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Geopolitical Shocks and Trade Integration: A Theoretical and Empirical Investigation of the BRICS

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Abstract. This study examines the impact of geopolitical shocks on international and regional trade integration, with a specific focus on the BRICS economies. The increasing fragmentation of global trade and the rising frequency of geopolitical conflicts have raised urgent questions as to how nations adapt their trade strategies amid uncertainty. The primary objective of this research is to analyze whether such geopolitical risks amplify trade volatility and accelerate shifts toward regionalism. The study hypothesizes that second-moment uncertainty shocks such as political instability, sanctions, or global conflicts lead to a disproportionate decline in foreign trade while simultaneously boosting intra-regional trade flows within BRICS. The study integrates Bloom's (2009) uncertainty shock framework into an open economy model and empirically tests it using the cross-quantilogram (CQ) method. The study employs monthly data from the BRICS countries spanning the period 2000 to 2023. The CQ method captures the asymmetric response of trade integration to varying levels of geopolitical risk. The results reveal that higher geopolitical risks, especially during extreme events, are associated with a significant uptick in trade integration within the BRICS countries, thus supporting the theoretical model. Theoretically, this work contributes to the trade literature by integrating second-moment shocks and inventory adjustment mechanisms under uncertainty into open-economy frameworks. Practically, it offers insights for policymakers seeking resilient trade frameworks in the face of global instability. The findings emphasize the importance of regional strategies such as nearshoring and friend-shoring, which can reduce vulnerability to global shocks. This study offers a valuable lens for understanding the future of trade integration amid increasing geopolitical uncertainty.

Key words: geopolitical risk; trade integration; regionalism; BRICS; uncertainty shocks; cross-quantilogram; inventory behavior.

JEL F1, F5, F15, D21

1. Introduction

The recent global economic crisis witnessed an atypically substantial and expeditious decrease in worldwide output. Furthermore, the decrease in foreign trade volumes was far more pronounced, reaching nearly double the magnitude IMF [1]. Internationally, there was a 12 % decline in industrial production and a 20 % decrease in trade volumes during the twelve-month period starting from April. These shocks were of such size that they were not seen since the Great Depression. Similar to the

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ongoing debate over the factors that led to the trade collapse in the 1930s, it is anticipated that the recent resurgence will continue to be a subject of examination by economists for an extended period of time. Why? One major reason is that conventional models of international trade and macroeconomics do not adequately consider the gravity of the events that occurred in 2008–2009 and the subsequent period after 2022, commonly referred to as the geopolitical fragmentation. Therefore, this situation raises the issue of the nature of regional integration occurring in various global settings, a topic that has received limited scholarly attention.

As I demonstrate in the next section, these models, which rely on typical first–moment shocks that I acknowledge are in operation, can effectively elucidate the reasons behind the proportional drop in international trade in relation to output or demand. In the absence of further explanations grounded in trade composition and a theoretical framework expounding the disproportionate decline of certain components, these models are unable to account for the phenomenon of trade sighted a twofold decrease compared to GDP during significant downturn episodes such as the post-2008 or post-2020 periods [2].

In this paper, I examine why geopolitical shocks make international trade more volatile by utilizing uncertainty shock idea within regional setup. For example, the global financial crisis, 9/11 terrorist attacks, Brexit, deadly pandemic, US-China Trade war, Russian-Ukraine conflict, and recent Middle East tensions increase uncertainty about the regional economies' future. In wake of such events countries adopt diverse trading strategies to recover from these crises. In this respect, an important and rather ignored facet of regionalism is the uncertainty issue. Bloom [3] illustrates that second-moment shocks (political instability, financial crises, or unexpected policy changes) might cause firms decision to import or export due to increased uncertainty.

This methodology incorporates the uncertainty shock idea into a global economy where countries in different regions participate in trade endeavors. This theoretical framework differs from the open-economy setup [4] as this phenomenon entails the participation of regional firms in the import and export of resources from both international and domestic (regional) merchants. The foundation of this framework is rooted in the recognition that a substantial proportion of contemporary global trade comprises both goods and services that feature global production, such as capital goods or industrial machinery and energy products as recently confirmed by the experiences of the BRICS [5, 6] and European countries [7]. Since the ordering costs for foreign inputs are higher, this model predicts that firms will keep an inventory of regional inputs on hand in the face of rising energy commodity prices, supply chain delays caused by transportation costs, and other indirect channel of geopolitical risks [8].

In accordance with Hassler's [4] and Novy & Taylor [9] inventory model that considers fluctuating uncertainty over time, here I demonstrate that when faced with a significant geopolitical shock affecting business conditions (such as sanctions and global supply chain disruptions), regions strategically adjust their

inventory policies by reducing the trade of foreign inputs to a greater extent than domestic inputs within the region. This adjustment is made in response to changes in productivity or demand for final products.

Therefore, the varying responses of various regions cause a greater contraction in their foreign trade operations and a stronger recovery in their domestic trade or intra-regional trade — that is, trade shows greater volatility. It is important to note that not all regions will possess the capacity to withstand the global shock, since a significant number of regions may face challenges in procuring inventories from domestic or regional suppliers, rendering them susceptible to geopolitical uncertainty. Geopolitical shocks have the effect of amplifying the fluctuations in international trade due to the varying cost structures in different regions [10]. This is a novel projection that has not been previously examined or suggested, however it demonstrates that it aligns with the data in case of BRICS, African Union, Asian regions and many other developing blocs [11].

In line with the above logical reasoning, I provided additional evidence that this proposed model produces a broader range of supplementary and novel testable predictions considering gain and loss for regional trade integration in BRICS bloc due to geopolitical fragmentation of world. The effects for less resilient region should be muted for countries characterized by highly import dependency outside the region. Commodity prices like energy and agriculture commodities are case in point [12, 13].

Empirical research substantiates the notion that regionalism ought to be comprehended as a regulatory mechanism. Countries that encounter a higher frequency of interstate disputes are more inclined to establish a comprehensive Regional Trade Agreement (RTA), such as a custom union or common market. Conversely, the presence of international insecurity acts as a deterrent to the establishment of preferential and free trade agreements [14].

Hence, the current global economic decline exhibits qualitative similarities to past postwar contractions in global trade and can be analogously applied to regional trade dynamics [15]. Indeed, this study argues that this specific approach has the potential to enhance understanding about the fragmentation of international trade, regional integration, and volatility in the long term, extending beyond the confines of geopolitical crises.

The purpose of this study is to evaluate how second-moment uncertainty shocks influence international and regional trade integration.

Research Hypotheses:

H1: Geopolitical uncertainty positively influences regional trade integration among BRICS countries by increasing intra-bloc trade activity during periods of elevated external risk.

H2: Second-moment uncertainty shocks, such as geopolitical conflicts, amplify trade volatility and accelerate a shift from global to regional trade networks.

The paper is structured in the following manner. Section 2 delves into the literature review. In section 3, I delineate theoretical framework and do provide basis

for some comparative analysis. In section 4, explain the empirical method and data used in the study, in section 5 I empirically prove to what extent this proposed theory of uncertainty shocks is responsible for recent international trade dynamics due to geopolitical risk. Section 5 concludes with policy recommendations and strategies for the trading blocs.

2. Literature Review

This work diverges from traditional static trade models, such as those reliant on the gravity models, by directing its attention towards the dynamic nature of regional trade. The unique aspect lies in the fact that shocks to the instability of idiosyncratic factors, specifically second moment shocks, can lead to distinct adjustments in imported and domestic inputs. The existing body of theoretical and empirical research has predominantly concentrated on first moment shocks, such as those affecting trade cost, exchange rate and productivity. This methodology holds significance for both scholars and policymakers who aim to comprehend the resilience process in relation to geopolitical occurrences.

Additionally, it may prove applicable in comprehending historical events such as the Great Depression, 9/11 incident, Brexit, the Covid-19 pandemic, and the Russian-Ukrainian conflicts, among others [16]. Furthermore, it could assist in explaining the reaction of regional and global trade patterns during forthcoming economic downturns and political mergers. Similar to the verdicts of Vicard [14], the theoretical reasoning posits that the decision to reform and enhance a regional trading bloc is influenced by political and economic factors, mostly driven by the presence of uncertainty.

While I am not first author to examine uncertainty shocks in the realm of globalization, the existing work has not yet concentrated on the recent escalation of uncertainty shocks. Baldwin & Krugman [17], employ a real-options framework to elucidate the phenomenon of trade hysteresis in the presence of major swings in exchange rates. However, their model exclusively incorporates conventional first-moment shocks.

In recent times, there has been a rising interest in the significance of uncertainty within the realm of trade policy, trade restrictions in the form of sanctions, and trade agreements across different nations [18, 19]. The uncertainty surrounding Brexit has already resulted in a net withdrawal of traded goods and a decrease in the bilateral trade flows between the United Kingdom and the European Union [20]. The impact of these effects differs depending on the country, industry attributes, and trade costs.

Handley [21] and Handley & Limão [22] investigate how uncertainty about trade policies affects export decisions made by individual firms. Their findings indicate that trade policy uncertainty has a negative effect on the decision to enter export markets.

In a dynamic model of heterogeneous firms, Carballo et al. [2] conduct a more in-depth analysis of the interplay between policy and economic

uncertainty and its impact on trade volumes. The primary factors that led to the decline in U.S. trade volume during the 2008 financial crisis are identified as these two forms of uncertainty and their interplay. It is argued that trade agreements have the potential to alleviate the negative outcomes resulting from heightened levels of uncertainty.

Mamman [23] links digitalization and institutional quality with inclusive economic responses, relevant for understanding adaptive trade mechanisms. The studies mostly concentrated on the broad scope of international trade. The fundamental mechanism employed by this system is based on the conventional wait-and-see channel, which, as demonstrated in the theory, tends to enhance the intensive margin of trade. This study places particular emphasis on the financial channel as a means of transmitting uncertainty shocks to trade, in addition to the scholarly work.

Novy & Taylor [9] integrate irregular inventory investment into a dynamic trade model by employing the wait-and-see approach to analyze the impact of uncertainty shocks on trade dynamics. Their model does not take into account a significant margin response, and they recognize the need to accommodate such responses.

In line with proposed methodology, Taglioni et al. [24] conducted an empirical study to examine the correlation between trade for a group of nations and uncertainty on a quarterly basis.

Carrière-Swallow & Céspedes [25] observe domestic input data on consumption and investment in forty nations, focusing on their response to shocks, in contrast to Bloom [3] analysis of US domestic data.

Gourio et al. [26] investigates the response of G7 countries to increased volatility. However, they lack a theoretical framework and fail to address the differences that exist across regions and firms. International trade flows are not taken into consideration in any of these articles. A previous study offers valuable insights into the correlation between market uncertainty and international trade, with a specific focus on China. Additionally, it presents a theoretical framework that aims to elucidate the observed phenomenon [27].

