

## Striking the balance in resource management: Exploring the impact of natural and mineral resources on financial development in BRICS-T nations

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### ABSTRACT

The BRICS-T nations—Brazil, Russia, India, China, South Africa, and Turkey—feature diverse economic structures, including strong manufacturing sectors, advanced technological capabilities, and rich natural and mineral resources, all of which offer substantial potential for economic growth. However, the role of these resources in fostering financial development has been underexplored. This study investigates the impact of natural (oil and coal) and mineral resource rents on financial development in BRICS-T countries, while controlling for political stability and economic growth, to discern whether these resources contribute to a “resource blessing” or a “resource curse.” Utilizing a 34-year dataset (1990–2023) and robust panel estimation techniques, including the Cross-Sectionally Augmented Autoregressive Distributed Lag (CS-ARDL) model alongside rigorous robustness tests, the analysis reveals a “resource curse” for natural resources (oil and coal), which hinders financial development due to economic volatility and sector imbalances. In contrast, mineral resources exhibit a “resource blessing,” significantly enhancing financial development by supporting financial sector growth and diversification. Furthermore, economic growth and political stability are pivotal in promoting financial development, with their long-run effects being more pronounced than in the short run. These findings suggest that policymakers in BRICS-T nations should focus on the strategic management of mineral resources rather than relying heavily on natural resources to promote financial development. Additionally, fostering stable political environments and sustained economic growth is essential to enhancing the resilience and strength of the financial sector.

### 1. Introduction

The premise of the “natural resource curse” holds significant relevance within the study of resource economics, primarily due to the emergence of various perspectives within this domain. However, in the modern era, economists increasingly examine the relationship between natural resources and financial development in both developed and emerging countries (Liu et al., 2023). It is often predicted that

resource-rich nations tend to exhibit stronger macroeconomic indicators, such as reduced deficit spending, steady investment and capital accumulation, stable exchange rates, and lower levels of poverty and inequality. However, in reality, these countries frequently face challenges including political instability, weak institutional structures, low capital accumulation, poor human development outcomes, sluggish GDP growth, and volatile exchange rates (Khan et al., 2023). Currently, policymakers have focused on the resource curse hypothesis due to the

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significant and observable disparities in development between resource-rich and resource-poor nations. Countries with abundant natural resource reserves primarily generate their income from resource rents (Wang et al., 2023; Okpebenyo et al., 2023). Nevertheless, it is largely unrealistic to channel resource rents into the financial system effectively without the presence of a well-functioning and progressive economic framework.

The outcome variable in this study is the financial development (FD) of the BRICS-T nations. A high ratio of domestic credit to the private sector relative to GDP may suggest potential weaknesses in banking sector financing mechanisms. However, factors such as sustained economic growth, increasing consumption and investment expenditures, and rising corporate profit margins create numerous opportunities for advancing FD (Murinde, 2012). Consequently, the economic expansion of BRICS-T nations may positively influence the advancement of their financial sectors. This study seeks to examine the validity of that assumption. Ensuring economic and financial stability may be achieved by sustainable usage and equitable allocation of mineral, oil, natural gas, and coal resources. Conversely, mishandling the price of these resources, although possibly beneficial for growth, can also lead to financial instability. The income generated from the elevated prices of minerals, oil, and coal in the economy has a persistent impact on various sectors, resulting in inequality and potentially fostering economic diversity. Furthermore, the prices of minerals, oil, and coal frequently vary. The transactions have the potential to jeopardize the economic growth and stability of the financial sector in the countries (Guan et al., 2020; Sun et al., 2020). From this viewpoint, the study explores how changes in mineral, oil, and coal prices might influence the financial development of the BRICS-T nations, either positively or negatively.

Several other factors influence the efficiency of a financial system, with political stability being one of the most crucial. A stable political environment plays a key role in enhancing the overall performance of the economic system. Some BRICS-T nations, such as Brazil, India, and South Africa, exhibit a notable level of political stability, supported by well-established democratic systems. Conversely, other countries, including Russia, China, and Turkey, encounter more substantial political obstacles and uncertainties. The fluctuations in political stability can have an impact on investment conditions, economic progress, and global interactions within the BRICS-T alliance, thereby influencing the growth of the financial sector. Nations characterized by political instability tend to exhibit a comparatively lower degree of financial growth in comparison to politically stable nations (Yakubu et al., 2020). Thus, political uncertainty contradicts the rate of FD (Afzal et al., 2023). Moreover, political volatility is a significant factor that hinders policy practitioners from fully harnessing the advantages of natural resource provision. Law and Azman-Saini (2012) conducted a study that also emphasized the correlation between political stability and FD.

