Finance and Business Economics Review

Vol. 10, No. 2, June 2026, pp. 229-242
DOI : 10.58205/fber.v10i2.2118

Geopolitical Tensions and Alternative Payments: A Panel Study of BRICS, 2010–2021

Mohamed Balouz[1], Najla Hamdi[2]

[1] Department of Finance and International Trade, Faculty of Economic, Commercial and Management Sciences, University of Relizane, Algeria, mohamed.balouz@univ-relizane.dz
[2] Department of Management Sciences, Business School of Tunis (ESCT), University of Manouba, Tunisia, najla.hamdi.guest@esct.uma.tn

Article Information

Article history
Received: 8 September 2025
Accepted: 28 June 2026
Published: 30 June 2026

Corresponding Author
BALOUZ Mohamed
Mohamed.balouz@univ-relizane.dz

Copyright © 2026, University of Abdelhafid Boussof, Mila. This is an open access article under the CC BY-NC-ND license.

Suggested Citation
BALOUZ, M. & Hamdi N., (2026). Geopolitical Tension and Alternative Payments: A Panel Study of Brics, 2010-2021, Finance and Business Economics Review, Vol. 10, No. 2, pp. 229-242. DOI : 10.58205/fber.v10i2.2118

Abstract: This study explores the influence of geopolitical tensions and economic indicators on the adoption of alternative payment systems across BRICS nations from 2010 to 2021. Utilizing panel data analysis, it assesses the effects of geopolitical tensions, GDP, inflation, and exchange rates on transaction volumes. The findings reveal that both geopolitical tensions and GDP exert a statistically significant positive influence on the use of alternative payment systems, while inflation and exchange rates are not significant predictors. These results imply that geopolitical instability and economic expansion drive increased reliance on alternative payment methods. The study urges policymakers in emerging economies to account for these factors in shaping resilient financial infrastructures. It also highlights the need for further research into broader macroeconomic and socio-political variables.

Keywords: Geopolitical Tensions; Alternative Payment Systems; BRICS; Economic Growth; Panel Data Analysis.

1. Introduction

The rapid evolution of global finance over the past decade has been profoundly influenced by geopolitical tensions and their impact on the establishment and development of alternative payment systems. These systems have emerged as key tools for countries seeking to reduce their dependence on traditional Western-dominated financial infrastructure, particularly in the wake of escalating political and economic conflicts.

Historically, the BRICS countries began exploring alternative payment systems at different points, with China and Russia leading the way in the early stages. From 2010 to 2015, China developed the Alternative Payment (Roy, Dubey, & Tiwary, 2024, pp. 4-5), which was officially launched in 2015 as a strategic alternative to the global financial networks dominated by Western institutions such as SWIFT. Similarly, Russia began working on its own **System for Transfer of Financial Messages (SPFS)** after 2012 (Dogan & Ugurlu, 2024, pp. 9-10), following increasing geopolitical tensions with the West. While India had its **Real-Time Gross Settlement (RTGS)** system in place since 2004 (Ramesh, 2025, pp. 6-7), the expansion

of its international scope only began after 2010. Brazil, on the other hand, continued to rely on traditional payment systems with limited bilateral arrangements during this period.

From 2015 to 2021, the geopolitical landscape underwent significant shifts, particularly after Russia's annexation of Crimea and the subsequent imposition of Western sanctions. These events catalyzed the development and expansion of alternative payment systems in BRICS countries, especially in Russia and China (Bastanifar, Khan, & Koch, 2025, pp. 4-5). Russia, in particular, witnessed a sharp rise in transaction volumes associated with alternative systems, coinciding with the official launch of the **Mir** payment system in 2015 (Aljaradat, Sarkar, & K. Shukla, 2024, p. 3). The **Mir** system was conceived as a response to the disruptions caused by Western sanctions, providing a domestic and international alternative to global payment systems.

Meanwhile, Alternative Payment system saw significant growth after 2015, reinforcing China's goal of reducing its reliance on the U.S. dollar and asserting the Chinese yuan as a dominant international currency (Tago, 2025, pp. 82-83). Both China and Russia also engaged in bilateral **currency swap agreements** (Yu, Liu , Liu , & Li , 2023, pp. 3-4)to facilitate transactions outside of Western-dominated financial networks, further solidifying the role of alternative payment systems in circumventing global financial sanctions (Dowlah, 2024, p. 10).

While Brazil and India gradually embraced alternative payment systems, their adoption remained more measured than that of Russia and China, with Brazil experiencing steady transaction growth yet slower systemic shifts, and India intensifying its pursuit of cross-border alternatives post-2010 alongside existing domestic frameworks like RTGS (Hayakawa, 2024, p. 43), This research investigates how geopolitical tensions and macroeconomic dynamics from 2010 to 2021 have shaped the evolution of alternative payment systems across BRICS nations, seeking to determine the extent to which such tensions propel the demand for new financial infrastructures. This issue can be posed as a question as follows:

To what extent do geopolitical tensions and economic factors such as GDP growth, inflation, and exchange rates influence the adoption of alternative payment systems, in BRICS countries during the period from 2010 to 2021?

This research posits that geopolitical tensions are positively associated with increased utilization of alternative payment systems within BRICS nations, while economic indicators like GDP growth exert significant influence over their adoption, whereas inflation and exchange rates are anticipated to have more modest effects.