Baldwin [28] compiles many techniques to documenting the Great Trade Collapse of 2008–2009, while Bems et al. [29] surveys the literature on the topic. In the meantime, a structural approach of international trade is developed by Eaton et al. [30]. This model elucidates the decline in trade through a combination of first-moment shocks, encompassing a reduction in the value of investment in irreversible products, a decline in the demand for traded commodities, and an escalation in trade conflicts. According to their findings, most of the decrease in trade can be explained by the first moment shock. In contrast, this methodology can endogenize the regional response difference by generating the demand collapse with a second-moment uncertainty shock. It is not necessary for first-moment shocks or a rise in trade conflicts to explain the instability of trade; regional firms respond to the uncertainty shocks by adopting a wait-and-see channel.

This methodology aligns with the perspective that trade frictions remained mostly unchanged over the recent crisis. According to the findings of Bown & Crowley [31] protectionism was effectively restrained during the Great Recession.

Kee et al. [32] specifically determine that a spike in tariffs and antidumping duties accounts for less than 2 percent of the Great Trade Collapse. Likewise, the impact of financial stress and the drying up of trade credit is emphasized by Amiti et al. [33].

Nevertheless, Guiso & Parigi [34] have demonstrated through their analysis of Italian manufacturing enterprises that the adverse impact of uncertainty shock on investment cannot be accounted for by limitations in liquidness and stocks. While credit frictions are not included in this methodology, I acknowledge that these processes may be beneficial and do not exclude the possibility of other mechanisms playing a role.

According to Li et al. [35], the reduction of barriers in international trade and foreign direct investment (FDI) has resulted in a significant increase in global trade and FDI inflows. By constructing a two-region model that involves the volatility of commodity market prices, supply chain disruptions, FDI, logistics cost and other trading arrangements, it is possible to accurately reproduce the greater fluctuations in regional trade compared to overall economic activity. On the other hand, I establish a connection between the heightened volatility of trade dynamics and the adjustment of inventory in reaction to shocks of uncertainty. The international trade volatility in the proposed model is influenced by compositional effects, which are applicable within regional firms. The process via which trade liberalization shifts a nation's production mix toward goods in which it has a comparative advantage is known as the "composition of effect".

This paper is also connected to the work of Alessandria et al. [36], who provide a rationale for the decrease in international trade by attributing it to alterations in inventory behavior of firms, which are influenced by a supply-shock occurring in the first moment and procyclical inventory investment. On the other hand, this study centers on the significance of heightened uncertainty in the context of second-moment shocks as the primary catalyst for firms' inventory changes. The recent trade integration inside the BRICS region [5], together with its expansion into BRICS+6 in perspective of energy security, is a notable characteristic of the current uncertainties [37]. In this theoretical study, I utilize an observable measure known as second moment shocks that could be used to assess this phenomenon. Nevertheless, it is crucial to note that there exists a significant diversity among regions that shows resilience amid second moment shock.

To conclude, studies provide a model that incorporates second-moment shocks in the absence of inventory. This study represents a pioneering effort in integrating inventory holdings and uncertainty shocks inside a unified framework and subsequently applying this paradigm to a regional context to explain trade dynamics.

According to Alessandria et al. [38], the heterogeneous productivity distribution variance is influenced by a second-moment shock, which differs from this approach. There is an increase in trade following a subsequent shock. The increasing disparity in productivity has distinct implications for exporters compared to non-exporters, resulting in this outcome as exporters appear to have a high level of productivity in every region. Exporters in the region have a greater advantage over exporters outside the region due to the increased dispersion of productivity shocks. In contrast to the given situation, where the shock probability of all business firms changes symmetrically and trade declines following a second-moment shock leading to increased domestic trade activities.

3. Materials and Methods

3.1. Theoretical Model Construction

This study employs a methodology that relates the likelihood of trade integration to the volume of bilateral trade. The findings demonstrate that a small and regional economy may be motivated to focus on producing goods in which it lacks a competitive advantage. This is attributed to the inherent uncertainty associated with international trade.

This study presents a fresh mechanism to elucidate the susceptibility of regional trade integration to economic shocks. This approach expands upon Bloom [3] theory of uncertainty shocks by incorporating international trade and extending its application to the broader context of the open economy. Businesses usually obtain their raw materials from either domestic or international suppliers, with the latter option being more expensive. Firms also keep a stock of intermediate goods due to the presence of fixed costs related to the process of ordering, as described by Novy & Taylor [9].

I demonstrate that in the presence of an uncertain shock, businesses should promptly modify their inventory policies by significantly reducing foreign order for their inputs. As a result, countries will have the opportunity to take part in onshoring, nearshoring, and friend shoring. Therefore, this response enhances regional integration by reducing international trade flows to a greater extent than domestic or regional economic activity.

Consider an open economy with firms that import inputs (both intermediate and final goods) from abroad and also source inputs domestically. Let D represent domestic inputs and F represents foreign inputs. Firms make decisions on sourcing inputs based on costs, including inventory holding costs, under uncertainty.

Assume that there is a Cobb-Douglas production function for each firm in a specific country of each region.

$$F\left(A, I_D, I_F\right) = A\, I_D^{\alpha}\, I_F^{1-\alpha}, \tag{1}$$

Where: A is a productivity parameter, I_D and I_F represent inputs sourced domestically and from foreign supplier respectively, an input sourced from foreign suppliers.

Given the scenario of distinct goods and potential trade in the future, companies import both I_D and I_F under the Armington assumption with depreciation at rate δ. Each firm's output Q has an iso-elastic demand with elasticity η.

$$Q = \psi P^{-\eta}, \tag{2}$$

Where ψ refers as a demand shifter. In the short run, since a firm has fixed factor prices, it operates based on given factor prices and meets product demand.

In the proposed model, I_D and I_F — say, represent specialized domestic and foreign machinery. In this model, the firm can be seen as ordering a combination of these traded products from various countries within or outside a region. So, the total inventory holding cost is a function of the quantities of each type of input and their respective costs, adjusted for uncertainty.

Additionally, incorporating uncertainty, geopolitical risk (G) is modelled as an additional variable that influences the costs and availability of foreign inputs, particularly affecting I_D and I_F. The model needs to account for the impact of G on firms' ordering policies for these inputs, considering the risk-adjusted cost function for ordering foreign inputs. Incorporating uncertainty, geopolitical risk (G) is modelled as an additional variable that influences the costs and availability of foreign inputs, particularly affecting I_D and I_F. The model needs to account for the impact of G on firms' ordering policies for these inputs, considering the risk-adjusted cost function for ordering foreign inputs:

$$C(G) = C_D(I_D) + C_F(I_F). \tag{3}$$

As inputs lose value over time, requiring the company to replenish them periodically. Therefore, a firm implements an s-S inventory policy and retains its inputs due to a consistent order cost. Hence, placing an order lead to the creation of domestic trade flows, imports, and exports, in that direction which is a is a factual event within the realm of intra-trade. In the short term, purchasing foreign inputs may result in higher fixed costs compared to buying domestic inputs. As an experienced investor, the firm occasionally replenishes its inventory, storing items according to a specific policy to manage fixed ordering expenses. Scarf [39] shows that an s-S policy is the best choice when dealing with these costs (shocks).

It is assumed that the fixed costs for ordering foreign inputs are higher than those for domestic inputs, with $0 < C_D < C_F$. As per what was found by Kropf & Sauré [40], there is a notable connection between fixed costs per shipment and shipping distance. This correlation was noted in situations where the countries did not have a common language and were without a free trade agreement or political ties. Both types of fixed costs are considered equal, except for this distinction.

According to Equation (1), the firm's usage of I_D and I_F is directly linked to Q (output), irrespective of demand and productivity shocks. Analogous to study by

Hassler [4], I deliberate that τ_D and τ_F are directly related to output Q as well as I_D and I_F, respectively. Therefore, this can be put together as:

$$\Delta\tau_D* = a_D + q. \tag{4}$$

Given that a_D is constant, $\Delta\tau_D*$ signifies the desired inventory expansion, while $q \equiv \Delta(Q)$ denotes production growth. Within this framework, the target level is influenced by the country's higher adjustments in production due to unexpected events. For the sake of simplicity, the same equation applies to τ_F, but will be followed without including the *D* and *F*.

This study incorporates a theoretical approach in solving the dynamic inventory problem. This analysis examines a quadratic loss function that imposes penalties for departures from the target $\tau*$, by as $1/2z$, where z is defined as $z \equiv \tau - \tau*$. If ordering costs are absent, the firm will have to consistently set τ equivalent to the target $t*$, with no deviation. However, this model considers non-zero ordering costs ($C > 0$), which require the company to weigh the fixed expenses against the costs of deviating from the target. Every time there is a change in inventory, firm incurs fixed costs C to modify τ.

Suppose a firm follows an s–S policy for each input, where s is the reorder point and S is the target inventory level, and the policy must be adjusted to account for geopolitical risk. Therefore, the optimized solution to this inventory problem follows with a random outcome q. Understanding optimal control can be seen as a consequence of the following. When the inventory z-deviation drops below a certain threshold, the firm initiates an order for the amount θ needed to replenish the inventory to the maximum deviation value $S = s + \theta$. In full notation, there are s_D, S_D, θ_D for domestic (regional) inputs and s_F, S_F, θ_F for foreign inputs. It is fitting to phrase the problem in the following manner:

$$\min_{\{U_t, z_t\}_0^\infty} E_0 \int_0^\infty e^{-rt}\left(\frac{1}{2}z_t^2 + U_t C\right) d_t \tag{5}$$

subject to: $z_0 = \bar{z}$

$$z_t + \Delta_t = \begin{cases} \text{free} \\ z_t - \delta d_t - d_q \end{cases} \text{ if } t_t \text{ is adjusted otherwise;}$$

$$U_t \Delta_t = \begin{cases} 1 \\ 0 \end{cases} \text{ if } t_t \text{ is adjusted otherwise.}$$

Given that (discount rate) $r > 0$ and $\delta > 0$ (rate of depreciation for inputs), the equation $dX_t / X = \delta d_t$ holds true, with *Ut* representing a dummy variable that equals 1 when the firm meets τ_t by paying C. Keep in mind that the input only depreciates when it is actively utilized in the production process, not when it is simply stored.

Equation (1) and equation (2) illustrate the impact of shifts in productivity A and demand ψ on q, as a result of the market clearing phenomena. The trade of exports and imports serves as demand shifters in response to fluctuations in trade conditions. When and $\sigma > 0$, the instant probability per unit of time $(\sigma/2)$ causes q to shift either upwards or downwards by the magnitude of ε.

$$q_t + d_t = \begin{cases} q_t + \varepsilon & \text{with probability } (\sigma/2)d_t \\ q_t & \text{with probability } 1 - \sigma d_t \\ q_t - \varepsilon & \text{with probability } (\sigma/2)d_t \end{cases}. \quad (6)$$

In this framework, the shock ε can be understood as an abrupt variation in trade conditions that results in integration. The inclusion of the output-to-target inventory ratio in Equation (4) leads to a change in the target inventory level $\tau*$ when q is shifted. Assuming that it is significantly large, it is optimal for the firms to adjust τ. Indeed, when there is a positive shock to output, it results in an increase in $\tau*$ that is significant enough to create a negative deviation z that falls under the minimum trigger point of s.

