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The Role of Fintech and Natural Resources in Financial Stability with a Moderating Analysis of Fintech: Evidence from BRICS.

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A B S T R A C T

Purpose—Financial stability has been a critical concern in all countries, with a considerable impact on economic progress. As a result, every nation has worked to promote financial stability by implementing a variety of strategies aimed at boosting financial development and economic growth. The current study examines the effect of natural resources on financial stability, considering the role of Fintech in BRICS economies.

Study Design/methodology/approach—The study applied first-generation approaches, including unit root tests for series stationarity, a panel co-integration test, and panel-ARDL to investigate long-run relationships. The direction of the causal relationship is also determined using the Granger causality test.

Findings—This study explored the negative impact of natural resources, whilst the positive impact of Fintech on financial stability. Moreover, a significant and positive moderating role of Fintech in the natural resources rent and financial stability nexus suggests that Fintech plays a critical role in minimizing the negative effect of natural resources on financial stability.

Research Practical Implications—In light of data availability, the study used data from 2004 to 2021, which is a small sample size for panel estimations.

Originality/value—Previously, researchers have clearly addressed the role of natural resources in financial development and economic growth. To the best of the author's knowledge, no previous research has attempted to examine the role of natural resources in financial stability. Moreover, literature has ignored the important role of fintech in turning the natural resource curse into a blessing. This study investigates the impact of natural resources on financial stability and the moderating role of Fintech, the natural resources, and financial stability nexus in BRICS economies.

Keywords: Natural Resources, Fintech, Financial Stability, Economic Growth, Real Interest

JEL Classification Codes: G21, G28, Q32, Q33

1 | INTRODUCTION

In the dynamic world of global finance, sustainable financial stability plays a vital role, especially as economies go through phases of economic expansion and contraction, driven by complex interactions of domestic and global factors (Claessens & Kose, 2013). A stable financial system means that financial institutions efficiently perform the distribution of funds, manage risk, maintain liquidity, and provide other services to creditors and depositors (Proczek, 2023). Financial stability helps to manage banking crises, enhances the capability of the financial system to withstand shocks from both economic and non-economic events. Also, a stable financial system can utilize natural resources revenue efficiently, which plays a crucial role in positively influencing a country's overall economic growth (Stewart et al., 2021). Moreover, the BRICS countries rely heavily on natural resource earnings, representing a significant portion of their GDP. Although revenue from oil, minerals, gas, and other natural resources provides significant financial inflows, they can also cause volatility in the financial system. Price fluctuations in global commodity markets can have an impact on the economic stability of resource-dependent countries, impacting their ability to maintain financial equilibrium. For instance, good management of natural resource rents, along with a stable financial framework, can support long-term economic growth, avoid downturns, and give resilience to external shocks. To better understand this relationship, it is crucial to investigate how the financial systems in resource-rich economies manage both the opportunities and risks posed by resource dependency, particularly in BRICS.

Phan et al. (2021) define financial stability as a stable financial system in which the banking sector effectively carries out its primary economic activities, including risk distribution, resource allocation, and payment settlements. A stable financial system always enables the economy's mass producers to evaluate risk, which helps with better resource allocation and, eventually, promotes economic growth (Fernandez & Wigger, 2016; Jayakumar et al., 2018). Economies around the world, particularly emerging countries, largely depend on several internal and external sources of financing to promote economic growth (Bostan et al., 2023). Emerging economies endeavor to foster economic expansion, and they resort to a combination of internal and external financing mechanisms. External debts can affect financial institutions' stability, liquidity, and overall health. It can also affect exchange rate risk, liquidity risk, sovereign default risk, and credit risk, which in turn raises interest rates and influences monetary policy. As a result, the rising issues due to external debt can affect financial institutions' stability. This induces emerging economies towards internal financing channels, utilizing their enormous natural resources due to the vulnerability of the financial systems to external risks, specifically those resulting from external indebtedness (Ali & Ramakrishnan, 2022; Dogan et al., 2020; Khan et al., 2020). Therefore, leveraging internal sources like natural resources rents becomes a strategic move to enhance financial stability and resilience.

The allocation of resources, revenue, and implementation of regulations, natural resource rent can be either a blessing or a curse for a nation (Isiksal, 2023; Shahbaz et al., 2019; Zhou et al., 2022). This positive role of resource rent (internal finance) promotes financial stability in these economies by acting as a safeguard against external risks. Resultantly, the circulation of natural resources rent in the economic and financial system could raise the deposit-to-credit ratio and overall financial stability. Natural resource wealth, while beneficial, can pose risks to financial stability, a phenomenon often referred to as the "resource curse" (Sachs, 1995). Over-reliance on resource rents can hinder economic diversification and expose financial systems to

the volatility of commodity prices (Collier & Goderis, 2007). This dependence may lead to "Dutch disease," where currency overvaluation weakens other export sectors, making them less competitive (Corden, 1992). Resource-dependent economies often face challenges like weaker institutional quality and higher levels of corruption, contributing to financial vulnerabilities (Ross, 2001). Effective resource management and diversification are thus essential to mitigate these risks and support long-term financial stability (Auty, 2001). However, the extent to which financial innovations, particularly fintech, can help moderate this resource-related risk remains underexplored in existing literature.