2. The theoretical framework of the study

2.1. Literature Review

Growing geopolitical tensions, particularly amid BRICS nations' economic transformations, have spurred scholarly interest in how such dynamics drive the rise of alternative payment systems circumventing Western-centric financial networks; this section synthesizes pivotal research at this nexus, delineates existing gaps, and situates the current study's contributions within this evolving discourse.

(Roy, Dubey, & Tiwary, 2024), investigate how intensifying geopolitical tensions, especially between China and the U.S., spur the development of alternative payment systems in BRICS nations, revealing a positive link particularly in China and Russia, though their cross-sectional approach lacks temporal depth—a gap this study addresses through panel data analysis that captures the dynamic interplay between geopolitical tensions and economic factors over time. **(Dogan & Ugurlu, 2024)** analyzing Russia's SPFS through panel data, demonstrate that geopolitical risks—particularly Western sanctions—primarily drove its development, though

their study omits broader economic variables crucial for understanding payment systems across BRICS, a gap this research addresses by incorporating factors like GDP, inflation, and exchange rates for a more comprehensive analysis.

Similarly, **(Yu, Liu , Liu , & Li , 2023)** employ time-series analysis to show how bilateral currency agreements, notably between China and Russia, have advanced alternative payment systems to circumvent the U.S. dollar, yet their focus on currency swaps overlooks broader macroeconomic and geopolitical dynamics—a gap this study bridges by integrating geopolitical instability, inflation, and GDP growth into the analysis of alternative payment adoption across BRICS nations.

(Simmons, Pot , Dant , & Leichsenring , 2024) reveal through a mixed-methods approach that economic factors like inflation and GDP growth exert a stronger influence than geopolitical tensions on the adoption of alternative payment systems, though they overlook the temporal dynamics between political and economic forces—a gap this study addresses by analyzing the evolving interplay of these variables across BRICS nations from 2010 to 2021.

In a study on Russia's Mir Payment System, **(Aljaradat, Sarkar, & K. Shukla, 2024)** demonstrate, using panel data from 2015 to 2021, that Russia's Mir Payment System emerged chiefly as a safeguard against Western sanctions and financial isolation post-Crimea, though their analysis remains confined to Russia, whereas this study broadens the lens to encompass the entire BRICS bloc and integrates wider economic indicators shaping alternative payment system adoption.

2.2. Research Gap and Contribution of the Present Study

While prior studies have illuminated the geopolitical roots of alternative payment systems, they often neglect the integrated influence of macroeconomic factors across BRICS nations and rely on static methodologies, a gap this study bridges through panel data analysis from 2010 to 2021, revealing that GDP growth significantly propels the adoption of alternative payment systems, whereas inflation and exchange rates exert comparatively minimal effects.

2.3. Definition of study variables

- **Geopolitical Tensions:** refer to the threat, realization, and escalation of adverse events associated with wars, terrorism, and any tensions among states that affect the normal and peaceful course of international relations (Sójka, Demir, & Zaremba, 2022, pp. 3-4). These tensions can significantly influence economic and political stability, leading to fluctuations in business activities and market dynamics (Long, Demir, Sójka, Zaremba, & Shahzad, 2022, pp. 2-3)
- **Alternative Payment Systems:** encompass financial mechanisms that provide alternatives to traditional banking infrastructures, facilitating transactions through digital platforms or networks (McElwee, Cole, Kaliappan, Masters, & Steuten, 2025, p. 538). These systems aim to enhance efficiency, reduce costs, and increase accessibility in financial transactions (Simmons, Pot , Dant , & Leichsenring , 2024, pp. 2-3).
- **Political Risk:** refers to the probability of adverse effects to businesses and governments as a result of political decisions, events, or conditions. This includes factors such as instability, expropriation, and changes in government policies that can significantly affect the profitability and operations of entities (A. Hartwell & Devinney , 2021).
- **Financial Market Stability:** denotes the ability of financial systems to withstand shocks and the smooth functioning of financial markets without significant disruptions (Ait Mimoune , 2025, pp. 196-197). It involves maintaining investor confidence, liquidity, and the efficient

allocation of resources, which are crucial for economic growth and development (Curi & Murgia , 2023).

3. The experimental framework for the study

This study adopts a quantitative methodology, employing panel data analysis to examine how geopolitical tensions and macroeconomic factors shape the adoption and growth of alternative payment systems—particularly the Cross-Border Interbank Payment System—across BRICS countries during 2010–2021.

3.1. Methods Used in the Field Study

The study employs econometric techniques, notably panel data regression models, to investigate how geopolitical tensions, GDP, inflation, and exchange rates influence the use of Alternative Payment Systems, leveraging data from 2010 to 2021 sourced from the Global Peace Index, World Bank, and central bank reports.

3.2. Reference Framework for the Study

Rooted in economic and geopolitical theory, this study employs advanced econometric analysis in EViews12 to examine how geopolitical risks and economic forces shape alternative payment systems, addressing key statistical challenges.

3.3. Sample Selection and Variables

A. Alternative Payment which is measured by transaction volume.

This variable reflects the impact of geopolitical tensions and economic factors on the adoption and growth of alternative payment systems in BRICS countries.

B. **Geopolitical Tensions**: Geopolitical Tensions are quantified using the Global Peace Index, which scores countries from 1 (most peaceful) to 5 (most tense), with higher values indicating greater geopolitical instability.

C. **GDP (Gross Domestic Product)**: measured in thousands of U.S. dollars (K $).

D. **Inflation (%)**: denotes the annual percentage change in the general price level of goods and services, typically measured through the Consumer Price Index (CPI).

