and their current links to the economy of the Russian Federation is still under-researched, with few notable exceptions (Bayramov *et al.*, 2020). Geopolitical and economic events within Russia can have significant implications for countries around it in terms of regional spill over effects, we examine the repercussions of the Russia – Ukraine on CIS economies and argue that these countries so far have been highly susceptible to the economic shocks and repercussions of the conflict, which, to different extents, has affected the rest of the world. The key motivation to undertake this study is the dearth of studies that analyses the impact of conflicts on the banking system in the CIS counties. A recent report by UN highlight that the countries experienced economic shocks because of the COVID-19 pandemic (UN, 2021).

The primary objective of the study is to examine the impact of the on-going Russian-Ukrainian conflict specifically on financial institutions that operate in CIS countries and to test the spill over effects of this crisis across the regions. This study contributes to the existing literature in two important ways, firstly, to the authors' knowledge, this is the first paper that investigates the geopolitical effects caused by the on-going Russian-Ukrainian conflict on CIS economies and their financial institutions; secondly, the study contributes to the emerging finance and banking literature on the strengths and vulnerabilities of banking systems in these developing countries.

Although most previous studies on GPR are cross-country in nature, CIS economies have not yet received as much attention from academics as other developed and developing countries, however the geographical, historical, and cultural proximity to CIS countries to the

parties involved in the on-going Russia – Ukraine conflict makes this research particularly important and topical.

The importance of this study lies in its ability to provide a thorough understanding of the transmission mechanisms, impact and spill over effects of the current conflict on the vast economic area represented by the CIS countries, Russia's main economic partners and it aims at providing insights on possible future changes in (international trade and) financial flows in the area and how the uncertainty caused by the war can be best managed by financial institutions and policy makers.

2. Background

2.1 Development of economy and financial sector in CIS

Starting from 1991 the banking systems of all Commonwealth of Independent States (CIS) evolved into two-tier system, relinquishing the Soviet model, which had a unique bank (monobank) that controlled and regulated both monetary policy and commercial banking within all member states (Djalilov and Piesse, 2016). As a result of elimination of the monobank system, all CIS member states experienced a rapid development of financial markets and an increase in the number of new banks. Within 30 years most post-Soviet countries managed to develop their banking segment independently, facing sporadic collapses in the sector. In particular, the whole 1990s, 2008 financial crises threatened banking systems of countries to a certain extent.

Yet, these post-communist economies, their financial, commodity and energy markets were closed for the world economy for many decades, faced serious challenges during the transformation period. Consequently, the degree of market liberalization did not reach considerable results and in many CIS economies, including Russia, did not make considerable progress in transforming centrally planned economies into market economies (IMF, 2002).

Currently, according to IMF classification (2000), all CIS economies are considered as 'transition economies', and they are comprised of 12 states: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan.

At the initial stage of the transition, several countries (in particular, Russia, Kazakhstan, Armenia, Georgia, Kyrgyzstan) applied liberal model of economic reform with a limited regulatory role of the state, while other countries (Belarus, Uzbekistan, Turkmenistan) pursued evolutionary approach (reforms were introduced gradually). Later in the future, the models of economic transformation changed for many CIS countries. For example, in the early 2000s, Russia and Kazakhstan strengthened the role of the state in the economy.

CIS member states could be divided into several sub-groups, understanding of which is essential in conducting spill over analysis. The first group is constituted of energy exporting countries (Russia, Kazakhstan, Azerbaijan, Turkmenistan and partially Uzbekistan). Next group is composed of the countries heavily dependent on migrants' remittances (Tajikistan, Kyrgyzstan, Armenia, Moldova, Georgia).

2.2 Impact of recent sanctions and downgrade of credit ratings

All CIS neighbors are under the 'privileged interests' of Russia (Trenin, 2009). This is justified by the Russian economic integration with all member states. One of the key channels of the economic integration are the cross-border investments in the CIS region. On the one hand, these investments enhance economic co-operation and integration. On the other hand, this could lead many countries to become economically and, even politically subservient to Russia. Due large energy imports and high energy prices, some of CIS countries are already seriously indebted to Russia (Jackson, 2003). Hence, all these factors demonstrate how CIS region is sensitive in terms of any geopolitical turmoil and its implications.