Moreover, in utilizing and channeling natural resources revenue in the financial system, Fintech plays an essential role (Diaz-Rainey & Ashton, 2015). According to (Tan et al., 2023), Fintech development positively influences natural resource management, stressing how it may help with sustainability initiatives. Moreover, highlighted the important role of the financial industry in fostering economic growth and prosperity, claiming that in order to increase growth, the financial industry must mobilize resources effectively. Fintech acts as a catalyst for internal finance in this scenario, making it easier to raise funds for using natural resources efficiently. Literature demonstrates that natural resources are abundant in emerging countries, and efficient use of these resources, together with Fintech, can reduce financial instability caused by external shocks. This positions fintech as a potential moderator that could strengthen the stabilizing effect of natural resources by improving efficiency, transparency, and access within the financial system.

Fintech applications raised innovation in financial services and dramatically transformed the financial sector in both developed and emerging economies. The goal of these developments is to provide new financial services in an efficient, timely, and cost-effective manner (Kolli & Amarouche, 2023). Whilst Fintech remains relatively small in comparison to traditional financial services. Even though it is expanding rapidly, particularly in the more volatile parts of the financial sector (Arner et al., 2015). On one side, Fintech can mitigate financial risks by promoting decentralization and diversification of financial services, expanding financial markets, and increasing the efficiency and transparency of financial service delivery. Whereas, on the other side, it may increase market volatility, expose users to cyber security threats, weakening collective risk-taking, and promote infectious behavior among financial institutions and customers, all of which could threaten the financial system's stability (Beck et al., 2016; Chou, 2007; Claessens, 2009; Gennaioli et al., 2012; Goetz, 2018; Gubler, 2011; Henderson & Pearson, 2011; Rajan, 2006). Because of its dual characteristics, fintech is a strong contender to evaluate its moderating impact in economies that are vulnerable to external threats because of their heavy reliance on natural resources.

The volatility of macroeconomic conditions may limit the financial sector's ability to promote economic growth. For instance, frequent fluctuations in interest rates can have an unfavorable impact on the financial sector, particularly in emerging economies (Alam & Uddin, 2009). Similarly, interest rate fluctuation exposes financial institutions to several risks (such as credit risk, liquidity risk, and operational risk) and decreases economic growth (Adrian & Liang, 2018). This makes it necessary to keep the interest rate stable to ensure financial stability. Furthermore, contended that frictions in the credit markets could cause interest rate volatility to have a negative impact on the financial sector's performance. When interest rates are low, two things happen: banks get more money, which seems good, but people also borrow more, which can be risky.

So, while low interest rates might make banks seem stronger, they also make the risk of too much borrowing higher (Rubio & Yao, 2020). These low rates present two key challenges for policymakers. First, they constrain the effectiveness of conventional monetary policy in stabilizing the economy. Second, they heighten concerns about potential financial imbalances and threats to financial stability (Borio, 2016). Moreover, it may encourage banks to take more risks due to the belief that stabilizing interest rates enhances financial stability (Smith & Van Egteren, 2005). Thus, interest rate is also a relevant control factor in studying financial stability across the BRICS nations.

Studying BRICS countries is important due to their diverse economic structure, rapid fintech development, and an abundance of natural resources, all of which impact financial stability in different ways. Their significance to the global economy and unique financial challenges make them ideal for examining how fintech and natural resources interact to influence financial stability. Accordingly, this study makes several contributions to existing literature. Firstly, we narrow our focus to the BRICS economies, examining the effect of natural resources and Fintech on financial stability within this diverse group of emerging economies. Secondly, we explore the moderating role of fintech, investigating whether its integration changes the relationship between natural resources and financial stability, an area that remains largely unexplored. Thirdly, we have also examined the effect of interest rates and economic growth as additional influential factors. Finally, this study adopts the Pooled Mean Group Autoregressive Distributed Lag (PMG-ARDL) technique (Pesaran et al., 1999), which is particularly suitable for heterogeneous panels like BRICS as it captures both long-run and short-run dynamics while accounting for cross country differences. This choice of methodology directly aligns with our research objective to assess the long run equilibrium relationship across structurally diverse emerging economies.

The rest of the study is structured as follows. Section two discusses pertinent literature. Section three highlights the empirical model, data source, and methodology. Section 4 explains the empirical results and discussion, while Section five presents the conclusion, policy implications, and recommendations.

2 | LITERATURE REVIEW

This section explores the theoretical basis for natural resource rent, financial stability, and Fintech nexuses, along with empirical evidence to build our testable hypothesis.

2.1 | Financial Stability and Natural Resources

This sub-section provides a detailed overview of the economic importance of financial stability as well as the numerous economic approaches by which natural resources influence the financial stability of BRICS nations.

Financial stability is considered an essential component in economic growth, as it reflects the reliability of the financial institutions. Shabir et al. (2021) identified that banking stability can be associated with the absence of a banking crisis. Banks exhibit stability when they offer credit and carry out regular banking operations without any disruptions (Taghizadeh-Hesary et al., 2022).

In previous literature, the importance of NR in long-term sustainable economic expansion is widely discussed. Since the 1980s, researchers have recorded lots of empirical and theoretical evidence opposing the

previously popular view of NR abundance as a driver of growth in the economy, e.g., (Auty, 2002; Corden, 1992; Gylfason, 2001).