E. **Exchange Rate (per USD)**: represents how many units of the local currency are equivalent to one U.S. dollar. For example, an exchange rate of 30 means that 1 U.S. dollar is equivalent to 30 units of the local currency.

Table 1. Description of Variables and Data Sources

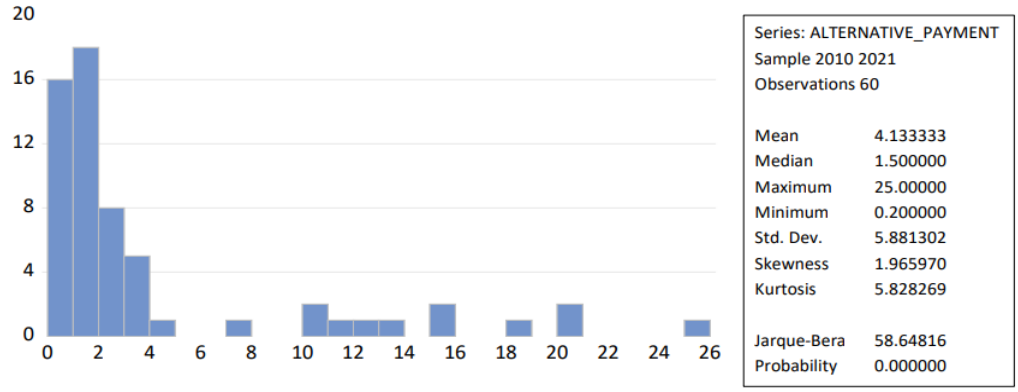
Variable	Definition	Measurement Unit	Data Source
Alternative Payment	Volume of transactions processed through alternative payment systems in BRICS countries	Transaction volume index	Central Bank Reports
Geopolitical Tensions	Level of geopolitical instability measured by the Global Peace Index	Index score (1–5)	Institute for Economics and Peace
GDP	Gross Domestic Product representing economic output	Billion USD	World Bank
Inflation	Annual percentage change in consumer prices	Percentage (%)	World Bank
Exchange Rate	National currency per US dollar	Local currency per USD	World Bank

Source: Compiled by the authors.

Although the variables are expressed in different measurement units, logarithmic transformation was not applied because the values of the variables are relatively moderate and do not exhibit extreme dispersion. Furthermore, the Ramsey RESET test confirmed that the linear specification of the model is appropriate, indicating that the use of a linear functional form does not lead to specification errors (Wooldridge, 2002).

3.4. Statistical Description of the Dependent Variable Alternative Payment (Gusti Ngurah, 2014, p. 11)

Fig. 1: Descriptive Statistics of Alternative Payment System Usage 2010–2021



Source: Output Data from EViews 12 Software

Figure 1 reveals substantial dispersion, with a mean of 4.13 and median of 1.50, underscoring lower-end clustering, while the broad range (0.20–25), pronounced positive skewness (1.97), high kurtosis (5.83), and significant Jarque-Bera test (58.65, $p < 0.0001$) collectively indicate a leptokurtic, non-normal distribution influenced by potential outliers.

3.5. Statistical Description of the Independent Variables

Table 2. Descriptive Statistics of Determinant Factors (2010–2021)

	Geopolitical_Tensions	**GDP**	**Inflation**	**Exchange_Rate**
Mean	4.603333	4.191583	5.245000	26.97000
Median	3.500000	2.520000	5.050000	12.60000
Maximum	8.500000	15.00000	15.50000	75.00000
Minimum	2.000000	1.280000	1.400000	1.700000
Std. Dev.	1.890742	3.778851	2.496467	26.42542
Skewness	0.484632	1.705593	1.391116	0.679513
Kurtosis	1.757735	4.570804	6.488892	1.761306
Jarque-Be	6.206735	35.25903	49.78294	8.453279
Probability	0.044898	0.000000	0.000000	0.014601

Source: compiled by the researchers, utilizing EViews 12 program results

Table 2 reveals marked differences in central tendencies and variability across key economic indicators, notably the Exchange Rate's substantial dispersion (SD = 26.43), while significant Jarque-Bera statistics for Inflation and GDP ($p < 0.0001$) underscore substantial deviations from normality, unlike the relatively moderate divergence observed in Geopolitical Tensions.