In the face of geopolitical tensions and sanctions, economic activity in Russia decelerated several times, resulting in negative spill overs on CIS member states.

Since March 2014, several restrictive measures on Russia have been imposed in response to: annexation of Crimea in 2014;decision to recognize the non-government-controlled areas of the Donetsk and Luhansk regions as independent entities in 2022.The sanctions imposed included individual restrictive measures, economic sanctions, diplomatic measures, restrictions on media, restrictions on economic relations with Crimea and Sevastopol.

All these sanctions had direct and indirect impact on macro-economic and banking system indicators in CIS. Indeed, the degree of impact is commensurate with the level of these countries' trade, remittances, and foreign direct investment (FDI) links with Russia.

The recent outbreak of the Russia – Ukraine war has unleashed multiple shocks in CIS region, having heavily depressed economic activity since the early part of the first quarter of 2022. Contrary to expectations, according to the recent report from Moody's Investors Service (2023), while banks in Ukraine and Belarus suffered from the Russian invasion of Ukraine last year, banks in other parts of CIS[6] experienced some unexpected gains. Most banks reported unusually high foreign-currency gains in 2022 caused by higher demand for currency conversion as trade with Russia, customer numbers and profitability increased; consequently, banks improved their asset quality and liquidity. In addition, capital inflows and remittances increased. However, this could be short-term gain and improvement in macroeconomic and bank-specific indicators. These forecasts differ from Fitch Ratings Agency predictions which claims that economic spill overs will be material for CIS member states, though the region's level of connectivity to the Russian economy and the channels of contagion can vary ('Fitch Expects Significant Economic Shock', 2023).

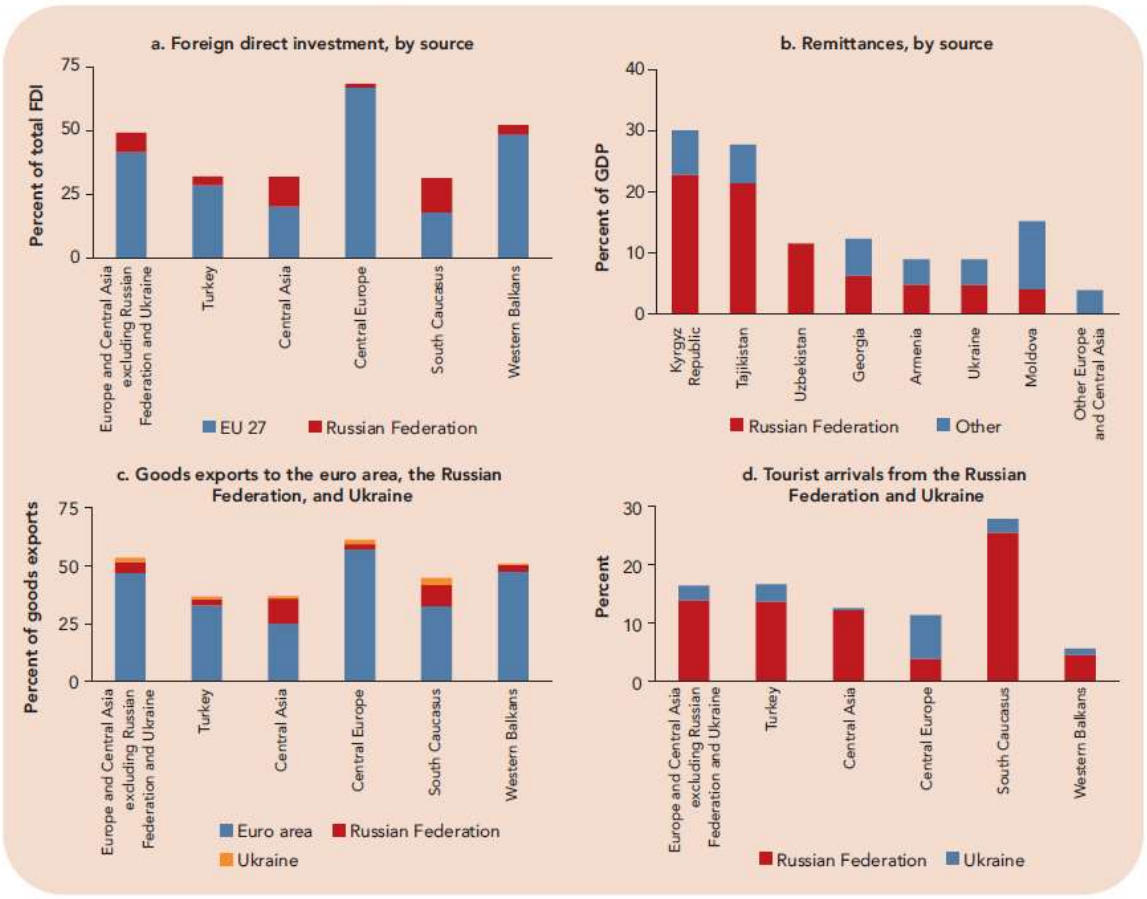
[6] This report covers banks in the following countries: Kazakhstan, Uzbekistan, Ukraine, Armenia, Azerbaijan, Georgia, Belarus, Kyrgyz Republic and Tajikistan. Georgia and Ukraine are not members of the Commonwealth of Independent States; however, they are covered in this report given their historical and economic links.