In this context, Gylfason (2006) discovered that revenue from natural resources affect economic growth due to its influence on savings and investment. Their study demonstrated that NR reliance might hinder economic growth by reducing investment and savings in nations that depend on these resources. These results encouraged more research into the resource curse phenomenon in the finance industry, acknowledging the critical role that investment and savings play in financial progress. Because of this, numerous scholars have looked into the relationship between NR rents and FD in a range of settings, producing a wide range of results.

Depending on the geography and economic structure, natural resource rents have a very variable effect on financial development. Evidence from the U.S. and OECD countries Shahbaz et al. (2018) suggests a positive influence, possibly due to better institutional quality and diversified economies, whereas studies from China (Yuxiang & Chen, 2011) and Pakistan (Asif et al., 2020) report negative impacts due to governance issues and Dutch disease effects. This implies that the relationship is not consistent and is greatly impacted by the institutional, economic, and regulatory settings unique to each nation.

Yuxiang and Chen (2011) examined the effects of natural resource rent on China's financial development. Their findings demonstrate that NR promotes the NRC phenomenon and has a negative impact on FD. They contend that corruption, rent-seeking, and Dutch disease cause natural resource rents to reduce financial development. The relationship between NR rents and financial development was also examined by Kao (1999)(Guan et al., 2020). Their results indicate a negative correlation between FD and NR rents. Likewise, Asif et al. (2020) investigated how NR rents affected financial development in Pakistan. The results of the study show that NR rent has a detrimental impact on FD, which supports NRC in Pakistan's financial sector.

Furthermore, Mlachila and Ouedraogo (2020) examined the RCH in 68 resource-rich economies and discovered considerable evidence of the NRC in the sample countries' financial industry, which functions through the product price volatility mechanism. Sun et al. (2020) examined the negative effect of NR rents on financial development in 7 emerging nations and found strong support for the NRCH. Shahbaz et al. (2018) looked into the relationship between NR rent and FD in the US and found that NR rent had a favorable impact on FD in the country. Zaidi et al. (2019) also found similar findings in OECD nations.

Despite the growing body of literature on natural resource rents and financial development, limited studies specifically examine these relationships within the BRICS nations. Given their unique economic compositions and resource dependencies, this paper aims to fill that regional gap and provide insights tailored to BRICS financial systems.

Mechanistically, natural resource rents affect financial development through variables such as corruption, rent-seeking, investment misallocation, and currency overvaluation, often measured as a share of GDP.

Based on the reviewed literature, it is concluded that natural resources might be a curse for countries with an abundance of natural resources compared to those with fewer resources, and the following hypothesis is proposed.

Hypothesis 1: *Natural resource rent has a negative impact on financial stability in BRICS.*

2.2 | Natural Resources and Financial Stability: The Role of Fintech

As described in the previous section, the NRC doesn't always persist; several factors can potentially transform it into a blessing. Currently, both practitioners and scholars are looking to Fintech as a potential solution to address the resource curse. In this subsection, we review the literature, both theoretical and empirical, that looks into the role of fintech within the resource-finance paradigm.

The volume of research on fintech and its influence on financial stability is growing rapidly; however, it is still limited in scope, presenting different aspects on whether technology poses a risk or provides an opportunity (Daud et al., 2022; Feyen et al., 2021; Fung et al., 2020; Minto et al., 2017; Nguyen, 2022c; Pantielieieva et al., 2018; Pierri & Timmer, 2020; Vučinić, 2020). The rise of Fintech is increasingly moderating the relationship between financial stability and natural resources, which plays an important role in improving both stability and sustainability.

The role of Fintech in improving financial resilience can be theoretically supported by both Fragility Theory and Resource Management Efficiency Theory. Fragility Theory emphasizes vulnerabilities in financial systems, such as leverage and interconnectedness, which Fintech addresses by enabling transparency, automation, and risk monitoring. Resource Management Efficiency Theory, meanwhile, highlights the potential of Fintech to optimize resource allocation and sustainability through technologies like blockchain, AI, and big data analytics, ultimately supporting long-term financial stability.

Financial stability theories, such as the Fragility Theory, highlight the inherent risks within financial systems caused by factors like leverage and interconnectivity (Brunnermeier & Sannikov, 2014). Fintech advancements support in mitigating these risks by providing better transparency and real-time monitoring of financial activities related to natural resource investments (Han & Heng, 2024). This rising transparency increases macro prudential stability by decreasing systemic risks and enhancing regulatory monitoring.

The Resource Management Efficiency Theory, which focuses on effective natural resource utilization and management, benefits from fintech applications like IoT devices and predictive analytics. These techniques enable more effective monitoring and management of resource extraction and environmental impacts, encouraging sustainable practices and minimizing the risk of resource depletion (Iqbal et al., 2024). By utilizing Fintech solutions in natural resource management, financial stability is enhanced through better risk management and regulatory compliance, resulting in a more resilient and sustainable financial ecosystem.

Recently, scholars investigated how Fintech may mitigate the negative effects of NR abundance on economic and environmental outcomes. Fintech development has been found to reduce carbon emissions both directly and indirectly by moderating the relationship between dependency on NR and emissions (Khan et al., 2024). Fintech and trade diversification help minimize reliance on resources and enhance economic growth, countering the resource curse argument in resource-rich MENA nations (Han & Heng, 2024). Fintech also promotes biodiversity and sustainable practices in natural resource extraction (Iqbal et al., 2024). Incorporating fintech and green finance can help the BRICS countries in overcoming the resource curse and moving towards sustainable economies by promoting green investment and minimizing the effects of Dutch disease (Yadav et al., 2024).