Consequently, the firm must increase its inventory of more $\tau*$. Conversely, in the event of a negative shock, the value of more $\tau*$ decreases to a level where z surpasses the maximum trigger point, necessitating the firm to engage in destocking of more $\tau*$. So, to keep the model controllable, it allows the firm to restock (integrate) and destock (disintegrate) contingent upon the direction of the uncertainty shock and how it affects different regions differently.

The first moment of the process described by equation (6) is zero and constant, unrelated to ε. Assuming ε remains constant in the following. The crucial parameter σ (arrival of shock) is or primarily interest, which is the primary measure of uncertainty. It marks the end of the second shock moment. Any change in σ is seen as an alteration in the level of uncertainty. A shock's frequency, not its size, is determined by σ. The likelihood of greater shock is not raised by a higher level of uncertainty in this model. To simplify the setup, Hassler [4] approach was adopted by allowing an indexed degree of uncertainty $\sigma\lambda$ to randomly alternate between two conditions $\lambda \in (0,1)$, a low uncertainty and high uncertainty ($\sigma 1$), with $\sigma 0 < \sigma 1$. The uncertainty conditions undergo a Markov process during their transition:

$$\lambda_t + d_t = \begin{cases} \lambda_t & \text{with probability } 1 - \gamma_\lambda d_t \\ \overline{\lambda}_t & \text{with probability } \gamma_\lambda d_t \end{cases}. \quad (7)$$

For $\lambda_t = 0$, $\overline{\lambda}_t = 1$ otherwise. The likelihood of shifting the uncertainty condition at $d_t = \gamma_\lambda d_t$, with γ — 1 representing the predicted period until the next switch. To calibrate the model, selecting parameter values for $\sigma 0, \sigma 1, \gamma 0$ and $\gamma 1$ that align with uncertainty fluctuations over the past few decades is very crucial. The Bellman equation for inventory problems and system solutions could be derived

to utilize numerical methods to calculate the bounds for the four endogenous variables: $s0$ and $S0$ for low uncertainty $\sigma 0$, and $s1$ and $S1$ for large uncertainty $\sigma 1$.

In Equation (7), the parameters $\gamma 0$ and $\gamma 1$ represent key coefficients governing the relationship between inventory adjustments related to trade and economic shocks. This model usually assumes that firm knows the stochastic process parameters signified through equations (6) and (7) considers them while solving its optimization problem (5).

Following the above model, this section adapted the hypothetical illustration of how geopolitical uncertainty endogenously impacts the s-S bounds of the firm. A firm reduces boundaries in reaction to uncertainty in the above modelling. It also explores the comparative statics for the fixed cost of ordering C and the depreciation rate δ. As previously stated, the model in this study requires data in order to be solved empirically, thus hypothetical illustration from the calibration of US manufacturing data has been adapted to portray the idea behind the adjustment of s-S policy, and then to practically show how the firms and domestic countries take decision by further using the BRICS trade data in this study. Increasing uncertainty changes s-S bounds, as shown in Figure 1.

The vertical scale shows the percentage departure from the intended $\tau *$. Two sets of s-S bounds exist: one for low uncertainty condition 0 and 1 for high uncertainty condition. Low uncertainty is constant at $\sigma 0 = 1$, while high uncertainty $\sigma 1$ varies horizontally. By construction, the limits for the two states coincide at $\sigma 0 = \sigma 1 = 1$. Since s-S boundaries are endogenous, they all shift when $\sigma 1$ increases. Importantly, increasing $\sigma 1$ does not significantly impact the low-uncertainty state boundaries.

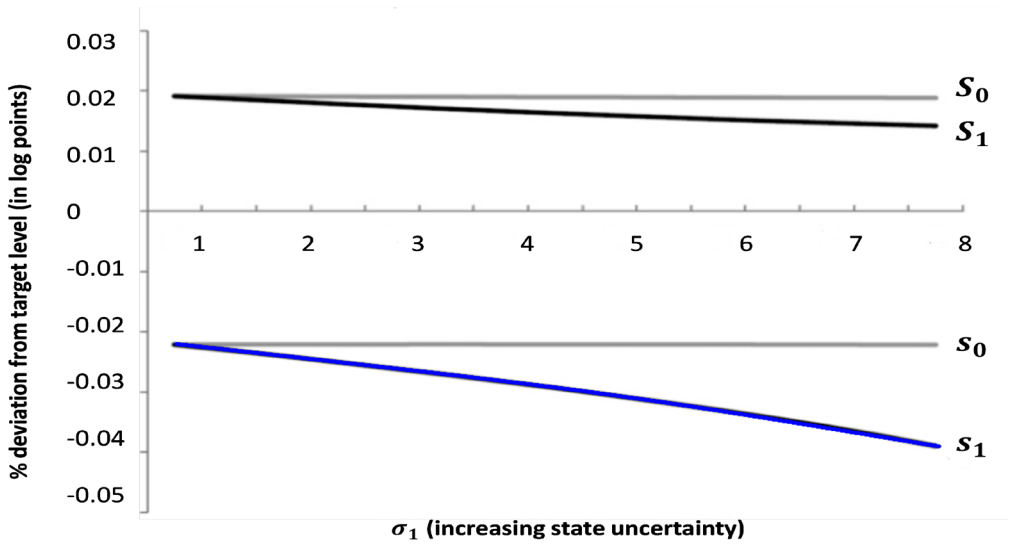

Figure 1. Variation in s-S boundaries amid increased uncertainty shock

Source: Hypothetically constructed by author using the S-s policy rule for US data; the state of low uncertainty is depicted in gray, whereas the state of high uncertainty in black and blue.

Here two explanations stand out. First, the lower point of trigger is always far away from the target than the return point. This applies to both uncertainty conditions $(|s0| > |S0|$ and $|s1| > |S1|)$. Uncertainty increases the probability of a shock to the firm's output, causing it to manage its inventory to the return point. Thus, larger shock probabilities mean the firm should manage inventory overhead target more often. To combat this, the firm should place the return point closer to the goal. Second, the high-uncertainty state boundaries fall with uncertainty shock, $\partial S1/\partial\sigma 1 < 0$ and $\partial s1/\partial\sigma 1 < 0\, \partial s1/\partial\sigma 1 < 0$ .As mentioned above, increased uncertainty shocks require more frequent changes, hence $S1$ must be decreased to avoid excessive inventory holdings. The lower point of trigger $s1$ decrease probably reflects increased waiting option-value. Suppose the firm has low inventory and orders C at fixed costs to stock up. If the firm is shocked immediately, it must pay C again. Waiting might have saved the firm a single round of C and similarly longer waiting lowers $s1$. The research on uncertainty and waiting option value naturally supports this approach.

Figure 2 condenses the qualitative findings. Case 1 shows a hypothetical situation with negligible fixed costs C and uncertainty σ. The low fixed costs and lack of uncertainty result in symmetric $s1$ and $S1$ bounds around the target level resulting in a small bandwidth (box height). In case 2, fixed costs rise, pushing $s1$ and $S1$ symmetrically far away from the target $\tau*$. The condition that is considered in this study with nonnegligible uncertainty is cases 3 and 4. Case 3 uncertainty has two consequences related to case 2. Initially, both $s1$ and $S1$ move down, making them asymmetric about the target. Second, bandwidth expands. In Case 4 increased uncertainty compounds these impacts.

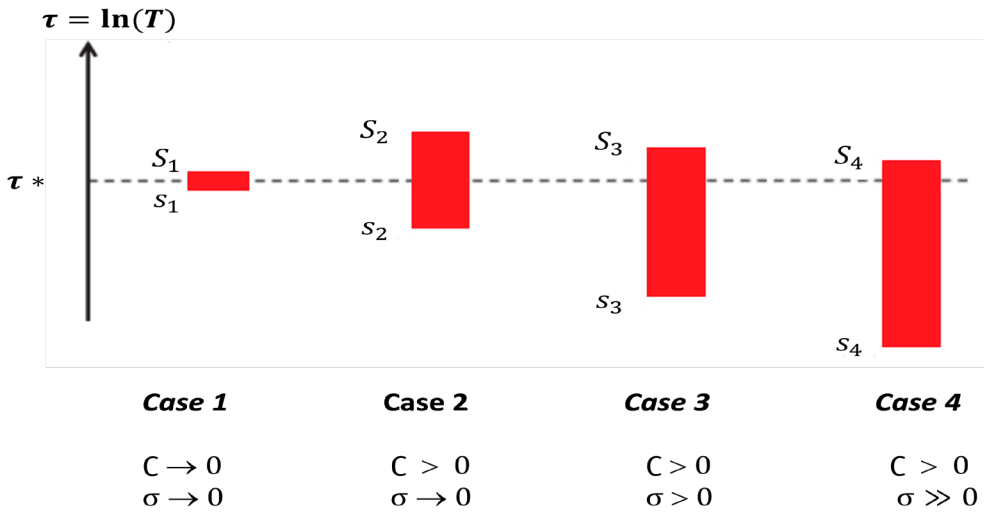

Figure 2. The impact of uncertainty shock on the s-S boundaries and the expansion of bandwidth

Source: created by author based on the s-S policy data of US.

Using a method in which the probability of trade integration is a function of trade volume, I show that a small economy may be compelled to specialize in the production of goods, which has a competitive disadvantage due to the inherent uncertainty internationally. To explain the sensitivity of regional trade integration to economic shocks, I propose a novel mechanism in section 3 built upon uncertainty shock theory of Bloom's [3], by modelling international trade and outspreading it to the open economy.

As discussed, firms typically source their raw materials from either domestic or international vendors, with the latter choice being more costly. Firms also maintain an inventory of intermediates owing to the occurrence of such fixed costs associated with ordering. It is proved empirically that when faced with an uncertainty shock, businesses should make the appropriate adjustment to policy related to inventory by drastically decreasing orders of foreign input. Consequently, nations will be able to engage in onshoring, nearshoring, and friend shoring. Hence, trade integration is strengthened as a result of this response since international trade flows are reduced by more than domestic/regional economic activity.

3.2. Data Description

The key determination of this study is to measure responsiveness of trade integration to geopolitical risk events in BRICS countries by incorporating the monthly data from January 2000 to December 2023. Considering that geopolitical risk is a critical factor in promoting or hindering regional trade integration, we have chosen this period due to the following reasons.

1) Impact of global events. The aftermath of the global financial crisis, combined with the events of 9/11 and Brexit, led to a substantial slowdown in international trade [19]. This shift contrasts with the previous trend of expanding trade over multiple decades.
2) Trade war and uncertainty. The reversal in trade expansion occurred alongside increasing trade conflicts between the United States and China. Additionally, there has been a rise in populism and greater skepticism regarding the benefits of globalization. Literature highlights these factors as contributing to the changing landscape of global trade.
3) Pre-existing trends. Even before the COVID-19 pandemic and the invasion of Ukraine, which further strained regional relations, the trends mentioned above were already profound. Therefore, the examination of geopolitical factors becomes crucial in evaluating regional ties and their impact on trade integration.