4. Quantitative Analysis in the Econometric Framework

Table 3. Regression Results Using Panel Least Squares Method

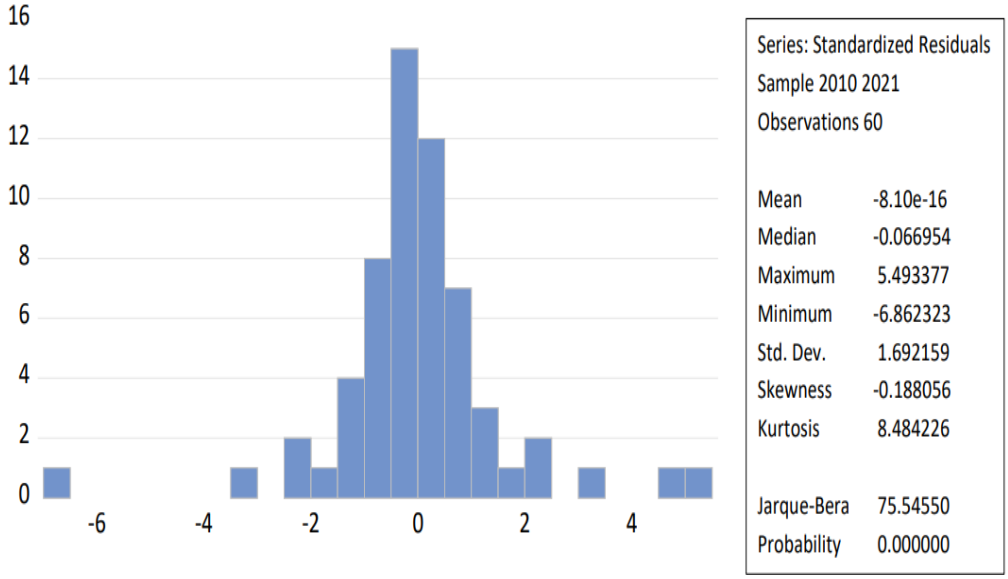
Variable	Coefficient	t-statistic	Prob
C	-5.447513	-5.305620	0.0000
Geopolitical_Tensions	0.894263	5.618744	0.0000
GDP	1.205389	12.75175	0.0000
Inflation	0.055018	0.479132	0.6337
Exchange_Rate	0.004568	0.455860	0.6503
Statistical Results			
f-stat	152.3491	F. statistical Probability	0.0000
Durbin-Watson	1.478955	R-squared	0.917218

Source: developed by the researchers, using EViews 12 analytical outputs

Table 3 reveals that Geopolitical Tensions and GDP significantly and positively influence the dependent variable (p = 0.0000), while Inflation and Exchange Rates have negligible, insignificant effects (p = 0.6337 and 0.6503), with the model exhibiting high explanatory power (R^2 = 0.9172, F = 152.35, p = 0.0000) despite moderate residual autocorrelation (Durbin-Watson = 1.479).

4.1. Model Quality Assessment

Figure 2. Distribution of Standardized Residuals for Regression Model Analysis

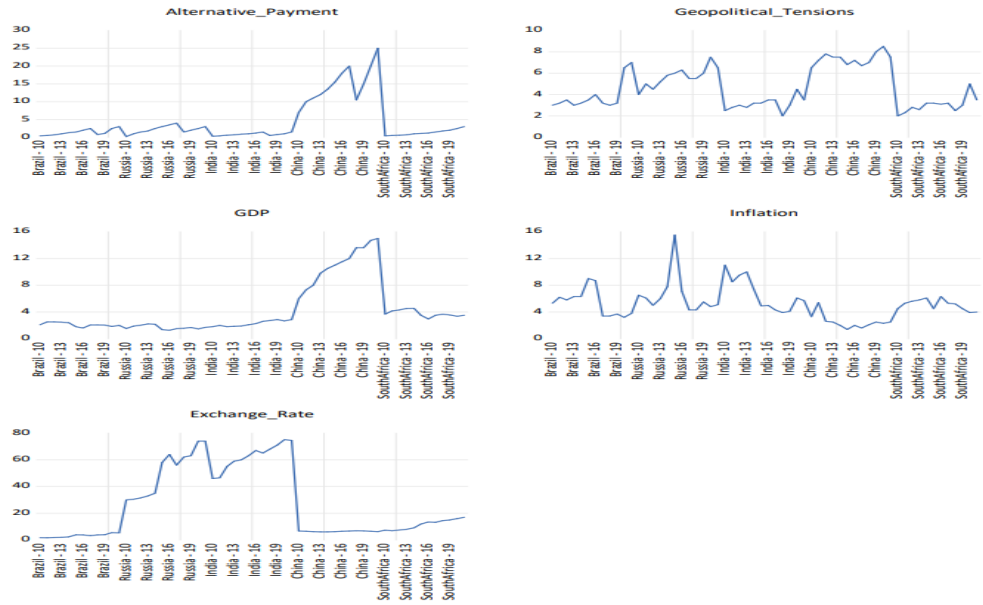


Source: Output Data from EViews 12 Software

Figure 2 illustrates that the standardized residuals are roughly symmetric around zero (mean ≈ -8.10e-16), indicating minimal bias, yet the wide range (–6.86 to 5.49), moderate dispersion (SD = 1.69), slight negative skewness (–0.19), and high kurtosis (8.48) reveal a leptokurtic distribution with heavy tails, as confirmed by a significant Jarque-Bera statistic (75.55, p < 0.0001), hinting at potential outlier effects.

4.2. Study Model Variable Stability Analysis (Baltagi, 2005, p. 18)

Figure 3: Stability of the Study Variables



Source: Output Data from EViews 12 Software

Figure 3 illustrates pronounced temporal dynamics from 2010 to 2021, with Alternative Payment surging sharply—especially in late 2013—amid possible adoption spikes or external shocks; Geopolitical Tensions steadily rising with periodic peaks; GDP remaining largely stable; Inflation showing marked volatility tied to economic or policy shifts; and the Exchange Rate spiking notably toward end-2013, hinting at significant currency devaluations or monetary interventions.