Previous studies have reported the impact of the Western sanctions on Russia and further implications of them for post-communist neighbours (Kuchins, 2015; Zhou and Cuyvers, 2011). In particular, spill over analysis conducted by Bayramov et al., (2020) revealed that the Western sanctions against Russia had significant impact on Russia's post-communist neighbours: the accumulated response of CIS GDP to a 1% shock to Russian GDP was −0.72. Present crisis has its features and at the top of the sanction list there are financial sanctions which hit not only Russian financial sector, but also neighboring countries. These sanctions included freezing of assets held abroad by Russia's Central Bank and selected Russian commercial banks, the exclusion of most Russian intermediaries from the SWIFT messaging system which was used to facilitate cross-border transactions among member banks (Berner et al., 2022).

Western sanctions were complemented by downgrading the most prominent Russian banks, with the sovereign debt assigned near default grade (Lo et al.,2022). Belarus and Ukraine were also added to this list. Although Fitch has not taken rating actions on other CIS member states since the war began, most of them are experiencing currency weakening which contributes to inflation, increase in food prices and aggravates the impact from the generally high foreign-currency component of government debt and deposit dollarisation ('Fitch Expects Significant Economic Shock', 2023).

Similarly, European Bank for Reconstruction and Development (EBRD thereafter, 2022) forecasts that the economic sanctions on Russia are expected to remain for the foreseeable future, condemning the Russian economy to stagnation in 2023 (after a sharp GDP drop in 2022), with negative spill overs for several neighbouring countries in eastern Europe, the Caucasus and Central Asia. This will happen due to having close trade, remittances, financial channel (See Figure 1).

Figure 1. Regional economic linkages with the Russian Federation, Ukraine, and the euro area



Source: European Bank for Reconstruction and Development (EBRD, 2022)

Currently, CIS countries face serious challenge in maintaining existing political ties with Russia and resist external economic pressures.

2.3 Impact of geopolitical crisis on financial markets and institutions

Financial markets and institutions are highly receptive to external extreme shocks such as global financial crises, health threats and conflicts, the clearest manifestation of geopolitical risk. The literature on GPR to date has mostly focused on its consequences on commodity prices, stock markets volatility and asset price returns (see Smales, 2021; Manela and Moreira, 2017; Berkman *et al*. 2011). The existing financial literature on the effects of geopolitical risk such as that caused by conflicts and similar external shocks is extensive and consistently shows

negative effects of such events on asset returns, with the obvious exception of the defence industry (Zhang *et al*, 2022), a significant increase in the volatility of financial markets and asset price, especially in emerging markets (Balcilar *et al*. 2018; and Bouras et al. 2019) as well as unfavourable effects on investors sentiments as shown by Nikkinen and Vähämaa (2010).