Similarly, (Tan et al., 2023) evaluated the impacts of Fintech growth, renewable energy, government effectiveness, and FDI on NR management in twenty-two selected Belt and Road nations. They conducted their research using data from 2006 to 2021 and discovered a positive effect on natural resource management. This favorable influence has the potential to change the financial resource curse into a blessing and thus improve financial stability. The Murshed (2024) examined how Fintech funding could help mitigate environmental challenges caused by mineral resources in mineral-exporting nations by using advanced panel data estimation techniques. Their study showed fintech financing initially widens and later on shrinks ecological deficits.

Additionally, Liao and Zeng (2023) examine the moderating role of Information and Communication Technology (ICT) and financial development on the resource curse phenomena in 11 developing nations from 1990 to 2021. Results revealed that ICT and financial development can reduce the NRC in developing nations.

While Lisha et al. (2023) explore the relationship between sustainability, green innovation, Fintech, FD, and NR in BRICS nations from 2000 to 2019. Using the Method of Moments Quantile Regression, the results demonstrate that Fintech and NR have a negative influence on environmental sustainability. The Li et al. (2023) analyzed how Fintech, digitalization, institutional quality, and human capital influenced natural resource rents in selected OECD nations from 2002 to 2020. The results show that using Fintech and digitalization reduces the dependence on natural resources. Likewise, enhancing human development and institutional quality decreases the dependency on natural resources. Another study by Li et al. (2020) explored how natural resources effect financial development in Next-11 nations using data spanning from 1990 to 2017. They discovered a negative impact known as the 'resource curse,' which can be mitigated through investments in human capital and advancements in technology.

Based on this theoretical and empirical understanding, we posit that natural resource rents alone may harm financial stability, but with the integration of Fintech, these negative impacts can be mitigated. Fintech not only strengthens institutional and regulatory effectiveness but also promotes transparency and sustainable practices in resource management, offering a pathway to turn the resource curse into a blessing.

These studies collectively indicate that Fintech plays an important role in moderating the negative impacts of natural resource abundance and promoting financial stability in resource-rich countries. Based on theoretical and empirical literature, we propose our 2nd hypothesis as below:

Hypothesis 2: *Fintech moderates the relationship between natural resource rent and financial stability in BRICS.*

2.3 | Economic Growth, Real Interest Rate, and Financial Stability

Real interest rates and economic growth are key factors influencing financial stability. Moderate real interest rates support sustainable economic growth by encouraging investment while balancing borrowing costs (Taylor, 1993). Steady growth, in turn, enhances financial stability by reducing default risks and systemic vulnerabilities (Levine & Renelt, 1992). However, this relationship is influenced by factors like global economic conditions and fiscal policies (Mishkin, 1999). The connection between real interest rates, economic

expansion, and financial stability is often analyzed using frameworks like the Taylor Rule and endogenous growth theories to understand their impact on a stable financial system (Roubini & Sala-i-Martin, 1992).

Prior studies have often employed citation stacking, limiting the depth of individual study insights. In contrast, this review explicitly discusses each study's methods, findings, and national contexts to highlight how results vary across institutional and economic environments, particularly in developing versus developed economies.

In the literature, many researchers have examined the connection between financial stability, GDP growth, and real interest rate. Recently, Mtar and Belazreg (2023) examined the relationship between financial development and GDP growth in 11 European nations from 2001 to 2016. The study's conclusions demonstrated that there is a one-way causal relationship between FD and growth in the economy. The study found that financial institution regulations and funding quality are the key components that can promote economic growth. According to Carbó-Valverde and Sánchez (2013) FD significantly boosts growth in the economy of Germany when the economy is stable, but its impact is reduced when the economy is unstable. Norway continuously shows that financial development positively affects growth, regardless of financial stability. In Spain, when more credit is available from commercial banks and other financial organizations, it encourages economic expansion when the economy is stable, but can have negative impacts when the economy is unstable. Additionally, financial institutions rather than stock markets had a larger overall impact on economic growth, according to research by (Abubakar & Kassim, 2021).

Studies have indicated that one of the primary variables in maintaining financial stability is the real interest rate. Akinci et al. (2020) introduce the concept of a financial stability and real interest rate, which is the threshold rate that can trigger financial instability events. This rate is influenced by imbalances in the financial sector, such as increased leverage. Jenkins and Walsh (1987) further explore the role of the real interest rate in economic stabilization, particularly in the context of credit markets. The Velasco (1993) highlights the potential destabilizing effect of high real interest rates on government debt during stabilization efforts, particularly in the context of exchange rate regimes. In this regard, Hajilee et al. (2015) found an adverse association between the development of the banking sector in emerging economies and interest rate uncertainty. These studies collectively underscore the importance of the economic growth and real interest rate in maintaining financial stability.

Moreover, recent studies emphasize the nonlinear effects of real interest rates on financial stability, suggesting that both excessively low and high real rates can pose risks, thus highlighting the need for optimal policy calibration to maintain a stable financial environment (Claessens & Kose, 2013).