Table 4. Assessment of Unit Root (Time Series Stationarity)

Variable	Test Type	Lag Period	Unit Root Test Settings		p-value Prob	Test Statistic Value
Alternative Payment	Levin, Lin & Chu t	1	Second Difference	None	0.000	-8.0062
	ADF – Fisher Chi-	1			0.000	51.992
	PP – Fisher Chi-sq	1			0.000	94.268
Geopolitical_Tensions	Levin, Lin & Chu t	1	Second Difference	None	0.000	-8.6649
	ADF – Fisher Chi-	1			0.000	52.858
	PP – Fisher Chi-sq	1			0.000	80.515
GDP	Levin, Lin & Chu t	1	Second Difference	None	0.015	-7.1667
	ADF – Fisher Chi-	1			0.043	45.895
	PP – Fisher Chi-sq	1			0.000	86.397
Inflation	Levin, Lin & Chu t	1	Second Difference	None	0.000	-9.7961
	ADF – Fisher Chi-	1			0.000	65.086
	PP – Fisher Chi-sq	1			0.000	95.226
Exchange_Rate	Levin, Lin & Chu t	1	Second Difference	None	0.000	-6.7318
	ADF – Fisher Chi-	1			0.000	48.931
	PP – Fisher Chi-sq	1			0.000	86.701

Source: prepared by the researcher, based on EViews 12 software outputsS

Table 4 confirms that all study variables are stationary, with Alternative Payment and Geopolitical Tensions achieving clear second-difference stationarity evidenced by uniformly significant p-values (0.0000) across all tests, while GDP shows stationarity despite minor p-

value variations, and Inflation and Exchange Rate exhibit strong stationarity supported by consistently significant test outcomes.

5. Methodological Framework for Estimating the Three Panel Data Models

The estimation of the three panel data models is meticulously conducted using rigorous econometric techniques to secure reliable parameter estimates and uphold the robustness and validity of the empirical findings (Sul , 2019, p. 60):

Table 5. Model Estimation Results

Variables	Pooled Regression		Fixed Effects		Random Effects	
	Probability	Coefficient	Probab	Coeffic	Prob	Coeff
C	0.0000	-5.447513	0.0108	-6.178	0.0000	-5.4475
Geopolitical_Tensions	0.0000	0.894263	0.0830	0.1266	0.0000	0.89426
GDP	0.0000	1.205389	0.0000	-0.117	0.0000	1.20538
Inflation	0.6337	0.055018	0.6168	0.1903	0.6292	0.05501
Exchange_Rate	0.6503	0.004568	0.3950	0.6628	0.6459	0.00456
R-squared	0.917218		0.925268		0.917218	
F-statistic	152.3491		78.93039		152.3491	
Probabi (F.statistic)	0.000000		0.00000		0.000000	
Durbin Watson Statis	1.478955		1.560117		1.478955	

Source: generated by the authors, using EViews 12 outputs

6. Comparative Analysis of Models

A comprehensive comparison among the panel data models is undertaken employing a series of diagnostic tests, namely the Restricted Fisher Test, the Homogeneity Test, the Lagrange Multiplier (LM) Test, and the Hausman Test:

6.1. Restricted Fisher Test

H0: The Pooled Regression Model is suitable.

H1: The Fixed Effects Model is suitable.

Table 6. Redundant Fixed Effects Tests

	Statistical Measure	Probability
Cross Sectional F Statistic	1.373483	0.2562
Chi-square Statistic for Cross section	6.138456	0.1890

Source: prepared by the researchers, based on EViews 12 software outputs

Table 6 reveals that the redundant fixed effects tests produce statistically insignificant results—evidenced by a Cross-Sectional F statistic of 1.373483 (p = 0.2562) and Chi-square statistic of 6.138456 (p = 0.1890)—indicating no substantial evidence of redundant fixed effects and thus favoring the random effects model as the more appropriate specification.

6.2. Hsiao's Homogeneity Test outcomes (1986)

This test is used to determine the degree of homogeneity in terms of intercepts and slopes (Hsiao, 2014, p. 36).

Table 7. Results of the Hsiao Homogeneity Test

Test	Test Statistic	p-value
Total Homogeneity Test (F1)	5.493932	**0.2403**
Slope Homogeneity Test (F2)	3.215487	**0.2085**
Intercept Homogeneity Test (F3)	2.782650	**0.2491**

Source: Compiled by the researcher, using EViews 12 software outputs

The results in Table 7 reveal no significant evidence of heterogeneity among units, as all Hsiao tests report p-values above 0.05 (F1 = 5.4939, p = 0.2403; F2 = 3.2155, p = 0.2085; F3 = 2.7827, p = 0.2491), thereby supporting the suitability of the random effects model for the analysis.

6.3. LM test for Lagrange Multiplier

A Breusch Lagrange Multiplier (LM) test is employed to compare the pooled regression framework with the random effects model, and it is based on testing certain hypotheses:
H0: The combined regression model is the most suitable.
H1: The model with random effects is the most suitable.

Table 8. Lagrange Multiplier Test

Test	Test Statistic	p-value
Lagrange Multiplier (LM) Test Breusch-Pagan	1.173033	0.2788

Source: Compiled by the researcher, using EViews 12 software outputs

The data in Table 8 indicate that the Breusch-Pagan LM test yields a statistic of 1.1730 with a p-value of 0.2788, providing no significant evidence for random effects and thus suggesting that their inclusion in the model may be unnecessary.

6.4. Hausman Test

Hausman's statistical test is employed to assess the differences between the fixed and the random effects model based on the evaluation of two specific hypotheses:
H0: The model incorporating random influences is deemed more suitable.
H1: The model with fixed effects is considered the better choice.

Table 9. Hausman's Method (Hausman, 1976, p. 5)

Test	Statistic Value	p-value
Hausman Test	5.493932	0.2403

Source: compiled by the author, using results derived from EViews 12 software

The results in Table 9 show that the Hausman test yields a statistic of 5.4939 with a p-value of 0.2403, offering no significant evidence against the random effects model and thereby indicating its suitability over the fixed effects alternative.