3. Data and Methods

3.1 Data

The data set used for this work covers (i) measures of market performance of banking sector and (ii) measures of geopolitical risk. Measures of performance of banking sector are captured by the daily nominal stock market price indices covering the period January 2017 to January 2023, consisting of 2214 daily observations. The price indices are composite indices of available bank data of five CIS economies including Georgia, Kazakhstan, Uzbekistan, Russia and Ukraine. Table 1 reports further information on the number of banks in each composite price index. The choice of these banks and countries is based mainly on the availability of a reasonably large sample. Table 1 gives an overview of the series in the data and their sources.

[Table 1 about here]

All data are obtained as price indices in their raw form. Since we aim to measure connectedness in the returns and risk series. The returns of each stock are computed as the change of the natural logarithm of prices (i.e. $r_{it} = \Delta(lnP_{it})$, for stock i and over $t = 1,2, \dots, T$). The risk series is obtained by estimating a GARCH (1,1) specification for each stock return series. In this context, the risk is based on the following model:

$$r_{it} = \mu_i + \varepsilon_{it}, \tag{1A}$$

$$\sigma_{it}^2 = \omega_i + \alpha_i \varepsilon_{it-1}^2 + \beta_i \sigma_{it-1}^2 + v_{it} \tag{1B}$$

where $\varepsilon_{it} \sim (0, \sigma_{it}^2)$, $v_{it} \sim iid(0, \sigma_{iv}^2)$, $\omega_i > 0$, $\alpha_i, \beta_i \geq 0$, $\alpha_i + \beta_i < 1$ for stock *i* and over $t = 1,2, \dots, T$.

We use four measures of geopolitical risk, all based on Dario and Iacoviello (2019). This includes the Global Geopolitical Risk Index (GGRI), Russia GRI, Ukraine GRI and United States GRI. All indices are expressed in natural logarithm.

4. Econometric Methodology

We apply for this work the generalised variance decomposition approach proposed by Diebold and Yilmaz (2012), DY hereafter. The concept of connectedness, as proposed by Diebold and Yilmaz (2009, 2012, 2014), assesses the shares of forecast error variation of different stock returns series in response to a shock occurring in other stock returns. This concept is modelled in Vector Autoregressive, VAR, set up.

Suppose there are *n* endogenous variables, $y'_t = (y_{1t}, y_{2t}, \dots, y_{nt})$**,** the general form of this dynamic model can be expressed as:

$$y_t = c + \sum_{i=1}^{p} \Phi_i y_{t-i} + u_t \qquad (2)$$

where the maximum number of lags is p (i.e. the optimal lag length). The term $c' = (c_1, c_2, \dots, c_n)$ is an $1 \times n$ vector of constants and $\Phi_1, \Phi_2, \dots, \Phi_p$ are $n \times n$ coefficients matrices. The error term $u'_t = (u_{1t}, u_{2t}, \dots, u_{nt})$ is $1 \times n$ vector with zero mean and a variance – covariance matrix, Σ, is an $n \times n$ symmetric – and possibly non-diagonal – matrix.

The VAR (p) model allows for reverse causality and interdependence across all variables. The structure of this model, in which every endogenous variable is regressed on its own lagged values and the lags of the other variables in the system, allows the coefficients matrices, Φ_i, to include all the information about the interactions and connectedness between

these variables. Furthermore, all the series in the vector y_t are assumed to be covariance stationary. This requires that the roots of the characteristic equation (i.e. $|\Phi(z)|$), lie outside the unit circle. Using lag operator, L, and combined with stationarity assumption the model in (2), the VAR(p) can be written as a function of moving averages of infinite order, or MA(∞). In other words:

$$y_t = \Theta(L)u_t \tag{3}$$

where $\Theta(L) = \Theta_0 + \Theta_1 L + \Theta_2 L^2 + \cdots$ is the infinite lag polynomial that can be computed recursively from $\Phi(L) = I_N - \Phi_1 L - \Phi_2 L^2 - \cdots - \Phi_p L^p = [\Theta(L)]^{-1}$. The term Θ_0 does not need to be diagonal and captures the contemporaneous features of connectedness, while the terms $\Theta_1, \Theta_2, \ldots$ capture the dynamics of connectedness. The measure of connectedness based on this structure is best obtained using variance decompositions.