After thoroughly reviewing the theoretical and empirical literature, we propose our 3rd hypothesis as below:

Hypothesis 3: *Real interest rates positively influence financial stability by promoting sustainable economic growth in BRICS economies.*

3 | METHODOLOGY & DESIGN

3.1 | Data Collection and Estimation

This research used annual data of BRICS economies from 2004 to 2021. This time span is chosen based on data availability. BRICS nations were classified by Goldman Sachs Group (O'neill, 2001). This study uses Bank Z-Score to measure financial stability in BRICS and is considered as most accurate measure in previous literature (Beck et al., 2013; Berger et al., 2009; Berger et al., 2017; Fiordelisi et al., 2011; Fung et al., 2020; Kolli & Amarouche, 2023; Laeven & Levine, 2009; Nguyen, 2022a, 2022b, 2022d; Nguyen & Dang, 2023; Phan et al., 2021; Stankevičienė & Kabulova, 2022). The bank z-score measures the ongoing solvency risk of the banking system by comparing financial buffers and risk, where a higher z-score indicates greater financial stability. Natural resources represent the total natural resources rent as a % of GDP (Faisal et al., 2023). Following the study of (Kolli & Amarouche, 2023), we used Mobile Cellular Subscriptions (per 100 people) and Individuals Using the Internet (% of population) to measure Fintech. To develop a composite index from these two variables, we have used PCA, which is a well-known and most widely used procedure for extracting meaningful information from multiple indicators that retains all characteristics of the original indicators (Abdi & Williams, 2010; Falqi et al., 2020; Le et al., 2016; Shlens, 2014). Similarly, GDP (Current US$) proxy is used for the measurement of economic growth, and real interest rate (%) proxy is used to measure real interest rate. All data is obtained from the World Bank's World Development Indicators (WDI) database. Detailed information is provided in Table 1.

Table 1

Variable Explanations

Variables	Symbols	Variable Type	Indicators Proxy	Source
Financial Stability	FS	Dependent	Bank Score	World Bank 2024
Natural Resources	NR	Independent	Total Natural Resources Rent (% of GDP).	World Bank 2024
Fintech	FT	Independent	Mobile cellular subscriptions (per 100 people) + Individuals using the Internet (% of population).	World Bank 2024
Economic Growth	EG	Control	GDP (Current US$)	World Bank 2024
Real Interest Rate	RIRAT	Independent	Real interest rate (%)	World Bank 2024

3.2 | Empirical Model and Methodology

Theoretically, natural resource revenues can have a substantial impact on a country's financial stability (Van der Ploeg & Poelhekke, 2009). Countries rich in natural resources can produce vast revenue streams, resulting in increased economic growth, improved infrastructure, and stronger financial institutions. However, fluctuations in global commodity prices or resource depletion can make revenue from natural resources volatile, potentially destabilizing the economy. Fintech can play an important moderating role in this scenario, allowing for more efficient and transparent management of natural resource revenues. Fintech solutions can

help governments and financial institutions make better decisions by boosting financial inclusion, promoting resource allocation, and offering real-time data analytics (Arner et al., 2015; Gomber et al., 2018). Fintech can help countries effectively manage their resource rents, minimize the risk of financial instability, and increase long-term economic development. As a result, studying the role of Fintech as a moderator in the nexus between NR and financial stability in emerging financial markets is very important. This study's estimated proposed model is as follows.

$$\ln FS_{it} = \alpha_0 + \beta_1 \ln NR_{it} + \beta_2 \ln FT_{it} + \beta_3 \ln EG_{it} + \beta_4 \ln RIRAT_{it} + \varepsilon_{it} \quad (1)$$

$$\ln FS_{it} = \alpha_0 + \beta_1 \ln NR_{it} + \beta_2 \ln FT_{it} + \beta_3 \ln FT^{*}NR_{it} + \beta_4 \ln EG_{it} + \beta_5 \ln RIRAT_{it} + \varepsilon_{it} \quad (2)$$

Equation one serves as the base model of our study, and it investigates the direct impact of NR and Fintech on financial stability. Whereas, equation two presents the moderating role of fintech on the natural resources and financial stability nexus. In the above equations, FS represents financial stability, NR denotes natural resource rent, FT stands for Fintech, the interaction term FT*NR represents the moderating effect of Fintech on natural resources, EG signifies economic growth, and RIRAT represents real interest rates at country i and time t. All the variables are transformed into natural log form.

3.3 | Econometric Techniques

To examine how the explanatory variables affect the dependent variables, the following steps were taken. Firstly, Descriptive statistics were generated for all variables to assess trends. Multicollinearity was assessed through correlation matrices and Variance Inflation Factors (VIFs), ensuring the robustness of estimated coefficients. In the second step, unit root tests are employed to investigate the order of cointegration in the series of the variables. These tests include Breitung t-stat (Breitung, 2001), (Im et al., 2003), (Levin et al., 2002), Augmented Dickey Fuller (Dickey & Fuller, 1979), and (Phillips, 1988). Test assumptions and results from these tests are available and show mixed stationarity levels across variables, which justifies the use of the ARDL framework. The model selection was based on the AIC criteria. In the third step (Kao, 1999; Pedroni, 1999), panel co-integration tests were conducted to look for the existence of a relationship between the variables. In the fourth step, we have used the PMG-ARDL technique of estimation. "Auto regressive distributive lag" PMG-ARDL is introduced by (Pesaran, 1995; Pesaran et al., 1999) and (Pesaran et al., 2001) to calculate long and short run coefficients. This study specifically employs the Pooled Mean Group (PMG) estimator within the ARDL framework, which assumes long-run homogeneity but allows for short-run heterogeneity across countries. The ARDL model is used because it can handle variables with different levels of stationarity and is suitable for smaller samples (Latif et al., 2015). It can also manage serial correlation across various lags for both exogenous and endogenous variables. The study estimated the long and short-term cointegration coefficients for the variables using the ARDL technique. The Error Correction Term (ECT) was computed to capture the speed of adjustment to long-run equilibrium. A significantly negative ECT coefficient confirms the existence of a stable long-run relationship. But the direction of the causality needs to be ascertained, as this cointegration method does not reveal (Pervaiz et al., 2021). The Pairwise Granger

causality was used to determine the causal relationship between the variables, which was the last method used in the study.