Data nature and sources are designated in Table 1.

This study uses aggregate and disaggregate measures of GPR as explanatory variables as uncertainty shocks, and TI (measured as the growth rate of bilateral trade volume of a bloc) as the dependent variable. Caldara & Iacoviell [41] used daily geopolitical tension articles since 1900 to create a measure of negative events and dangers.

Table 1. **Description of Data and Sources**

Variable	Specifications	Source
	(Dependent Variable)	
Trade Integration (TI)	Total bilateral Trade Volume with Monthly frequency for each bloc (Trade volume converted into Growth rate)	United Nation (UN) COMTRADE Database (https://comtradeplus.un.org/data/)
	(Independent Variables)	
Geopolitical Risk (GPR) Index	The GPR index is created by counting the number of newspaper articles that pertain to six categories of geopolitical events and tensions in 11 prominent newspapers every month	Caldara & Iacoviello [41]
Geopolitical Risk Threats (GPRT) Index	The GPRT index accentuates two main terms: military tensions and nuclear tensions, including threats pertaining to war, peace, military prowess, nuclearization, and terrorism	Caldara & Iacoviello [41]
Geopolitical Risk Acts Index (GPRA)	The GPRA index highlights certain keywords, such as the initiation and blowout of different conflict and the operational phase of terrorist actions	Caldara & Iacoviello [41]

3.3. Cross-Quantilogram Approach

The study examines the response of growth in trade volume to aggregate and disaggregate geopolitical risk measures, more specifically trade integration in BRICS. To scrutinize this, Han et al. [42] cross-quantilogram (CQ) method is used. The CQ method possesses several distinct qualities.

Firstly, it can estimate bivariate volatility spillovers even in existence of asymmetrical distributions and extreme observations.

Secondly, the CQ approach can determine the duration of shocks from one variable to another across different quantiles.

Thirdly, it relaxes the stationarity assumption and is appropriate for fat-tailed distributions.

Finally, this procedure allows for the estimation of higher lags, enabling the simultaneous assessment of the connectedness between two indicators in terms of period and magnitude.

The practice of CQ analysis in this study provides a new econometric approach to compare the influence of GPR on trade integration in BRICS. This approach allows for a more comprehensive analysis of the association between geopolitical risk and trade integration, captivating the dynamic nature of both variables over time. CQ among two events $\left\{y_{1t} \le q_{1t}\left(\tau_1\right)\right\}$ and, $\left\{y_{2t-k} \le q_{2t-k}\left(\tau_2\right)\right\}$ where k signifies the lag length $\left(k = \pm 1, \pm 2\right)$ for a pair of τ_1 and τ_2:

$$\rho_{\tau}(k)=\frac{E\left[\psi_{\tau_1}\left(y_{1t}\le q_{1t}(\tau_1)\right)\psi_{\tau_2}\left(y_{2t-k}\le q_{2t-k}(\tau_2)\right)\right]}{\sqrt{E\left[\psi^2_{\tau_1}\left(y_{1t}\le q_{1t}(\tau_1)\right)\right]}\sqrt{E\left[\psi^2_{\tau_2}\left(y_{2t-k}\le q_{2t-k}(\tau_2)\right)\right]}}, \tag{8}$$

Where: y_{it} shows the stationarity intense of time series variables; I is equivalent to 1, 2, or 3, and illustrates liability, asset or net asset and t is time (t = 1, 2, 3…T). $F_i(\cdot)$ and $f_i(\cdot)$ show the functions of distribution and density measures of y_{it}, I = 1, 2. $q_{it}(\tau_i)=f\{v:F_i(v)\ge\tau_i$ denote the function of the equivalent quantile for $\tau_i\in(0,1)$ and, $\psi_a(u)=1[u<0]-a$ which is the quantile-hit procedure. Different quantiles' serialized dependence among the variables is controlled within the CQ framework.

Hence, both series belong to the monotonous change in the model. In the case of two events $\{y_{1t}\le q_{1t}(\tau_1)\}$ and $\{y_{2t-k}\le q_{2t-k}(\tau_2)\}$ $\rho_{\tau}(k)=0$ indicate the lack of cross-sectional dependence from event $\{y_{2t-k}\le q_{2t-k}(\tau_2)\}$ to event $\{y_{1t}\le q_{1t}(\tau_1)\}$. When assessing how $\rho_{\tau}(k)$ differs with the kth lag span, we can determine the variational cross-quantile dependence among foreign liabilities, assets and net assets at diverse time horizons. Therefore, this lag difference accounts for the level and extent of the dependence. We adopt k = 1, 3, 6, 12, 24 and 36 in this investigation.

Then, we move to check the level of significance $\rho_{\tau}(k)$ using a Ljung-Box test, and this computes t-statistics as follows:

$$Q^*_{\tau}(p)=T(T+2)\sum_{k=1}^{p}\hat{\rho}^2_{\tau}(k)/(T-k). \tag{9}$$

Where $\hat{\rho}_{\tau}(k)$ denotes the cross-quantilogram estimated below:

$$\hat{\rho}_{\tau}(k)=\frac{\sum_{t\text{-}k+1}^{T}\psi_{\tau_1}\left(y_{1t}\le\hat{q}_{1t}(\tau_1)\right)\psi_{\tau_2}\left(y_{2t-k}\le\hat{q}_{2t-k}(\tau_2)\right)}{\sqrt{\sum_{t-k+1}^{T}\psi^2_{\tau_1}\left(y_{1t}\le\hat{q}_{1t}(\tau_1)\right)}\sqrt{\sum_{t-k+1}^{T}\psi^2_{\tau_2}\left(y_{2t-k}\le\hat{q}_{2t-k}(\tau_2)\right)}}, \tag{10}$$

where $(i = 1, 2)$ shows the examined function of the quantile.

4. Results

4.1. Preliminary analysis

The results of descriptive analysis in context of BRICS economies are summarized in Table 2. Prior to application of the CQ technique, descriptive analysis is a condition to know the nature of dataset. When examining the data features of the BRICS, it has been noticed that it has a larger kurtosis distribution. Notably, the Jarque-Bera test decisively disproves the normal distribution hypothesis for series. When taken as a whole, the data's abnormalities confirm its suitability for the CQ technique. The data is integrated at the level i. e., I (0), as shown in Figure 3, a time series trend with non-stationarity features.

Table 2. **Descriptive statistics**

	BRICS (TI)	GPR	GPR_T	GPR_A
Mean	0.02	104.94	104.12	107.63
Median	0.07	91.23	93.42	87.11
Maximum	9.95	512.52	413.29	854.07
Minimum	–10.21	45.06	44.36	28.45
Std. Dev.	0.98	4.29	45.89	85.95
Skewness	–0.87	28.70	3.04	5.47
Kurtosis	82.19	8447.35	6.42	43.36
Jarque-Bera	72155.19	8447.35	2499.12	4294.24
Probability	0.00	0.00	0.00	0.00
Observations	288	288	288	288

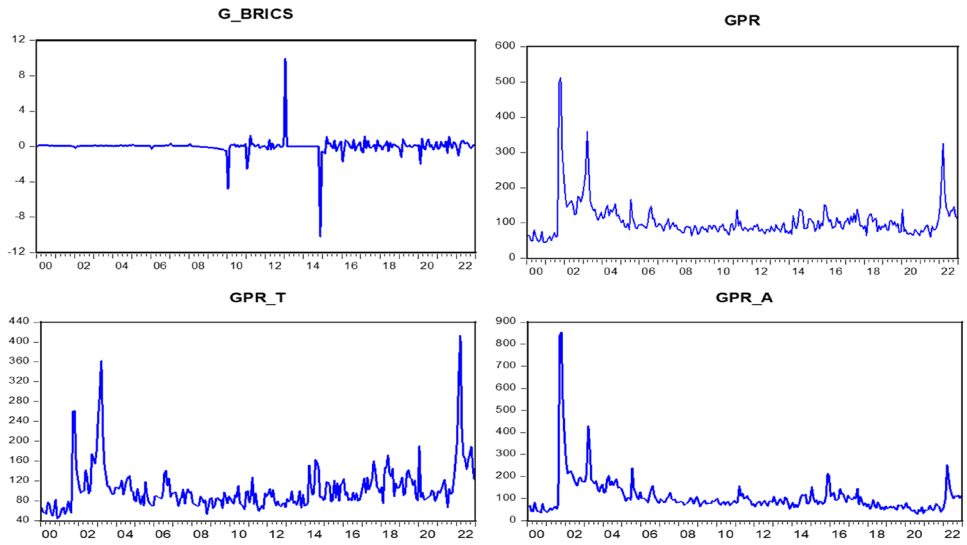

Figure 3. Growth trend in trade volume of BRICS and Geopolitical Risk indices

4.2. Main Findings

This study employs the cross quantilogram (CQ) method to measure the spillover inciting from GPR, GPRA and GPRT indices on TI in BRICS. The heat map scale generated from the CQ method includes the vertical and horizontal axes. Trade Integration for each bloc in respective heat map is depicted on the horizontal axis, Typically, the CQ procedure demarcates the short, medium and long memories to examine the connectedness between variables.

By using the monthly data, we refer lag 01, 03, 06, 12, 24 and 36 for the monthly, quarterly, bi-annually, annually, biennially, and triennially periods respectively. In our approximation, the "monthly" and "quarterly" define the short-term,

the "bi-annual" and "annual" refers to the medium-term and, biennially and triennially span captures the spillovers in the long-term. while global geopolitical risks (GPR), geopolitical risk "acts" (GPRA) and "threats" (GPRT) indices are represented by vertical axis. The rationale behind this approach stems from the recognition that inventory adjustments and trade agreements often require a significant amount of time to come into effect following notable geopolitical uncertainty.

Consequently, examining various timeframes allows for understanding and comparing the lasting impact of geopolitical events in BRICS bloc [43]. Therefore, by employing CQ approach, the study explores the response of TI to the aggregate and disaggregate GPR events in BRICS with results presented in short memory (lag 01 and 03), medium memory (lag 06 and 12) and long memory (lag 24 and 36) manner.

The analysis of the heat maps provides insights into the impact of geopolitical risk, geopolitical risk acts, and geopolitical risk threats on trade integration within the BRICS bloc. In Figure 4, concerning geopolitical risk, the short-term analysis suggests that higher geopolitical risk can have positive and negative effects on trade integration in BRICS.

While extreme geopolitical risk may lead to increased trade integration, lower to medium levels of geopolitical risk tend to hinder trade ties. In the medium term, there is a positive association between geopolitical risk and trade integration, indicating that certain risk events stimulate closer trade relationships [10]. However, the long-term analysis does not show a significant association, suggesting that geopolitical risk may have a limited impact on trade integration over extended periods.