The literature of econometrics offers various methods of variance decompositions. In the context of connectedness, Diebold and Yilmaz (2012) employ Cholesky factorisation, which depends on the ordering of variables. In the context of Cholesky decompositions, the first variable in the system is affected contemporaneously only by its own shocks. The second variable in the system is affected contemporaneously by the first and second variables' innovations, and so on. Although Diebold and Yilmaz (2014) argue that the total connectedness is robust to ordering of variables, this does not rule out the possibility that the connectedness is sensitive to the order assigned to variables in the VAR system. To overcome this issue, one can use Generalised Variance Decompositions, as proposed by Pesaran and Shin (1998), which do not rely on variable ordering. Generalised variance decomposition treats each variables as first variable in the ordering. In other words, correlated shocks are allowed while accounting for their historical correlation. Formally, for the *h*-step generalised variance decomposition matrix

$$D_t^{gH} = [d_{ij,t}^{gH}] \tag{4}$$

Has the elements

$$d_{ij,t}^{gH} = \frac{\sigma_{jj}^{-1} \sum_{h=0}^{H-1} \left(e'_i \Theta_{h,t} \Sigma_t e_j\right)^2}{\sum_{h=0}^{H-1} \left(e'_i \Theta_{h,t} \Sigma_t \Theta'_{h,t} e_j\right)^2} \tag{5}$$

where σ_{jj}^{-1} j-th diagonal element of the covariance matrix Σ_t, e_j is section vector with j-th element unity and zeros elsewhere, Θ_h is $n \times n$ of moving average coefficients at alg h,

$d_{ij,t}^{gH}$ refers to the contribution the j-th variable to the variance of the forecast error of the element i at horizon h. Since the shocks under the generalised variance decomposition are not necessarily orthogonal, the row sums of $d_{ij,t}^{gH}$ are not necessarily equal to one (i.e. forecast error variance contribution does not necessarily sum to one). Therefore, the generalised connectedness index – and its other variations – are based on the normalised $d_{ij,t}^{gH}$, which is defined as:

$$\widetilde{d_{ij,t}^{gH}} = \frac{d_{ij,t}^{gH}}{\sum_{j=1}^{N} d_{ij,t}^{gH}} \tag{6}$$

whereby definition $\sum_{j=1}^{N} \widetilde{d_{ij,t}^{gH}} = 1$ and $\sum_{i,j=1}^{N} \widetilde{d_{ij,t}^{gH}} = N$). Using the definition in (6), we can compute the following measures of connectedness:

Total Connectedness Index (TCI): This captures the interconnectedness among different variables and defined as:

$$C_t^{gH} = \frac{\sum_{i,j=1, i \neq j}^{N} \widetilde{d_{ij,t}^{gH}}}{\sum_{j=1}^{N} \widetilde{d_{ij,t}^{gH}}} \times 100 \tag{7}$$

The directional spill over from all variables j to variable i:

$$C_{i\leftarrow j}^{gH} = \frac{\sum_{j=1,i\neq j}^{N} \widetilde{d_{ij,t}^{gH}}}{\sum_{i=1}^{N} \widetilde{d_{ij,t}^{gH}}} \times 100 \quad (8)$$

The directional spill over from all variables i to variable j:

$$C_{i\rightarrow j}^{gH} = \frac{\sum_{i=1,i\neq j}^{N} \widetilde{d_{ij,t}^{gH}}}{\sum_{j=1}^{N} \widetilde{d_{ij,t}^{gH}}} \times 100 \quad (9)$$

The net pairwise directional spill over: which takes the difference between the two directional spill over measures above. In other words, the net pairwise directional $C_{ij,t}^{gH} = C_{i\leftarrow j,t}^{gH} - C_{i\rightarrow j,t}^{gH}$ ttakes the difference between total directional connectedness to others (from all *i* variables to *j* variable) and total directional connectedness from others (from all *j* variables to *i* variable). Thus, the measure is defined formally as:

$$NPDC_{ij}^{gH} = \left(\widetilde{d_{ji,t}^{gH}} - \widetilde{d_{ij,t}^{gH}}\right) \times 100 \quad (10)$$

5. Empirical Results

5.1. Primary Results

Table 2 provides the descriptive statistics for the returns series and risk series for five countries: Georgia (GEO), Russia (RUS), Ukraine (UKR), Uzbekistan (UZB), and Kazakhstan (KAZ), and the four geopolitical risk series.