4 | RESULTS AND DISCUSSION

4.1 | Descriptive Statistics

It is essential to begin empirical analysis by presenting the descriptive statistics of the key variables, as this provides a preliminary understanding of their distributional characteristics across the selected sample. Table 2 presents the descriptive statistics for the variables used in this study: financial stability (LOG_FS), natural resource rent (LOG_NR), Fintech (FT), economic growth (LOG_EG), and real interest rates (RIRAT). The summary statistics reported include the mean, median, maximum, and minimum values over the study period. The average value of financial stability (LOG_FS) is 2.6428, with a median of 2.7593. The maximum value observed is 3.2195, while the minimum is 1.6864. This reflects variation in the level of financial stability across BRICS economies. For natural resource rent (LOG_NR), the mean is 1.5388 and the median is 1.4218. The highest recorded value is 2.9499, whereas the minimum is -0.1464. These values indicate differing degrees of natural resource dependency among the countries in the sample. The Fintech indicator (FT) has a mean value of -5.3888 and a median value of 0.0234. The maximum and minimum values are 2.4838 and -2.5901, respectively. These figures demonstrate the heterogeneity in the development and adoption of Fintech services across the sampled nations. Economic growth (LOG_EG) shows a mean of 28.111 and a median of 28.158. The highest value recorded is 30.511, and the lowest is 26.267, indicating a relatively consistent range of economic performance among the observed countries. The real interest rate (RIRAT) has an average of 8.4362 and a median of 4.2784. The maximum value observed is 44.635, while the minimum stands at -12.856. These values capture significant differences in monetary policy environments across the BRICS countries.

Table 2

Descriptive Statistics

	LOG_FS	LOG_NR	FT	LOG_EG	RIRAT
Mean	2.6428	1.5388	-5.3888	28.111	8.4362
Median	2.7593	1.4218	0.0234	28.158	4.2784
Maximum	3.2195	2.9499	2.4838	30.511	44.635
Minimum	1.6864	-0.1464	-2.5901	26.267	-12.856

4.2 | Panel Unit-Root Statistics

This step was carried out in order to ensure the proper use of the P-ARDL model, which is appropriate for variables that are stationary at 1st difference (Pesaran et al., 2001). Therefore, several panel unit root tests are performed to identify the stationarity condition of the variables. To ensure robust results, multiple unit root tests—LLC, Breitung, IPS, ADF, and PP—are applied, as each test has different assumptions about heterogeneity and cross-sectional dependence. Although these are first-generation tests, their usage is common in small-N panels. The findings presented in Table 3 reveal that all the variables fit the P-ARDL model and are non-stationary at the level but stationary at 1st difference.

Table 3

Panel Unit-Root Statistics

Variables	At Level (Y)									
	LLC	**P-V**	**BT**	**P-V**	**IPS**	**P-V**	**ADF**	**P-V**	**PP**	**P-V**
log_fs	3.53	0.99	-1.19	0.11	-1.08	0.13	12.77	0.23	15.36	0.11
ft	-1.05	0.14	1.00	0.84	0.08	0.53	7.81	0.64	6.50	0.77
log_nr	-0.17	0.43	1.08	0.86	-0.90	0.18	12.11	0.27	11.88	0.29
log_eg	-1.29*	0.09	-0.74	0.22	0.11	0.54	6.04	0.81	7.35	0.69
rirat	0.01	0.50	0.07	0.53	-0.95	0.17	13.34	0.20	12.66	0.24
ft*nr	-0.01**	0.49	-0.29	0.38	0.22	0.58	7.63	0.66	9.04	0.52
Variables	**At 1st Difference (ΔY)**									
	LLC	**P-V**	**BT**	**P-V**	**IPS**	**P-V**	**ADF**	**P-V**	**PP**	**P-V**
d_log_fs	-4.67***	0.00	-6.53***	0.00	-5.86***	0.00	45.08***	0.00	53.78***	0.00
d(ft)	-2.23***	0.01	-2.46***	0.006	-1.86***	0.03	17.44*	0.06	12.58	0.24
d_log_nr	-6.97***	0.00	-0.41	0.33	-5.23***	0.00	40.34***	0.00	38.42***	0.00
d_log_eg	-5.33***	0.00	-0.46	0.32	-3.17***	0.007	26.38***	0.003	32.26***	0.00
d_rirat	-5.70***	0.00	-3.90***	0.00	-5.22***	0.00	40.90***	0.00	59.32***	0.00
d(ft*nr)	-2.84***	0.002	0.03	0.51	-1.85***	0.03	23.02***	0.01	28.003***	0.001

*Note: ***, **, and * represent significance at 0.01%, 0.05%, and 0.10%, respectively; P-v denotes the probability value. All variables are given in log form, with the exception of real interest rates, which already have features in rates.*

4.3 | Panel co-integration

After confirming the stationarity condition of the variables in panel unit root tests, the Pedroni (1999) and panel co-integration tests are used to investigate the cointegrating connection in the variables. As seen in Table 4, the Kao panel co-integration test rejects the null hypothesis of no co-integration at a level of significance lower than one percent, whereas the Pedroni panel co-integration results in Table 5 indicate that six out of the 11 Pedroni statistics significantly reject the null hypothesis of no cointegration.