When considering geopolitical risk acts, the outcomes in Figure 5 show a negative connection in the short term, representing that higher geopolitical risk acts can impede trade integration. Though, there are also instances of positive associations during extreme risk events, suggesting that certain high-risk events may stimulate

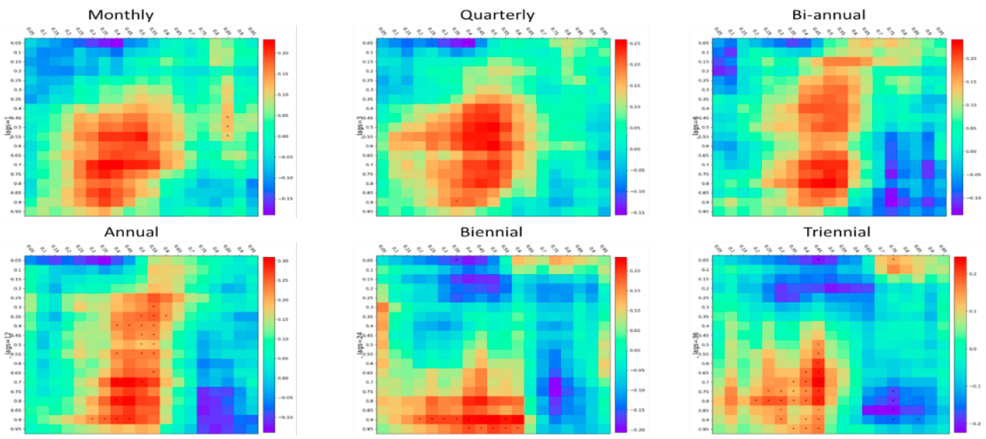

Figure 4. Geopolitical Risk (GPR) to Trade Integration (TI) for BRICS

Notes: Using both the GPR and TI for BRICS, a reading of 0.95 represents the most bullish situation, while a reading of 0.05 represents a bearish state. The negative influence is shown by the dark blue range, while the positive impact of the GPR on TI is shown by the dark red spectrum. Furthermore, blurry green and red tones have a moderately favorable correlation between GPR and TI.

closer trade ties. The medium and long-term analyses display mixed results, indicating a complex relationship between geopolitical risk acts and trade integration in the BRICS bloc.

Figure 6 documents the lagged analysis of geopolitical risk threats and trade integration. The short-term study reveals a significant positive association at medium quantiles, indicating that geopolitical risk threats can have an impact on trade integration among BRICS countries. The medium-term analysis shows a slight negative association at lower quantile and a significant positive association at medium quantiles, suggesting a dynamic relationship between geopolitical risk threats and trade integration.

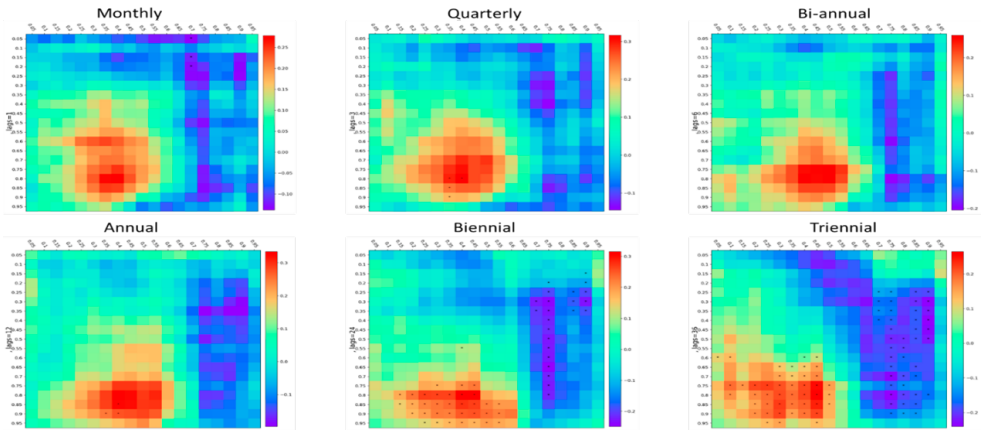

Figure 5. Geopolitical Risk Acts (GPRA) to Trade Integration (TI) for BRICS

Notes: Using both the GPRA and TI for BRICS, a reading of 0.95 represents the most bullish situation, while a reading of 0.05 represents a bearish state. The negative influence is shown by the dark blue range, while the positive impact of the GPRA on TI is shown by the dark red spectrum. Furthermore, blurry green and red tones have a moderately favorable correlation between GPRA and TI.

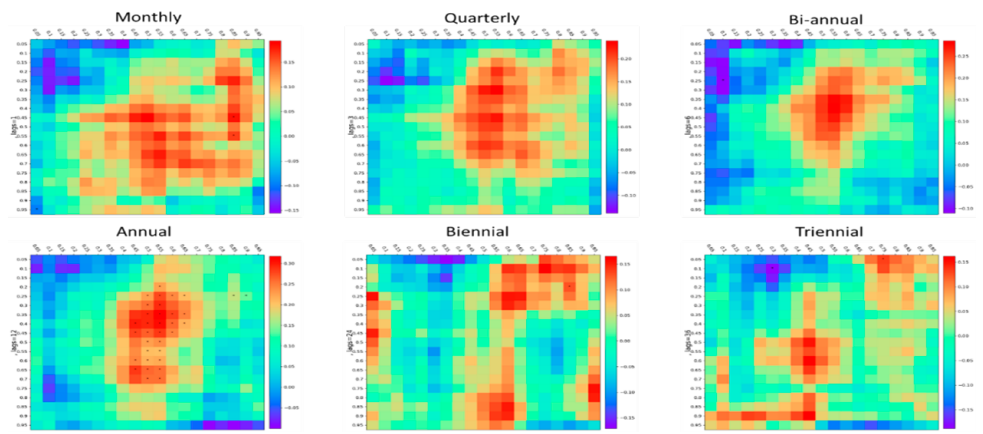

Figure 6. Geopolitical Risk Threats (GPRT) to Trade Integration (TI) for BRICS

Notes: Using both the GPRT and TI for BRICS, a reading of 0.95 represents the most bullish situation, while a reading of 0.05 represents a bearish state. The negative influence is shown by the dark blue range, while the positive impact of the GPRT on TI is shown by the dark red spectrum. Furthermore, blurry green and red tones have a moderately favorable correlation between GPRT and TI.

Overall, the results highlight the complex and dynamic nature of the relationship between geopolitical risks and trade integration in the BRICS bloc. Different time horizons and specific risk factors can influence the direction and magnitude of this relationship.

For example, Hettne & Soderbaum [44] confirmed that the latter could be recognizable through the existence of 'potentialities' and 'convergences'. These findings can inform risk management strategies and decision-making processes related to trade integration within the BRICS nations [45].

5. Discussion

One of the study's main conclusions is that geopolitical risks have played a larger role historically than any other factor in explaining changes in international trade. This novel finding suggests that interdependence between economies and policies/shocks at the national or global level is likely to be more relevant than other factors.

Another key outcome, consistent with Plakandaras et al. [46], that regional integration, especially when the ties goes beyond trade in goods, is positively related to the share of risk related to the regional factor and inversely related in the situation of the global factor. These investigators also discovered that, from a global perspective, geopolitical risk events reduce the volume of international trade and enhance regional trade [5]. The BRICS bloc shows a mixed pattern in terms of gain and loss in trade integration amid geopolitical risk. In the short term, moderate levels of geopolitical risk can hinder trade integration, potentially causing a loss.

However, extreme risk situations can lead to increased trade ties, indicating a gain in trade integration. The reversal has occurred in line with conclusions of Meinen et al. [47]. The BRICS nations' ability to adapt and strengthen trade relationships in the face of geopolitical uncertainties contributes to this positive outcome as backed by [48]. Notably, these trends are predated in line with the Covid-19 pandemic and the conflict in Ukraine, events that have further tested regional relations.

This finding is reassuring since based on the most recent IMF data [49], the BRICS countries will account for 32.1 % of global growth in 2023, surpassing the contribution of the G7 by 2.2 %. In the current situation of geopolitical conflict, some of the BRICS members, particularly Russia and China, encountered several economic sanctions, which forced them to re-orient their trade integration strategies.

On the other hand, the G7 bloc demonstrates resilience and adaptability in the medium and long term, strengthening trade integration despite geopolitical risks. These suggestions are in agreement with those obtained by Jiang et al. [50]. The result suggests a gain in trade integration over time as the G7 nations navigate and mitigate these risks. However, this result has not been described previously [51]. In accordance with the present results, previous studies have demonstrated that G7 countries stock markets are resilient to GPR in bearish stages [52].

Nevertheless, in extraordinary circumstances, higher geopolitical risk surprisingly contributes to enhanced trade integration, indicating a gain.

Our results are somehow inconsistent with Nitsch et al. [53] who find compelling evidence that terrorist actions and war reduce the volume of trade; a doubling in the number of terrorist incidents is associated with a decrease in bilateral trade by about 4 % in a specific region. More generally, the BRICS bloc is rich in potential for constructing trade integration, particularly in view of its increased presence within the world economy. Our findings support the suggestion that regional dynamics rather than global forces dictate trade integration [54].

Most notably, while Bouoiyour et al. [55] argue geopolitical risk 'threats' in themselves do not disrupt trade flows, it is actually the very real phenomenon of such risks 'acts' that kills off trade. These arguments emphasize the thin line between regional integration and geopolitical stability and that the path towards deeper integration is not merely an economic convergence but also the issue of how one reacts to a highly fragmented world order.

The empirical results presented in this study offer robust support for the stated research hypotheses. Hypothesis *H1,* which posits that geopolitical uncertainty positively influences regional trade integration among BRICS countries by increasing intra-bloc trade activity during periods of elevated external risk, is empirically confirmed. The findings derived from the cross-quantilogram analysis reveal that higher levels of geopolitical risk are consistently associated with stronger intra-regional trade responses in the long run, suggesting that regional economies within the BRICS bloc strategically deepen trade ties under conditions of external geopolitical pressure.

Likewise, the evidence substantiates Hypothesis *H2*, which proposes that second-moment uncertainty shocks intensify trade volatility and facilitate a structural shift from global to regional trade networks. The results indicate that trade integration within the BRICS bloc exhibits asymmetric and quantile-dependent sensitivity to different intensities of geopolitical risk, thereby confirming the theoretical prediction that uncertainty acts as a key driver of regional trade realignment.

Notwithstanding these contributions, the study is not without limitations. First, the analysis is confined to the BRICS economies; thus, the generalizability of the results to other regional blocs or global contexts may be limited. Second, the geopolitical risk indices employed are based on media-sourced data, which, although widely accepted in the literature, may not fully capture the complexity or latent dimensions of geopolitical tensions. Third, the use of monthly data, while enabling fine-grained analysis, may overlook ultra-short-term disruptions or long-horizon structural transformations in trade dynamics.

These limitations open avenues for future research, particularly in extending the analysis to other regional groupings, incorporating alternative measures of uncertainty, and exploring the persistence of trade responses across different temporal horizons. Addressing these aspects would further enhance the understanding of how geopolitical risks shape the evolving architecture of international trade.