The returns series for these countries show significant variations in their mean and standard deviation. For instance, the mean return for Ukraine is almost negligible, whereas Georgia, Kazakhstan and Russia have a negative mean return of -0.044, -0.04 and -0.004, respectively. Uzbekistan has the highest mean return. The standard deviation and reported range of the returns series is highest for Georgia, which shows that that the variability is the highest in banking sector in Georgia.

Similarly, the risk series for these series also show significant variations. Georgia has the highest risk score with a mean of 2.307, while Ukraine has the lowest with a mean of 0.015. The standard deviation of the risk series is highest for Kazakhstan at 0.439 and lowest for Ukraine at 0.006. Interestingly, the risk series for Russia is significantly lower than that of other countries, with a mean score of only 0.32.

The geopolitical risk series, as measured by the GGRI, RGRI, UGRI, and USGRI, also exhibit significant differences. The RGRI, which measures regional geopolitical risk specific to US, is the highest, lowest for that of Ukraine at -1.228.

[Table 2 about here]

5.2 Connectedness of Returns and volatility

Figures 1 and 2 illustrates the total connectedness based on returns and risk respectively. Total connectedness reports the overall index considering all variables in the VAR specification. This includes all measures of geopolitical risk indices. The total connectedness of returns and risk is on average 20.9% and 29.6% over the period 2018 – 2023, respectively. The total connectedness for returns series ranges between 12.4% and 31.1%. The highest spill overs index occur on 1 April 2022, which is post the start of the Ukrainian – Russian conflict. The total connectedness for risk series ranges between 13% and 62.8%. The highest spill overs index occur on 8 January 2022, which is close to the beginning of the Ukrainian – Russian conflict. Table 3 reports the summary statistics of the total connectedness.

[Figures 1 and 2 about here]

[Table 3 about here]

Table 4, Panel A shows the degree of spill overs or connectedness among the CIS economies bank stock returns of Georgia (GEO), Russia (RUS), Ukraine (UKR), Uzbekistan (UZB), Kazakhstan (KAZ) and measures of geopolitical risk, captured by GGRI, RGRI, UGRI and USGRI. The values in the table represent the percentage of spill overs from one series to

another. The connectedness is measured as the estimated contribution to the forecast error variance of a stock return i due to the shock to stock return j. The column 'From Others' reports the row sums, which refer to the total spill overs from other stock returns. The row 'Contribution to others' are the column sums of total spill overs to other stock returns. Both are computed using Equation (7). In addition, the values in the middle of the table or ij-th entries are decomposition of the Spill overs Index for each pair computed using Equations (8) and (9).

[Table 3 – Panel A about here]

Based on the table, it can be seen that there is a high level of 'own' spill overs among the countries. For instance, Georgia is highly connected to itself with 99.4% spill overs within the country, while Russia and Ukraine are highly connected to themselves with 98.8% and 99.4% spill overs, respectively. Uzbekistan and Kazakhstan also exhibit high levels of spill overs within their borders with 99.0% and 99.1%, respectively. The spill overs across countries is negligible and non-existent, which shows there is no bank interdependencies.

However, our findings suggest that there is no directional connectedness from measures of geopolitical risk to banks' returns. Similarly, banks in the CIS economies do not contribute to the variations in the geopolitical risk measures. This implies that – using the four measures of geopolitical risk – the banking sector in the CIS economies is not exposed to geopolitical risk captured by the indices in the data.

Table 4, Panel B reports the connectedness across banks volatility and geopolitical risk. Similar to returns, we find strong evidence of country's own connectedness. Cross-country connectedness is also negligible and non-existent. Furthermore, the measures of geopolitical risk are not connected, on either directions, to countries' bank risk.