6.5. Wooldridge Test for Autocorrelation (Wooldridge, 2002, p. 25)
H0: There is no autocorrelation.
H1: There is autocorrelation.

Table 10. Wooldridge Test

Test	Statistic Value	P-Value
Breusch-Pagan LM	16.21045	0.0938
The Pesaran Scaled Lagrange Multiplier (LM) test	1.388698	0.1649
Pesaran's CD test for cross sectional dependence	2.323351	0.0202

Source: developed by the author, using EViews 12 software outputs

The data in Table 10 reveal that while the Breusch-Pagan LM test (16.2105, p = 0.0938) and the Pesaran Scaled LM test (1.3887, p = 0.1649) show no significant autocorrelation, Pesaran's CD test (2.3234, p = 0.0202) provides significant evidence of cross-sectional dependence in the model.

6.6. Test for Heteroskedasticity

This test is used to verify that the variance of the errors (residuals) is not constant and varies across observations (Williams, 2020, p. 74).

H0: There is no heteroskedasticity between the cross-sections.

H1: There is heteroskedasticity between the cross-sections.

Table 11. Panel Cross-section Heteroskedasticity LR Test

Test	Statistic Value	p-value
Heteroskedasticity Test	65.84010	0.0000

Source: generated by the researcher, utilizing EViews 12 program results

Table 11 shows that the Panel Cross-section Heteroskedasticity LR test yields a statistic of 65.8 with a p-value of 0, providing strong evidence of heteroskedasticity and indicating non-constant residual variance across cross-sections.

6.7. Ramsey RESET Test

The Ramsey RESET test is used to verify whether the regression model is correctly specified and whether the relationship between the variables follows a linear functional form (Godfrey, 1989).

H_0: The model is correctly specified and the relationship is linear.

H_1: The model is misspecified, indicating possible omitted variables or nonlinear relationships.

Table 12. Ramsey RESET Test

Test	F-Statistic	p-value
Ramsey RESET Test	0.583841	0.5675

Source: generated by the researcher, utilizing EViews 12 program results

The results reported in Table (12) show that the test statistic equals **0.583841** with a **p-value of 0.5675**. Since the p-value is greater than the conventional significance level of **0.05**, the null hypothesis of correct model specification cannot be rejected. This result suggests that the regression model does not suffer from functional form misspecification and that the linear specification adopted in this study is appropriate.

7. Evaluation and Selection of Key Variables in Regression Models

A systematic approach was applied to retain significant and economically relevant variables, based on p-values, economic importance, and coefficient interpretability.

Table 13. Identification of Highly Statistically Significant Independent Variables

Variable	Statistical Description	Statistical Interpretation
Geopolitical_Tensions	Coeffici:0.853404 t-statis:4.929110 Prob: 0.0000	Both variables, Geopolitical Tensions and GDP, demonstrate strong statistical significance ($p < 0.05$), indicating their substantial impact Alternative Payment.
GDP	Coeffici: 1.183511 t-statis: 13.26726 Prob: 0.0000	

Source: prepared by the researchers based on Table 2

Analysis of Table 13 reveals that geopolitical tensions (coefficient = 0.853404; t = 4.929110; p < 0.0001) and GDP (coefficient = 1.183511; t = 13.26726; p < 0.0001) exert highly significant and substantial effects on Alternative Payment transaction volumes, underscoring their pivotal roles in shaping payment behavior.

Table 14. Exclusion of Statistically Insignificant Variables from the Model.

Variable	Statistical Description	Statistical Interpretation
Inflation	Coefficient: 0.055018 t-statistic: 0.479132 Probability: 0.6337	Both variables, Inflation Rate and Exchange Rates, exhibit p-values greater than 0.05, indicating that their effects lack statistical significance and should be excluded from the model
Exchange_Rate	Coefficient: 0.004568 t-statistic: 0.455860 Probability: 0.6503	

Source: prepared by the researcher based on Table 2

Table 14 indicates that inflation (coefficient = 0.055018; t = 0.479132; p = 0.6337) and exchange rates (coefficient = 0.004568; t = 0.455860; p = 0.6503) exert no statistically significant influence on the model, warranting their exclusion to enhance its robustness and precision.

Table 15. Statistical Results of the Regression Model after Excluding Statistically Insignificant Variables

Variable	Coefficient	t-statistic	Prob
C	-4.755958	-6.569209	0.0000
Geopolitical_Tensions	0.853404	4.929110	0.0000
GDP	1.183511	13.26726	0.0000
Statistical Results			
f-stat	201.2309	F. statistical	0.0000
Durbin-Watson	1.441827	R-squared	0.875942

Source: compiled by the author, using results derived from EViews 12 software

In light of the significant cross-sectional dependence detected by Pesaran's CD test (p = 0.0202) and pronounced heteroskedasticity evidenced by a p-value of 0.0000, Robust Regression was employed to address autocorrelation and non-constant error variance, thereby ensuring more reliable and robust estimations of the relationships among the variables.