Table 4

Kao Panel Co-integration Statistics

Test	t-statistics	Prob.
Kao co-integration test	-4.762	0.00a

Note: a denotes statistical significance at 1% level; source: Author(s) calculation.

Table 5

Pedroni Co-integration statistics

Tests	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	-0.1517	0.56	-0.6987	0.75
Panel rho-Statistic	1.8986	0.97	1.8402	0.96
Panel PP-Statistic	-2.7153	0.00a	-2.1607	0.01b
Panel ADF-Stat	-3.2341	0.00a	-2.1756	0.01b
Between-				
Panel rho-	2.6337	0.99		
Panel PP-	-3.0590	0.00a		
Panel ADF-Stat	-2.2342	0.01b		

Note: a and b denote the 1% and 5% significance level; source: Author(s) calculation.

4.4 | PMG-Autoregressive Distributed Lag Result

The long-term impacts of natural resources, fintech, economic growth, and real interest rate on financial stability are presented in Tables 6 and Table 7 separately for direct effect and moderating effect. The ideal lag length of panel-ARDL (1, 1, 1, 1, 1, 1, 1) was chosen for the panel-ARDL analysis using the Schwarz information criteria (SIC). The results show that in the long run, the NR coefficient of -0.153 is statistically significant at the level of 0.01%. This implies that in the long term, a 1% rise in NR revenue in BRICS economies would lead to a 0.153% decrease in financial stability, indicating that natural resources do not contribute positively to the financial stability of the BRICS nations in the long run. This result supports the theory put forth by (Auty, 1993), (Gelb, 1988), and (Guan et al., 2020) regarding the phenomenon known as the "resource curse." The negative effect could be because of over-reliance on resource revenues in BRICS economies makes other sectors less competitive. Natural resource markets, specifically commodities like oil, gas, and minerals, are highly fluctuating and subject to global price volatility. This volatility might cause the financial system to be unstable.

Similarly, Fintech has a positive long run influence of coefficient value 0.017 on financial stability at a 0.01% significance level in the BRICS economies. These findings suggest that a 1% rise in Fintech boosts financial stability by 0.017%. This finding supports (Fung et al., 2020) the argument that Fintech's influence on financial stability is multifaceted and dependent on the economic context. It might strengthen financial institutions in developing economies while posing challenges in developed ones. As our study sample is an emerging nation, our results show a positive impact of Fintech on financial stability.

Economic growth and real interest rates also have a positive and significant impact on financial stability, according to both estimations, in the long run. The coefficients of 0.105 and 0.008 indicate that a 1% rise in economic growth and real interest rates would boost financial stability by 0.105% and 0.008% in the BRICS nations, respectively.

Additionally, the results of the second model, which looks at how natural resources and Fintech interact to affect financial stability in BRICS economies, are displayed in the second table. When comparing the interaction term's negative and significant coefficient value (0.029) to the natural resources value (0.153) in model one, it becomes clear that NR has a beneficial impact on financial stability in the BRICS through the

use of Fintech. When natural resources interact with Fintech, the negative effect of those NR on financial stability in Model One is reduced to the lowest possible level.

Table 6

The Short and Long Run PMG-ARDL Results (Model 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
		Long Run Equation		
LOG_NR	-0.153	0.011	-13.638	0.000
FT	0.017	0.007	2.378	0.022
LOG_EG	0.105	0.001	104.516	0.000
RIRAT	0.008	0.005	1.698	0.097
		Short Run Equation		
COINTEQ01	-0.410	0.210	-1.952	0.057
D(LOG_NR)	0.058	0.027	2.115	0.040
D(LOG_NR(-1))	0.144	0.040	3.591	0.0009
D(FT)	-0.046	0.113	-0.414	0.680
D(FT(-1))	0.013	0.089	0.153	0.878
D(LOG_EG)	0.209	0.138	1.514	0.137
D(LOG_EG(-1))	-0.0008	0.355	-0.002	0.998
D(RIRAT)	-0.001	0.007	-0.245	0.807
D(RIRAT(-1))	0.012	0.005	2.152	0.037

Table 7

The Short and Long Run PMG-ARDL Results (Model 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
		Long Run Equation		
LOG_NR	-0.108	0.010	-10.703	0.000
FT	0.068	0.014	4.850	0.000
LOG_EG	0.103	0.001	96.513	0.000
RIRAT	0.009	0.003	2.846	0.007
FT*NR	-0.029	0.008	-3.449	0.001
		Short Run Equation		
COINTEQ01	-0.493	0.248	-1.988	0.056
D(LOG_NR)	0.139	0.074	1.859	0.072
D(LOG_NR(-1))	0.064	0.067	0.950	0.349
D(FT)	-0.045	0.115	-0.398	0.693
D(FT(-1))	-0.092	0.121	-0.763	0.451
D(LOG_EG)	0.048	0.166	0.289	0.773
D(LOG_EG(-1))	0.056	0.367	0.154	0.878
D(RIRAT)	-0.001	0.011	-0.091	0.927
D(RIRAT(-1))	0.015	0.008	1.876	0.070
D(FT*NR)	0.034	0.041	0.825	0.415
D(FT*NR (-1))	0.024	0.045	0.543	0.591