6. Conclusion

The real choice model of investment under uncertainty serves as the foundation for the underlying theory and theoretical models that address the impact of uncertainty shocks on international trade. According to this strategy, businesses delay their permanent investment choices when confronted with a more unpredictable business environment until the uncertainty is resolved. Within the context of an open economy businesses also modify their inventories by reducing their purchases of foreign inputs in reaction to the heightened level of uncertainty. The scholars use the real options model, which represents irreversible investment decisions in uncertain situations, to the context of international trade. To be more precise, they introduce unpredictability in an open economy framework where businesses import both long-lasting and short-lasting resources from both international and domestic (regional) suppliers.

The model incorporates an uncertainty shock, which may be described as uncertainty regarding productivity or aggregate demand for final goods. This shock alters the optimal inventory policy of firms, leading them to significantly decrease their orders for foreign inputs in comparison to regional inputs. This reduction is primarily driven by the presence of higher fixed costs. A sudden decline in international trade is ultimately caused by the relative decrease in demand for foreign inputs in comparison to domestic inputs which leads to trade integration in a specific regional bloc.

This model provides a distinct explanation for the trade dynamics that are influenced by geopolitical factors, which sets it apart from the traditional static trade models of gravity or dynamic inventory models that were previously observed. The incorporation of second-moment shocks can serve as a valuable driver in situations where the initial first-moment shocks have either an indirect impact on the impulse side or are inadequate in explaining the observed phenomena in the absence of second-moment shocks to explain the trade dynamics specially in context of trade integration.

The contention put out is that both theoretically and practically, regional and international trade dynamics can be conceptualized as responding to geopolitical shocks. In accordance with previous studies, this work incorporates second-moment uncertainty shocks, specifically geopolitical events, into a dynamic model of an open economy.

Therefore, this study investigated into how the trade integration of BRICS responds to the GPRs and its decomposed measures ‘threats’ and ‘acts’. To accomplish this, we employed the cross-quantilogram (CQ) approach, a new and robust econometric technique, to quantify the interdependence of the variables in the framework of BRICS economies. Notably, we help explain the results of our study, which show that geopolitical risk has a significant impact on intra-regional trade integration in BRICS. In conclusion, the BRICS bloc significant positive effects of geopolitical risk on trade integration, with potential gains in extreme risk situations.

Ultimately, the objective does not have to be entirely economic: there is an extensive record of seeing trade integration as a means to prevent conflict among countries. However, because trade is thought to promote economic prosperity, the benefits of economic integration are considered as a 'glue' to keep countries together for non-economic reasons.

To create better intergovernmental ties and reduce the risk of trade disputes, the trading blocs could focus on three important policy measures: using the international trade regime's common concerns to unite all nations; putting geopolitical tensions between nations on the back burner; and holding periodic discussions and meetings between negotiators and each of the heads of state. When regions choose to act on their own, barriers could help keep things from spreading across borders. For example, increasing regional collaboration for enhancing payments across borders and creating a regional framework to make payment systems more compatible with each other could help keep cross-border payment services from being interrupted by geopolitical conflicts outside the region.

No matter what we think about these policies and how well they work, fundamental geopolitics is a good way of attempting to comprehend their complex, multidimensional dynamics. It also helps us understand how regional dynamics are changing, which may be causing stronger trading blocs to emerge at present. To reduce trade obstacles and boost investment inside the BRICS, the BRICS might guarantee bilateral access to markets in certain industries. Processing operations (value chain upgrades in resource-based markets) and market-seeking investments (producing close to the final consuming market) could be two examples of high-priority economic sectors. One of the unknowns is whether or not the shift in trade flows during this time is likely to be short-term or long-term. Future study will examine whether these 'between' and 'within' trade effects have lasted for these countries.

References

1. International Monetary Fund. (2023). *World Economic Outlook: A Rocky Recovery.* Washington, DC. Available at: https://www.imf.org/en/Publications/WEO/Issues/2023/04/11/world-economic-outlook-april-2023

2. Carballo, J., Handley, K., Limão, N. (2022). Economic and policy uncertainty: Aggregate export dynamics and the value of agreements. *Journal of International Economics,* Vol. 139, 103661. https://doi.org/10.1016/j.jinteco.2022.103661

3. Bloom, N. (2009). The Impact of Uncertainty Shocks. *Econometrica,* Vol. 77, Issue 3, 623–685. https://doi.org/10.3982/ECTA6248

4. Hassler, J.A.A. (1996) Variations in risk and fluctuations in demand: A theoretical model. *Journal of Economic Dynamics and Control,* Vol 20, Issue 6–7, 1115–1143. https://doi.org/10.1016/0165-1889(95)00892-6

5. Nazir, S., Sohag, K., Mariev, O. (2025). Geopolitical Risk and Trade Reorientation Dynamics: A Comparative Study. *Emerging Markets Finance and Trade,* Vol. 61, Issue 8, 2338–2359. https://doi.org/10.1080/1540496X.2025.2451188

6. Sohag, K., Islam, M.M., Mariev, O. (2024). The response of BRICS trade integration to geopolitical risks. *Journal of Central Banking Law and Institutions,* Vol. 3, No. 1, 57–94. https://doi.org/10.21098/JCLI.V3I1.180

7. Nazir, S., Mariev, O., Sohag, K. (2024). Geopolitical risk and natural resources: A comparative analysis of trade integration in the African and European Unions. *Natural Resources Forum.* https://doi.org/10.1111/1477-8947.12586

8. Pitigala, N. (2022). Covid-19 and Russia-Ukraine war: trade impacts on developing and emerging markets. *Sri Lanka Journal of Economic Research,* Vol. 10, Issue 1, 113–137. https://doi.org/10.4038/sljer.v10i1.177

9. Novy, D., Taylor, A.M. (2020) Trade and uncertainty. *Review of Economics and Statistics,* Vol. 102, Issue 4, 749–765. https://doi.org/10.1162/rest_a_00885

10. Wang, C., Yao, X., Kim, C.Y. (2024). Is a friend in need a friend indeed? Geopolitical risk, international trade of China, and Belt & Road Initiative. *Applied Economics Letters,* Vol. 32, Issue 7, 1021–1028. https://doi.org/10.1080/13504851.2023.2299275

11. Onditi, F. (2021) Dominatarian Theory of Regional Integration. *Insight on Africa,* Vol. 13, Issue 1, 76–94. https://doi.org/10.1177/0975087820971451

12. Sokhanvar, A., Bouri, E. (2023) Commodity price shocks related to the war in Ukraine and exchange rates of commodity exporters and importers. *Borsa Istanbul Review,* Vol. 23, Issue 1, 44–54. https://doi.org/10.1016/J.BIR.2022.09.001

13. Nazir, S. (2024). From curse to blessing: a fourier-augmented ARDL analysis of agriculture, geopolitics, and trade in south and central Asia. *Letters in Spatial and Resource Sciences,* Vol. 17, 19. https://doi.org/10.1007/s12076-024-00384-w

14. Vicard, V. (2006). Trade, conflicts, and political integration: the regional interplays. *CESifo Working Paper Series,* No. 1839, 41 p. http://dx.doi.org/10.2139/ssrn.946910

15. Dadush, U., Dominguez Prost, E. (2023). Preferential Trade Agreements, Geopolitics, and the Fragmentation of World Trade. *World Trade Review,* Vol. 22, Issue 2, 278–294. https://doi.org/10.1017/S1474745623000022

16. Balli, F., Balli, H.O., Hasan, M., Gregory-Allen, R. (2022). Geopolitical risk spillovers and its determinants. *The Annals of Regional Science,* Vol. 68, 463–500. https://doi.org/10.1007/s00168-021-01081-y

17. Baldwin, R., Krugman, P. (1989). Persistent trade effects of large exchange rate shocks. *Quarterly Journal of Economics,* Vol. 104, Issue 4, 635–654. https://doi.org/10.2307/2937860

18. Early, B., Peksen, D. (2018). Searching in the Shadows: The Impact of Economic Sanctions on Informal Economies. *Political Research Quarterly,* Vol. 72, Issue 4, 821–834. https://doi.org/10.1177/1065912918806412

19. Graziano, A.G., Handley, K., Limão, N. (2021). Brexit Uncertainty and Trade Disintegration. *Economic Journal,* Vol. 131, Issue 635, 1150–1185. https://doi.org/10.1093/ej/ueaa113

20. Chessa, M., Persenda, A., Torre, D. (2023). Brexit and Canadadvent: An application of graphs and hypergraphs to recent international trade agreements. *International Economics,* Vol. 175, 1–12. https://doi.org/10.1016/j.inteco.2023.04.005

21. Handley, K. (2014). Exporting under trade policy uncertainty: Theory and evidence. *Journal of International Economics,* Vol. 94, Issue 1, 50–66. https://doi.org/10.1016/j.inteco.2014.05.005

22. Handley, K., Limão, N. (2015). Trade and Investment under Policy Uncertainty: Theory and Firm Evidence. *American Economic Journal: Economic Policy,* Vol. 7, No. 4, 189–222. https://doi.org/10.1257/POL.20140068

23. Mamman, S.O. (2023). Response of Inclusive Growth to Development Aid in Africa and the Role of ICT Diffusion. *Journal of Applied Economic Research,* Vol. 22, No. 4, 770–788. https://doi.org/10.15826/vestnik.2023.22.4.031

24. Taglioni, D., Zavacka, V. (2012). Innocent bystanders: how foreign uncertainty shocks harm exporters. *Policy Research Working Paper,* No. 6226. World Bank, 38 p. http://dx.doi.org/10.1596/1813-9450-6226

25. Carrière-Swallow, Y., Céspedes, L.F. (2013). The impact of uncertainty shocks in emerging economies. *Journal of International Economics,* Vol. 90, Issue 2, 316–325. https://doi.org/10.1016/j.jinteco.2013.03.003

26. Gourio, F., Siemer, M., Verdelhan, A. (2013). International risk cycles. Journal of International Economics, Vol. 89, Issue 2, 471–484. https://doi.org/10.1016/j.jinteco.2011.10.001

27. Fan, H., Nie, G., Xu, Z. (2023). Market uncertainty and international trade. *Review of Economic Dynamics,* Vol. 51, 450–478. https://doi.org/10.1016/J.RED.2023.05.001

28. Baldwin, R.E. (2008). Sequencing and Depth of Regional Economic Integration: Lessons for the Americas from Europe. *World Economy,* Vol. 31, Issue 1, 5–30. https://doi.org/10.1111/J.1467-9701.2007.01080.X

29. Bems, R., Johnson, R.C., Yi, K.M. (2011). Vertical linkages and the collapse of global trade. *American Economic Review,* Vol. 101, No. 3, 308–312. https://doi.org/10.1257/AER.101.3.308

30. Eaton, J., Kortum, S., Neiman, B., Romalis, J. (2016). Trade and the global recession. *American Economic Review,* Vol. 106, No. 11, 3401–3438. https://doi.org/10.1257/AER.20101557

31. Bown, C.P., Crowley, M.A. (2013). Import protection, business cycles, and exchange rates: Evidence from the Great Recession. *Journal of International Economics,* Vol. 90, Issue 1, 50–64. https://doi.org/10.1016/j.jinteco.2012.12.001