[Table 4 – Panel B about here]

The spill overs table suggests that geopolitical risk has a relatively low spill overs effect on the banking sector in the CIS countries, such as Georgia, Russia, Ukraine, Uzbekistan, and Kazakhstan. This may be due to several reasons, one of which could be the closed nature of their economies. These countries tend to have less integrated financial systems and rely more on domestic sources of financing. Therefore, the impact of global geopolitical risk on their banking sectors may be limited, as they are less exposed to external financing and investment flows.

Another possible explanation is that the banking sector in the CIS countries is relatively insulated from geopolitical risk due to the high level of government control and ownership. Many of the banks in these countries are state-owned or have close ties to the government, which may limit their exposure to external shocks. Furthermore, the regulatory environment in these countries may be less responsive to external shocks, as governments may prioritize stability over market-driven reforms.

Overall, while geopolitical risk may not have a significant impact on the banking sector in the CIS countries, there are still several internal and external factors that can affect their financial systems. These include domestic political and economic conditions, changes in international commodity prices, and shifts in global investor sentiment. Therefore, policymakers and financial institutions in these countries should remain vigilant and develop strategies to address both internal and external risks to their banking systems.

6. Conclusion

The Russian-Ukrainian war has had a significant impact on the geopolitical situation in the CIS countries. The sanctions imposed by Western countries on Russia has had spill over effects on the economies of other CIS countries, particularly those that have close economic ties with Russia.

The current research analyzed the spill over effects of geopolitical risk on the banking sector of selected CIS countries. Our research revealed that that geopolitical risk has a relatively low spill overs effect on the banking sector in the CIS countries, such as Georgia, Russia, Ukraine, Uzbekistan, and Kazakhstan. This can be an indication that countries with closed economies tend to have less exposure to external financing and investment flows and may therefore be less affected by global geopolitical risks. Another explanation is that majority banks in CIS countries are state-owned or have close ties to the government and thus operate under tight government control limiting their exposure to external shocks. Overall, this study contributes to the understanding of the relationship between geopolitical risk and the performance of banking sector. Furthermore, more research is needed to explore the impact of geopolitical risk on bank-level and macroeconomic indicators to identify the specific mechanisms through which geopolitical risk affects the banking sector. This research can be helpful for policymakers to identify effective strategies for managing and mitigating this risk stemming from geopolitical situation in the region.