Table 16. Outcomes of Robust Regression

Variable	Coefficient	Prob
C	-4.491281	0.0000
Geopolitical	0.878586	0.0000
GDP	1.038966	0.0000
R-squared	0.373081	
Rn^2 metric	1432.533	
Probability of	0.000000	

Source: compiled by the author, using results derived from EViews 12 software

 DOI 10.58205/fber.v10i2.2118

Table 16 demonstrates that geopolitical tensions (coefficient = 0.878586; z = 9.646870) and GDP (coefficient = 1.038966; z = 22.80405) exert significant positive effects on the dependent variable, with the model explaining approximately 37.3% of the variance in Alternative Payment (R^2 = 0.3730; adjusted R^2 = 0.3510).

Regression Equation

Based on the results from the table N° 12, the equation becomes:

Alternative Payment = −4.49128 + 0.87858·Geopolitical Tensions + 1.038966·GDP + ϵ

- **Overall Interpretation of the Equation**

A. The equation models how transaction volume in the Alternative Payment system is influenced by **Geopolitical Tensions** and **GDP**.
B. **Geopolitical Tensions**: For each 1 unit increase in **Geopolitical Tensions** (on the Global Peace Index), **Alternative Payment** increases by **0.878586** units. This suggests that as geopolitical instability increases, the volume of transactions in Alternative Payment tends to rise.
C. **GDP**: For each **1 K$** increase in **GDP**, Alternative Payment increases by **1.038966** units, indicating that higher economic output is positively associated with an increase in Alternative Payment transaction volume.

8. Results and Discussion

8.1. Quantitative Analysis and Regression Results

The panel least squares regression reveals that Geopolitical Tensions and GDP exert significant positive effects on the use of Alternative Payment Systems (coefficients 0.8534 and 1.1835; $p < 0.0001$), while Inflation and Exchange Rates are statistically insignificant, with the model demonstrating strong explanatory power (R^2 = 0.9172, F = 152.35) and moderate residual autocorrelation (Durbin-Watson = 1.479).

8.2. Stationarity of Variables and Model Selection

The unit root tests confirm stationarity of all variables at the second difference ($p < 0.0001$), ensuring suitability for econometric analysis, while the absence of significant fixed effects and evidence of homogeneity across units, as indicated by redundant fixed effects tests, Hsiao tests, and the Lagrange Multiplier test, justifies selecting the random effects model for further analysis.

8.3. Robustness and Model Adjustments

To address heteroskedasticity and autocorrelation identified by diagnostic tests, robust regression was employed, confirming Geopolitical Tensions and GDP as significant predictors, despite a modest adjusted R^2 of 0.3511 indicating notable unexplained variance.

8.4. Interpretation of Key Findings

A. **Geopolitical Tensions**: The positive coefficient of 0.878586 signifies that heightened geopolitical tensions significantly drive the adoption of alternative payment systems, reflecting how politically unstable economies increasingly turn to such mechanisms to circumvent vulnerabilities in conventional financial networks due to sanctions or disruptions.
B. **GDP**: The positive association between GDP and alternative payment system usage (coefficient = 1.038966) indicates that economic growth fosters greater adoption of such methods, likely reflecting enhanced cross-border transactions and more advanced financial infrastructure.
C. **Inflation Rate and Exchange Rates**: The statistical insignificance of the Inflation Rate and Exchange Rates suggests that, despite their theoretical relevance, these variables exert no substantial influence on the adoption of alternative payment systems in the BRICS countries during the study period.

8.5. Hypothesis Test

Hypothesis H1: The acceptance of Hypothesis H1, supported by a significant positive coefficient of 0.87857 (p-value < 0.0001), demonstrates compelling evidence that heightened geopolitical tensions are closely linked to increased transaction volumes in alternative payment systems across BRICS countries.

Hypothesis H2: The acceptance of Hypothesis H2, evidenced by a significant GDP coefficient of 1.03897 (p-value < 0.0001), confirms that higher economic output strongly correlates with increased adoption and transaction volumes in alternative payment systems within BRICS countries.

Hypothesis H3: The acceptance of Hypothesis H3, reflected in non-significant coefficients for inflation (0.05501; p = 0.633) and exchange rates (0.00457; p = 0.650), indicates that these variables exert no statistically meaningful influence on the adoption of alternative payment systems in BRICS countries during the study period.

9. Conclusion

This study provides significant insights into the factors influencing the use of Cross-Border Interbank Payment Systems, particularly in relation to **Geopolitical Tensions** and **GDP**. The analysis reveals that both geopolitical instability and economic output have a notable positive effect on Alternative Payment transaction volumes, highlighting how countries with higher geopolitical tensions or larger economies are more likely to adopt alternative payment systems to mitigate risks or facilitate international transactions. While **Inflation** and **Exchange Rates** were found to be statistically insignificant, suggesting that they have limited influence on Alternative Payment usage within the BRICS nations during the study period, the findings underscore the crucial role of geopolitical and economic factors in shaping the landscape of global financial systems. The robustness of the regression model, despite the presence of autocorrelation and heteroskedasticity, emphasizes the reliability of the results.

However, the limitations of the study, including the exclusion of other potential macroeconomic or socio-political factors, provide avenues for future research. Exploring additional variables, considering regional disparities within the BRICS nations, and extending the time frame could further enrich our understanding of the evolving landscape of global financial systems and their response to geopolitical shifts.

6. References

A. Hartwell , C., & Devinney , T. (2021, June). Populism, political risk, and pandemics: The challenges of political leadership for business in a post-COVID world. *Journal of World Business, 56*(4), pp. 1-17. doi:https://doi.org/10.1016/j.jwb.2021.101225.