32. Kee, H.L., Neagu, C., Nicita, A. (2013). Is protectionism on the rise? Assessing national trade policies during the crisis of 2008. *Review of Economics and Statistics,* Vol. 95, Issue 1, 342–346. https://doi.org/10.1162/REST_a_00241

33. Amiti, M., Weinstein, D.E. (2011). Exports and financial shocks. *Quarterly Journal of Economics,* Vol. 126, Issue 4, 1841–1877. https://doi.org/10.1093/qje/qjr033

34. Gourio, F., Siemer, M., Verdelhan, A. (2013). International risk cycles. *Journal of International Economics,* Vol. 89, Issue 2, 471–484. https://doi.org/10.1016/j.jinteco.2011.10.001

35. Li, W., Nie, G., Wang, Z. (2020). Trade, FDI, and Global Imbalances. *Journal of International Money and Finance,* Vol. 105, 102188. https://doi.org/10.1016/J.JIMONFIN.2020.102188

36. Alessandria, G., Kaboski, J.P., Midrigan, V. (2011). US trade and inventory dynamics. *American Economic Review,* Vol. 101, No. 3, 303–307. https://doi.org/10.1257/AER.101.3.303

37. Islam, M.M. (2024). A Cross-Country Examination of Mineral Import Demand and Wind Energy Generation: Empirical Insights from Leading Mineral Importers. *Journal of Applied Economic Research,* Vol. 23, No. 1, 6–32. https://doi.org/10.15826/vestnik.2024.23.1.001

38. Alessandria, G., Choi, H., Kaboski, J.P., Midrigan, V. (2015). Microeconomic uncertainty, international trade, and aggregate fluctuations. *Journal of Monetary Economics,* Vol. 69, 20–38. https://doi.org/10.1016/J.JMONECO.2014.11.007

39. Scarf, H. (2005). The Optimality of (S, s) Policies in the Dynamic Inventory Problem. *In: Herbert Scarf's Contributions to Economics, Game Theory and Operations Research.* 1–7. https://doi.org/10.1057/9781137024381_1

40. Kropf, A., Sauré, P. (2014). Fixed costs per shipment. *Journal of International Economics,* Vol. 92, Issue 1, 166–184. https://doi.org/10.1016/J.JINTECO.2013.10.003

41. Caldara, D., Iacoviell, M. (2022). Measuring Geopolitical Risk. *American Economic Review,* Vol. 112, No. 4, 1194–1225. https://doi.org/10.1257/AER.20191823

42. Han, H., Linton, O., Oka, T., Whang, Y.-J. (2016). The cross-quantilogram: Measuring quantile dependence and testing directional predictability between time series. *Journal of Econometrics,* Vol. 193, Issue 1, 251–270. https://doi.org/10.1016/J.JECONOM.2016.03.001

43. Javorcik, B., Kitzmueller, L., Schweiger, H., Yıldırım, M.A. (2024). Economic costs of friendshoring. *The World Economy,* Vol. 47, Issue 7, 2871–2908. https://doi.org/10.1111/twec.13555

44. Hettne, B., Söderbaum, F. (2000). Theorising the Rise of Regionness. *New Political Economy,* Vol. 5, Issue 3, 457–472. https://doi.org/10.1080/713687778

45. Naifar, N., Aljarba, S. (2023). Does geopolitical risk matter for sovereign credit risk? Fresh evidence from nonlinear analysis. *Journal of Risk and Financial Management,* Vol. 16, issue 3, 148. https://doi.org/10.3390/JRFM16030148

46. Plakandaras, V., Tiwari, A. K., Gupta, R., Ji, Q. (2020). Spillover of sentiment in the European Union: Evidence from time-and frequency-domains. International *Review of Economics & Finance,* Vol. 68, 105–130. https://doi.org/10.1016/J.IREF.2020.03.014

47. Meinen, P., Serafini, R., Papagalli, O. (2021). Regional economic impact of Covid-19: The role of sectoral structure and trade linkages. *ECB Working Paper,* No. 2528. European Central Bank, 24 p. https://doi.org/10.2139/ssrn.3797148

48. Dogah, K.E. (2021). Effect of trade and economic policy uncertainties on regional systemic risk: evidence from ASEAN. *Economic Modelling,* Vol. 104, 105625. https://doi.org/10.1016/j.econmod.2021.105625

49. Fernández-Villaverde, J., Mineyama, T., Song, D. (2024). Are we fragmented yet? Measuring geopolitical fragmentation and its causal effect. *NBER Working Paper,* No. 32638. National Bureau of Economic Research, 66 p. https://doi.org/10.3386/w32638

50. Jiang, Y., Tian, G., Mo, B. (2020). Spillover and quantile linkage between oil price shocks and stock returns: new evidence from G7 countries. *Financial Innovation,* Vol. 6, 42. https://doi.org/10.1186/S40854-020-00208-Y/FIGURES/3

51. Subhan, A.R., Santosa, B., Soeharjoto, S. (2021). Bilateral Trade Flows Among G7 Member Countries and Indonesia: Gravity Model Approach. *Media Ekonomi,* Vol. 29, No. 1, 21–36. https://doi.org/10.25105/me.v29i1.9108

52. Bossman, A., Gubareva, M. (2023). Asymmetric impacts of geopolitical risk on stock markets: A comparative analysis of the E7 and G7 equities during the Russian-Ukrainian conflict. *Heliyon,* Vol. 9, Issue 2, e13626. https://doi.org/10.1016/J.HELIYON.2023.E13626

53. Nitsch, V., Schumacher, D. (2004). Terrorism and international trade: an empirical investigation. *European Journal of Political Economy,* Vol. 20, Issue 2, 423–433. https://doi.org/10.1016/j.ejpoleco.2003.12.009

54. Arestis, P., Chortareas, G., Desli, E., Pelagidis, T. (2012). Trade flows revisited: further evidence on globalisation. *Cambridge Journal of Economics,* Vol. 36, Issue 2, 481–493. https://doi.org/10.1093/cje/ber018

55. Bouoiyour, J., Selmi, R., Hammoudeh, S., Wohar, M.E. (2019). What are the categories of geopolitical risks that could drive oil prices higher? Acts or threats? *Energy Economics,* Vol. 84, 104523. https://doi.org/10.1016/j.eneco.2019.104523

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Геополитические шоки и торговая интеграция: теоретическое и эмпирическое исследование БРИКС

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Аннотация. В исследовании рассматривается влияние геополитических потрясений на международную и региональную торговую интеграцию, при этом особое внимание уделяется экономикам стран БРИКС. Растущая фрагментация мировой торговли и растущая частота геополитических конфликтов подняли насущные вопросы о том, как страны адаптируют свои торговые стратегии в условиях неопределенности. Основная цель данного исследования — проанализировать, приводят ли такие геополитические риски к волатильности в торговле и ускоряют ли они сдвиги в сторону регионализма. Выдвигается гипотеза о том, что шоки неопределенности второго момента, такие как политическая нестабильность, санкции или глобальные конфликты, приводят к непропорциональному сокращению внешней торговли и одновременному увеличению внутрирегиональных торговых потоков. В исследовании модель шока неопределенности Блума (2009) интегрирована в модель открытой экономики и эмпирически проверена с использованием метода кросс-квантилограммы (CQ) на ежемесячных данных из стран БРИКС за период с 2000 по 2023 г. Метод CQ отражает асимметричную реакцию торговой интеграции на различные уровни геополитического риска. Результаты показывают, что более высокие геополитические риски, особенно во время экстремальных явлений, связаны со значительным всплеском торговой интеграции внутри стран БРИКС, что подтверждает теоретическую модель. Теоретически эта работа расширяет существующие торговые модели, включая вторичные шоки и поведение запасов в условиях неопределенности. На практике модель дает представление о том, как политики стремятся к созданию устойчивых торговых схем в условиях глобальной нестабильности. Полученные результаты подчеркивают важность региональных стратегий, таких как ниаршоринг и френд-шоринг, которые могут снизить уязвимость к глобальным потрясениям. Данное исследование предлагает ценный взгляд для понимания будущего торговой интеграции в условиях растущей геополитической неопределенности.

Ключевые слова: геополитический риск; торговая интеграция; регионализм; БРИКС; шоки неопределенности; кросс-квантилограмма; поведение запасов.

Список использованных источников

1. World Economic Outlook: A Rocky Recovery. Washington, DC: International Monetary Fund.. 2023. URL: https://www.imf.org/en/Publications/WEO/Issues/2023/04/11/world-economic-outlook-april-2023

2. *Carballo J., Handley K., Limão N.* Economic and policy uncertainty: Aggregate export dynamics and the value of agreements // Journal of International Economics. 2022. Vol. 139. 103661. https://doi.org/10.1016/j.jinteco.2022.103661

3. *Bloom N.* The Impact of Uncertainty Shocks // Econometrica. 2009. Vol. 77, Issue 3. Pp. 623–685. https://doi.org/10.3982/ECTA6248

4. *Hassler J. A.A.* Variations in risk and fluctuations in demand: A theoretical model // Journal of Economic Dynamics and Control. 1996. Vol. 20, Issue 6–7. Pp. 1115–1143. https://doi.org/10.1016/0165-1889(95)00892-6

5. *Nazir S., Sohag K., Mariev O.* Geopolitical Risk and Trade Reorientation Dynamics: A Comparative Study // Emerging Markets Finance and Trade. 2025. Vol. 61, Issue 8. Pp. 2338–2359. https://doi.org/10.1080/1540496X.2025.2451188

6. *Sohag K., Islam M. M., Mariev O.* The Response of BRICS Trade Integration to Geopolitical Risks // Journal of Central Banking Law and Institutions. 2024. Vol. 3, No. 1. Pp. 57–94. https://doi.org/10.21098/JCLI.V3I1.180

7. *Nazir S., Mariev O., Sohag K.* Geopolitical risk and natural resources: A comparative analysis of trade integration in the African and European Unions // Natural Resources Forum. 2024. https://doi.org/10.1111/1477-8947.12586

8. *Pitigala N.* Covid-19 and Russia-Ukraine war: trade impacts on developing and emerging markets // Sri Lanka Journal of Economic Research. 2022. Vol. 10, Issue 1. Pp. 113–137. https://doi.org/10.4038/sljer.v10i1.177

9. *Novy D., Taylor A. M.* Trade and uncertainty // Review of Economics and Statistics. 2020. Vol. 102, Issue 4. Pp. 749–765. https://doi.org/10.1162/rest_a_00885

10. *Wang C., Yao X., Kim C. Y.* Is a friend in need a friend indeed? Geopolitical risk, international trade of China, and Belt & Road Initiative // Applied Economics Letters. 2024. Vol. 32, Issue 7. Pp. 1021–1028. https://doi.org/10.1080/13504851.2023.2299275

11. *Onditi F.* Dominatarian Theory of Regional Integration // Insight on Africa. 2021. Vol. 13, Issue 1. Pp. 76–94. https://doi.org/10.1177/0975087820971451