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Figures

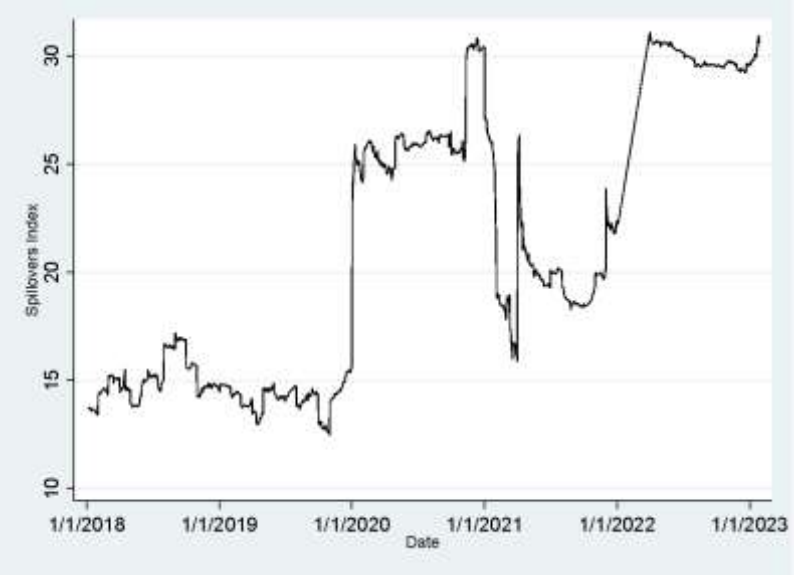

Figure 1: Returns Total Connectedness Index

Figure 2: Risk Total Connectedness Index

Tables

Table 1: Data Definitions and Sources

Country/ Series	Symbol	Definition	Freq	Source
		Bank Data		
Georgia	GEO	Composite price index of two banks	Daily	https://gse.ge/en/
Kazakhstan	KAZ	Composite price index of five banks	Daily	https://kase.kz/ru/subscribers/
Russia	RUS	Composite price index of six banks	Daily	https://www.investing.com/
Ukraine	UKR	Price index of one bank	Daily	https://www.ux.ua/ru/
Uzbekistan	UZB	Composite price index of 13 banks	Daily	https://uzse.uz/
		Geopolitical Risk		
Global Geopolitical Risk Index	GGRI	Index	Daily	https://www.matteoiacoviello.com/gpr.htm
Russia Geopolitical Risk Index	RGRI	Index	Monthly	https://www.matteoiacoviello.com/gpr.htm
Ukraine Geopolitical Risk Index	UGRI	Index	Monthly	https://www.matteoiacoviello.com/gpr.htm
United States Geopolitical Risk Index	USGRI	Index	Monthly	https://www.matteoiacoviello.com/gpr.htm

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
		Returns Series			
GEO	2214	-.044	2.316	-10.864	6.281
RUS	2214	-.004	.285	-5.102	4.819
UKR	2214	9.39E-05	.016	-.189	.116
UZB	2214	.002	.044	-.629	.462
KAZ	2214	-.040	1.247	-4.523	4.476
		Risk Series			
GEO	2214	2.307	.776	1.596	4.757
RUS	2214	.32	.091	.284	1.962
UKR	2214	.015	.006	.008	.112
UZB	2214	.045	.012	.03	.381
KAZ	2214	1.197	.439	.64	3.299
		Geopolitical Risk Series			
GGRI	2214	4.479	.557	1.272	6.291
RGRI	2214	.034	.665	-1.228	2.194
UGRI	2214	-1.327	1.328	-3.158	2.183
USGRI	2214	.837	.313	.261	1.947

Table 3: Descriptive Statistics of Total Connectedness

Variable	Obs	Mean	Std. Dev.	Min	Max
Returns	1761	20.819	6.215	12.444	31.095
Risk	1759	29.569	10.097	12.962	62.849

Table 4: Estimates of Connectedness

	GEO	RUS	UKR	UZB	KAZ	GGRI	RGRI	UGRI
				Panel A: Returns				
GEO	99.4	0.0	0.1	0.2	0.0	0.0	0.1	0.0
RUS	0.0	98.8	0.2	0.3	0.5	0.1	0.0	0.0
UKR	0.0	0.2	99.4	0.0	0.1	0.2	0.0	0.0
UZB	0.1	0.2	0.0	99.0	0.1	0.5	0.0	0.0
KAZ	0.1	0.3	0.1	0.1	99.1	0.1	0.1	0.0
GGRI	0.0	0.2	0.1	0.4	0.1	78.5	6.9	6.0
RGRI	0.1	0.0	0.0	0.0	0.0	1.8	38.6	35.7
UGRI	0.0	0.0	0.0	0.0	0.0	2.1	37.2	41.3
USGRI	0.2	0.0	0.0	0.0	0.0	2.0	29.6	22.9
Contribution to others	0.7	1.0	0.5	1.1	0.8	6.8	73.8	64.7
Contribution including own	100.2	99.8	99.8	100.1	99.9	85.3	112.5	106.0
				Panel B: Risk				
GEO	97.4	0.1	0.2	0.2	1.7	0.3	0.0	0.0
RUS	0.1	97.7	0.0	0.2	0.1	0.9	0.4	0.3
UKR	0.1	0.1	98.0	0.0	0.1	0.8	0.4	0.3
UZB	0.3	0.1	0.2	99.0	0.0	0.1	0.0	0.0
KAZ	1.5	0.3	0.1	0.2	96.8	0.6	0.1	0.0
GGRI	0.0	1.5	0.4	0.5	0.4	77.0	6.7	5.9
RGRI	0.0	0.1	0.0	0.1	0.1	1.7	38.6	35.7
UGRI	0.0	0.0	0.0	0.0	0.1	2.0	37.2	41.3
USGRI	0.0	0.1	0.0	0.3	0.1	1.8	29.5	22.9
Contribution to others	2.1	2.3	0.9	1.5	2.5	8.3	74.3	65.1
Contribution including own	99.5	99.9	98.9	100.5	99.3	85.3	112.9	106.4