4.5 | Granger Causality Test

The Pairwise-Granger causality test is used to determine the direction of causation between variables. Based on the findings in Table 8, a bidirectional Granger causality between financial stability and total natural resources, real interest rate and total natural resources, economic growth, and Fintech is identified. This demonstrates that total natural resources are strongly tied to financial stability and real interest rates; however, Fintech is significantly associated with economic growth. The findings match with the results presented by (Ganda, 2024). The findings also demonstrate a one-way causal relationship between Fintech and financial stability, as well as economic growth and total natural resources.

Table 8

Granger Causality Test

Null Hypothesis			Obs.	F-Statistics	Probability
LOG_NR	X->	LOG_FS	80	2.714	0.072
LOG_FS	X->	LOG_NR	80	3.194	0.046
FT	X->	LOG_FS	80	2.565	0.083
LOG_EG	X->	LOG_NR	80	2.777	0.068
RIRAT	X->	LOG_NR	80	3.175	0.047
LOG_NR	X->	RIRAT	80	3.508	0.034
LOG_EG	X->	FT	80	4.401	0.015
FT	X->	LOG_EG	80	3.586	0.032

Note: x-> shows no Granger causality; source: Author(s) calculation.

5 | CONCLUSION

The primary purpose of this study is to assess whether natural resources have a positive or negative effect on the financial stability of BRICS economies (financial resource curse or blessing). Moreover, examine the moderating effect of Fintech on the NR and financial stability relationships. The links between financial stability, economic growth, real interest rates, and Fintech in the BRICS countries are also explored in this paper. Significant long-term interactions between these factors are found by the analysis. Our initial model results show that NR has a substantial negative effect on financial stability, supporting the notion of the "financial resource curse" among the BRICS. The detrimental effects of natural resources on financial stability indicate that: (1) too much dependency on NR exports results in a lack of economic diversification; (2) corruption and poor NR revenue and wealth management prevent resources from being invested in profitable or diversified ventures; and (3) fluctuations in global resource prices lead to unstable revenues. The BRICS countries are plagued by a resource curse rather than benefiting from their abundance of natural resources.

Furthermore, Fintech has a positive effect on financial stability, implying that through the use of Fintech, financial stability is enhanced. Additionally, our second model reveals that the interaction term between Fintech and natural resources has the least detrimental effect on financial stability when compared to the effects of natural resources alone. Show that the curse of the natural resource can be lessened by the application of Fintech.

Additionally, the effect of economic growth and real interest rate on financial stability is found to be positive and strongly significant. These findings demonstrate the importance of strong economic policies that promote sustainable development and prudent financial management. These factors also contribute to a stable financial system by increasing government revenue, promoting investor confidence, encouraging prudent borrowing and saving, controlling inflation, and ensuring efficient capital allocation. Furthermore, it is discovered that real interest rates and economic growth have a positive and significant influence on financial stability. These findings highlight the need for strong economic policies that encourage sustainable growth and prudent financial management. These variables contribute to financial stability by raising government income, boosting investor confidence, promoting prudent borrowing and saving, decreasing inflation, and ensuring effective capital allocation.

5.1 | Policy implications and recommendations

During economic booms, establishing stabilization or sovereign wealth funds is important for retaining excess resource gains. During economic downturns, these funds can be utilized to keep the economy stable and offer a constant supply of funds for investments and government spending. Investing in other sectors, like services, technology, and manufacturing, can mitigate the reliance of the economy on natural resources and promote its ability to withstand price shocks. Being aware of this, countries like the UAE are trying ways to diversify their economies and reduce their dependency on natural resources such as oil supplies; as a result, they are boosting infrastructure and tourism. However, within the BRICS context, countries like Russia and Brazil, both heavily resource-dependent, could benefit from similar strategies by allocating resource revenues toward technology incubation hubs, renewable energy development, or logistics networks to broaden their economic base.

Establish a solid basis for accountability and transparency in the resource revenue management process. In addition to ensuring that resource earnings are used wisely for public goods and services, this will lessen corruption. Distribute resource income to infrastructure, healthcare, and education. Developing human capital leads to the creation of a trained labour force, which fosters economic expansion and diversity.

Implement countercyclical fiscal strategies to control the volatility of resource revenue that will help to mitigate the economic effects of resource fluctuation in prices and stabilize fiscal policy. Ensuring that the abundance of natural resources promotes economic development and stability in the long run, create long-term national plans for economic growth and resource management.

By promoting fintech, the natural resource curse can be reduced, and financial inclusion, transparency, and efficiency can all be improved. Therefore, the regulatory framework that governments establish should promote the growth and adoption of fintech. Invest in digital infrastructure to promote fintech solutions, especially in underprivileged and remote areas. Improved digital infrastructure facilitates the expansion of fintech, while also increasing access to financial services and promoting economic diversity. Encourage public-private partnerships to develop fintech solutions that are tailored to regional needs. Public-private partnerships have the potential to speed up the adoption of fintech while ensuring that they address specific concerns related to natural resources and financial stability.

Natural resources can promote financial stability rather than instability if these policies are implemented and Fintech is utilized.

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