12. *Sokhanvar A., Bouri E.* Commodity price shocks related to the war in Ukraine and exchange rates of commodity exporters and importers // Borsa Istanbul Review. 2023. Vol. 23, Issue 1. Pp. 44–54. https://doi.org/10.1016/J.BIR.2022.09.001

13. *Nazir S.* From curse to blessing: a fourier-augmented ARDL analysis of agriculture, geopolitics, and trade in south and central Asia // Letters in Spatial and Resource Sciences. 2024. Vol. 17. 19. https://doi.org/10.1007/s12076-024-00384-w

14. *Vicard V.* Trade, conflicts, and political integration: the regional interplays // CESifo Working Paper Series. No. 1839. 2006. 41 p. http://dx.doi.org/10.2139/ssrn.946910

15. *Dadush U., Dominguez Prost E.* Preferential Trade Agreements, Geopolitics, and the Fragmentation of World Trade // World Trade Review. 2023. Vol. 22, Issue 2. Pp. 278–294. https://doi.org/10.1017/S1474745623000022

16. *Balli F., Balli H. O., Hasan M., Gregory-Allen R.* Geopolitical risk spillovers and its determinants // The Annals of Regional Science. 2022. Vol. 68. Pp. 463–500. https://doi.org/10.1007/s00168-021-01081-y

17. *Baldwin R., Krugman P.* Persistent trade effects of large exchange rate shocks // Quarterly Journal of Economics. 1989. Vol. 104, Issue 4. Pp. 635–654. https://doi.org/10.2307/2937860

18. *Early B., Peksen D.* Searching in the Shadows: The Impact of Economic Sanctions on Informal Economies // Political Research Quarterly. 2018. Vol. 72, Issue 4. Pp. 821–834. https://doi.org/10.1177/1065912918806412

19. *Graziano A. G., Handley K., Limão N.* Brexit Uncertainty and Trade Disintegration // Economic Journal. 2021. Vol. 131, Issue 635. Pp. 1150–1185. https://doi.org/10.1093/ej/ueaa113

20. *Chessa M., Persenda A., Torre D.* Brexit and Canadadvent: An application of graphs and hypergraphs to recent international trade agreements // International Economics. 2023. Vol. 175. Pp. 1–12. https://doi.org/10.1016/j.inteco.2023.04.005

21. *Handley K.* Exporting under trade policy uncertainty: Theory and evidence // Journal of International Economics. 2014. Vol. 94, Issue 1. Pp. 50–66. https://doi.org/10.1016/j.jinteco.2014.05.005

22. *Handley K., Limão N.* Trade and Investment under Policy Uncertainty: Theory and Firm Evidence // American Economic Journal: Economic Policy. 2015. Vol. 7, No. 4. Pp. 189–222. https://doi.org/10.1257/POL.20140068

23. *Mamman S. O.* Response of Inclusive Growth to Development Aid in Africa and the Role of ICT Diffusion // Journal of Applied Economic Research. 2023. Vol. 22, No. 4. Pp. 770–788. https://doi.org/10.15826/vestnik.2023.22.4.031

24. *Taglioni D., Zavacka V.* Innocent bystanders: how foreign uncertainty shocks harm exporters // Policy Research Working Paper. No. WPS 6226. World Bank, 2012. 38 p http://dx.doi.org/10.1596/1813-9450-6226

25. *Carrière-Swallow Y., Céspedes L. F.* The impact of uncertainty shocks in emerging economies // Journal of International Economics. 2013. Vol. 90, Issue 2. Pp. 316–325. https://doi.org/10.1016/j.jinteco.2013.03.003

26. *Gourio F., Siemer M., Verdelhan A.* International risk cycles // Journal of International Economics. 2013. Vol. 89, Issue 2. Pp. 471–484. https://doi.org/10.1016/j.jinteco.2011.10.001

27. *Fan H., Nie G., Xu Z.* Market uncertainty and international trade // Review of Economic Dynamics. 2023. Vol. 51. Pp. 450–478. https://doi.org/10.1016/J.RED.2023.05.001

28. *Baldwin R. E.* Sequencing and Depth of Regional Economic Integration: Lessons for the Americas from Europe // World Economy. 2008. Vol. 31, Issue 1. Pp. 5–30. https://doi.org/10.1111/J.1467-9701.2007.01080.X

29. *Bems R., Johnson R. C., Yi K. M.* Vertical linkages and the collapse of global trade // American Economic Review. 2011. Vol. 101, No. 3 Vol. 101, No. 3. Pp. 308–312. https://doi.org/10.1257/AER.101.3.308

30. *Eaton J., Kortum S., Neiman B., Romalis J.* Trade and the global recession // American Economic Review. 2016. Vol. 106, No. 11. Pp. 3401–3438. https://doi.org/10.1257/AER.20101557

31. *Bown C. P., Crowley M. A.* Import protection, business cycles, and exchange rates: Evidence from the Great Recession // Journal of International Economics. 2013. Vol. 90, Issue 1. Pp. 50–64. https://doi.org/10.1016/j.jinteco.2012.12.001

32. *Kee H. L., Neagu C., Nicita A.* Is protectionism on the rise? Assessing national trade policies during the crisis of 2008 // Review of Economics and Statistics. 2013. Vol. 95, Issue 1. Pp. 342–346. https://doi.org/10.1162/REST_a_00241

33. *Amiti M., Weinstein D. E.* Exports and financial shocks // Quarterly Journal of Economics. 2011. Vol. 126, Issue 4. Pp. 1841–1877. https://doi.org/10.1093/qje/qjr033

34. *Gourio F., Siemer M., Verdelhan A.* International risk cycles // Journal of International Economics. 2013. Vol. 89, Issue 2. Pp. 471–484. https://doi.org/10.1016/j.jinteco.2011.10.001

35. *Li W., Nie G., Wang Z.* Trade, FDI, and Global Imbalances // Journal of International Money and Finance. 2020. Vol. 105. 102188. https://doi.org/10.1016/J.JIMONFIN.2020.102188

36. *Alessandria G., Kaboski J. P., Midrigan V.* US trade and inventory dynamics // American Economic Review. 2011. Vol. 101, No. 3. Pp. 303–307. https://doi.org/10.1257/AER.101.3.303

37. *Islam M. M.* A Cross-Country Examination of Mineral Import Demand and Wind Energy Generation: Empirical Insights from Leading Mineral Importers // Journal of Applied Economic Research. 2024. Vol. 23, No. 1. Pp. 6–32. https://doi.org/10.15826/vestnik.2024.23.1.001

38. *Alessandria G., Pratap S., Yue V. Z.* Microeconomic uncertainty, international trade, and aggregate fluctuations // Journal of Monetary Economics. 2015. Vol. 69. Pp. 20–38. https://doi.org/10.1016/J.JMONECO.2014.11.007

39. *Scarf H.* The Optimality of (S, s) Policies in the Dynamic Inventory Problem // In: Herbert Scarf's Contributions to Economics, Game Theory and Operations Research. 2005. Pp. 1–7. https://doi.org/10.1057/9781137024381_1

40. *Kropf A., Sauré P.* Fixed costs per shipment // Journal of International Economics. 2014. Vol. 92, Issue 1. Pp. 166–184. https://doi.org/10.1016/J.JINTECO.2013.10.003

41. *Caldara D., Iacoviello M.* Measuring Geopolitical Risk // American Economic Review. 2022. Vol. 112, No. 4. Pp. 1194–1225. https://doi.org/10.1257/AER.20191823

42. *Han H., Linton O., Oka T., Whang Y. J.* The cross-quantilogram: Measuring quantile dependence and testing directional predictability between time series // Journal of Econometrics. 2016. Vol. 193, Issue 1. Pp. 251–270. https://doi.org/10.1016/J.JECONOM.2016.03.001

43. *Javorcik B., Kitzmueller L., Schweiger H., Yıldırım M. A.* Economic costs of friendshoring // The World Economy. 2024. Vol. 47, Issue 7. Pp. 2871–2908. https://doi.org/10.1111/twec.13555

44. *Hettne B., Söderbaum F.* Theorising the Rise of Regionness // New Political Economy. 2000. Vol. 5, Issue 3. Pp. 457–472. https://doi.org/10.1080/713687778

45. *Naifar N., Aljarba S.* Does geopolitical risk matter for sovereign credit risk? Fresh evidence from nonlinear analysis // Journal of Risk and Financial Management. 2023. Vol. 16, Issue 3. 148. https://doi.org/10.3390/JRFM16030148

46. *Plakandaras V., Tiwari A. K., Gupta R., Ji Q.* Spillover of sentiment in the European Union: Evidence from time-and frequency-domains // International Review of Economics & Finance. 2020. Vol. 68. Pp. 105–130. https://doi.org/10.1016/J.IREF.2020.03.014

47. *Meinen P., Serafini R., Papagalli O.* Regional economic impact of Covid-19: The role of sectoral structure and trade linkages // ECB Working Paper. No. 2528. European Central Bank, 2021. 24 p. https://doi.org/10.2139/ssrn.3797148

48. *Dogah K. E.* Effect of trade and economic policy uncertainties on regional systemic risk: evidence from ASEAN // Economic Modelling. 2021. Vol. 104. 105625. https://doi.org/10.1016/j.econmod.2021.105625

49. *Fernández-Villaverde J., Mineyama T., Song D.* Are we fragmented yet? Measuring geopolitical fragmentation and its causal effect // NBER Working Paper. No. 32638. National Bureau of Economic Research, 2024. 66 p. https://doi.org/10.3386/w32638

50. *Jiang Y., Tian G., Mo B.* Spillover and quantile linkage between oil price shocks and stock returns: new evidence from G7 countries // Financial Innovation. 2020. Vol. 6. 42. https://doi.org/10.1186/S40854-020-00208-Y

51. *Subhan A. R., Santosa B., Soeharjoto S.* Bilateral Trade Flows Among G7 Member Countries and Indonesia: Gravity Model Approach // Media Ekonomi. 2021. Vol. 29, No. 1. Pp. 21–36. https://doi.org/10.25105/me.v29i1.9108

52. *Bossman A., Gubareva M.* Asymmetric impacts of geopolitical risk on stock markets: A comparative analysis of the E7 and G7 equities during the Russian-Ukrainian conflict // Heliyon. 2023. Vol. 9, Issue 2. e13626. https://doi.org/10.1016/J.HELIYON.2023.E13626

53. *Nitsch V., Schumacher D.* Terrorism and international trade: an empirical investigation // European Journal of Political Economy. 2004. Vol. 20, Issue 2. Pp. 423–433. https://doi.org/10.1016/j.ejpoleco.2003.12.009

54. *Arestis P., Chortareas G., Desli E., Pelagidis T.* Trade flows revisited: further evidence on globalisation // Cambridge Journal of Economics. 2012. Vol. 36, Issue 2. Pp. 481–493. https://doi.org/10.1093/cje/ber018

55. *Bouoiyour J., Selmi R., Hammoudeh S., Wohar M. E.* What are the categories of geopolitical risks that could drive oil prices higher? Acts or threats? // Energy Economics. 2019. Vol. 84. 104523. https://doi.org/10.1016/j.eneco.2019.104523

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