Ait Mimoune , K. (2025, January 20). Blockchain: Cryptocurrencies Projection In The Banking And Financial Sector During The Period (2009-2023). *Journal of Contemporary Business and Economic Studies, 8*(1), pp. 193-204. doi:https://asjp.cerist.dz/en/article/262701

Aljaradat, A., Sarkar, G., & K. Shukla, S. (2024, September). Modelling cybersecurity impacts on digital payment adoption: A game theoretic approach. *Journal of Economic Criminology, 5*, pp. 1-12. doi:https://doi.org/10.1016/j.jeconc.2024.100089.

Baltagi, B. (2005). *Econometric Analysis of Panel Data.* (J. W. Sons, Ed.) New Delhi, Trent university, India: British Library. doi:https://books.google.dz/books/about/Econometric_Analysis_of_Panel_Data.html?id=31ruAAAAMAAJ&redir_esc=y

Bastanifar, I., Khan, H. K., & Koch, H. (2025, March). Understanding BRICSIZATION through an economic geopolitical model. *Journal of Open Innovation: Technology, Market, and Complexity, 11*(1), pp. 1-10. doi:https://doi.org/10.1016/j.joitmc.2024.100440.

Curi , C., & Murgia , M. L. (2023, January). Forecast Targeting and Financial Stability: Evidence from the European Central Bank and Bank of England. *Finance Research Letters, 51*, pp. 1-6. doi:https://doi.org/10.1016/j.frl.2022.103486.

Dogan, B., & Ugurlu, U. (2024, December 23). Financial Performance of the Target Companies: Before and After Acquisitions. *Journal of Risk and Financial Management, 17*(12), pp. 1-27. doi:https://doi.org/10.3390/jrfm17120581

Dowlah, C. (2024). *Economic and financial sanctions of the United States: Legal perspectives.* New York (USA): Cambridge University Press. doi:https://doi.org/10.1017/9781009471381

Godfrey, L. (1989). *Misspecification Tests in Econometrics The Lagrange multiplier test and testing for misspecification: an extended analysis.* Cambridge: Cambridge University Press.

Gusti Ngurah, A. (2014). *Panel data analysis using eviews.* Indonesia: John Wiley & Sons, Ltd.

Hausman, J. (1976). *Specification tests in econometrics.* Americana: Cambridge, Mass. : M.I.T. Dept of Economics.

Hayakawa, H. (2024, April 3). How a liquidity saving mechanism affects bank behavior in interconnected payment networks. *Journal of Economic Interaction and Coordination , 20*, pp. 41-71. doi:https://doi.org/10.1007/s11403-024-00408-0

Hsiao, C. (2014). *Analysis of Panzl Data.* Cambridge: University of Southern California.

Long, H., Demir, E., Sójka, B. B., Zaremba, A., & Shahzad, H. S. (2022, October). Is geopolitical risk priced in the cross-section of cryptocurrency returns? *Finance Research Letters, 49*, pp. 1-8. doi:https://doi.org/10.1016/j.frl.2022.103131.

McElwee, F., Cole, A., Kaliappan, G., Masters, A., & Steuten, L. (2025, April 2). Alternative Payment Models for Innovative Medicines: A Framework for Effective Implementation. *Applied Health Economics and Health Policy*, pp. 535-549. doi:https://doi.org/10.1007/s40258-025-00960-1

Ramesh, A. C. (2025, June). Digitalisation of Payment Systems in India. *International Scientific Journal of Engineering and Management (ISJEM), 4*(6), pp. 1-8. doi:10.55041/ISJEM04617

Roy, D., Dubey, A., & Tiwary, D. (2024, December 9). Conceptualizing an Institutional Framework to Mitigate Crypto-Assets' Operational Risk. *Journal of Risk and Financial Management, 17*(12), pp. 1-31. doi:https://doi.org/10.3390/jrfm17120550

Simmons, C., Pot , M., Dant , L. K., & Leichsenring , K. (2024, May). Disentangling the impact of alternative payment models and associated service delivery models on quality of chronic care: A scoping review. *Health Policy, 143*, pp. 1-27. doi:https://doi.org/10.1016/j.healthpol.2024.105034.

Sójka, B. B., Demir, E., & Zaremba, A. (2022, December). Hedging Geopolitical Risks with Different Asset Classes: A Focus on the Russian Invasion of Ukraine. *Finance Research Letters, 50*, pp. 1-8. doi:https://doi.org/10.1016/j.frl.2022.103192.

Sul , D. (2019). *PANEL DATA ECONOMETRICS Common Factor Analysis or Empirical Researchers.* New York: Routledge/Taylor & Francis Group.

Tago, A. (2025). International Political Economy: Currency and Finance. In *Introduction to International Relations* (pp. 79-87). Singapore: Springe. doi:doi.org/10.1007/978-981-96-6317-0_7

Williams, R. (2020, January 10). *Heteroskedasticity*. Retrieved from https://www3.nd.edu/%7Erwilliam/.

Wooldridge, J. (2002). *Econometric Analysis of Cross Section and Panel Data.* London, Cambridge, Massachusetts, England: The MIT Press. Retrieved from https://mitpress.mit.edu/9780262232197/econometric-analysis-of-cross-section-and-panel-data/

Yu, Z., Liu , X., Liu , Z., & Li , Y. (2023, September). Central bank swap arrangements and exchange rate volatility: Evidence from China. *Emerging Markets Review, 56*, pp. 1-12. doi:https://doi.org/10.1016/j.ememar.2023.101044.