Based on the above background, the main purpose of this research is to investigate the effects of mineral and natural resource rents, political stability, and economic growth on financial development for the BRICS-T nations with annual data for the period 1990–2023. One key reason for the focus on BRICS-T nations is their combined share of 41.03 % of the global population, coupled with their emerging role as a driving force behind the rapid growth of the global financial sector. Furthermore, it encompasses around 29.50 % of the global geographical area and possesses a substantial reservoir of natural and mineral resources. Brazil, Russia, and South Africa, among the BRICS-T countries, have predominantly depended on natural resources, which they export to other nations. For instance, a significant proportion of Russia's national revenue, namely 97.7 %, is derived from its substantial reserves of natural and mineral resources, which account for 20 % of the global total (Kuang et al., 2023). China possesses abundant natural resources, including significant deposits of coal, rare earth minerals, metals, and other valuable materials. Brazil possesses significant mineral reserves, including iron ore, bauxite, and gold. India is endowed with a wide array of natural resources, encompassing substantial deposits of coal, iron ore,

bauxite, and several other minerals. Additionally, South Africa is renowned for its rich natural resource base, including significant reserves of gold, platinum, coal, and diamonds. Turkey also holds considerable deposits of boron, copper, and various other minerals.

However, there is a limited body of research examining the relationships between financial development and mineral, coal, and oil rents, political stability, and economic growth within the context of BRICS-T nations. Therefore, examining the BRICS-T countries, particularly in relation to the aforementioned variable linkages, serves as the primary motivation and objective of this study. In this context, the research aims to fill a gap in the existing literature by addressing the following key questions:

- i. What is the impact of mineral rents on financial development in BRICS-T nations?
- ii. How do coal and oil rents influence financial development?
- iii. What roles do political stability and economic growth play in shaping the financial sector in BRICS-T countries?

This study sets itself apart from similar research and makes several key contributions to the literature. First, it is among the first to investigate the impact of mineral and natural resource rents on the financial sector within the BRICS-T region. Second, recognizing the crucial role of political stability in shaping the financial sector—especially given the instability in both financial and political spheres in these countries—this study incorporates political stability alongside economic growth as control variables, an approach often overlooked in previous research. Third, it offers an evaluation of the resource curse in the BRICS-T region by analyzing disaggregated natural and mineral resource rents. Finally, the study employs the CS-ARDL estimator for both long- and short-run analysis, a method known for its robustness in addressing slope heterogeneity and cross-sectional dependence while producing unbiased results. To further enhance the reliability of the findings, the research also applies the Augmented Mean Group (AMG) and Common Correlated Effects Mean Group (CCEMG) estimators, thereby delivering a more policy-relevant framework. Overall, this study provides valuable insights and strategies for promoting sustainable resource management in the BRICS-T nations.

## 2. Literature review

### 2.1. Natural resources and financial development (FD)

Hussain et al. (2020) argued that, within the BRIC countries, natural resources are viewed as a form of endowment closely linked to financial development. However, their study, which partially covered the BRICS-T region, did not analyze the impact of disaggregated natural resources on FD. Dogan et al. (2020) demonstrate that natural resource rents play a significant role in enhancing financial development, particularly in high-income countries. Their findings suggest that the effective management and utilization of resource revenues can strengthen financial institutions and markets, thereby supporting broader economic growth. Chaudhry et al. (2021) conclude that natural resource rent deals with escalating FD. Zaidi et al. (2019) found that natural resources have a positive and significant effect on FD in OECD countries. Shahbaz et al. (2018) observe that an abundance of natural resources significantly contributes to the advancement of FD in the United States. Their findings highlight the role of resource wealth in fostering capital accumulation and strengthening financial institutions. Expanding on this, Raihan (2024) provides empirical evidence indicating that a 1 % increase in natural resource rents results in long-term gains of 0.30 % in FD. However, these studies did not explore the impact of disaggregated natural resources on FD.

Li et al. (2023) found that in the context of the Next-11 countries, natural resources and FD are negatively correlated, suggesting that resource abundance may, in fact, hinder financial sector growth. This

finding aligns with the resource curse hypothesis. In contrast, [Yildirim et al. \(2020\)](#) present a more nuanced view. Their study reveals that oil revenues have a positive and significant effect on FD in the long run, indicating that resource wealth can eventually support financial sector growth if managed effectively over time. However, in the short term, natural resource rents show no meaningful impact on FD. [Rahim et al. \(2021\)](#) argue that natural resource rents tend to impede FD in the Next Eleven (N-11) countries. Their findings suggest that the wealth derived from natural resources may not be effectively channeled into productive financial systems, potentially due to weak institutions, mismanagement of revenues, or an overreliance on extractive industries. Similarly, [Tang et al. \(2022\)](#) report a negative relationship between natural resource rents and FD in ASEAN countries. This suggests that, despite the economic potential of resource wealth, it may fail to translate into financial sector growth in regions where institutional frameworks are underdeveloped.

Various outcomes are documented for other countries. For instance, [Atil et al. \(2020\)](#) demonstrated that for Pakistan, natural resource abundance is driving the economy towards escalating financial development. However, [Asif et al. \(2020\)](#) detected that for Pakistan, primarily natural resource rents generate a surge in FD, but in the long run, natural resource rents generate a decrease in FD. [Jiang et al. \(2021\)](#) expound that natural resource rent plays a pivotal role in diminishing FD for China. Still, it is inclined towards a negative influence on FD as it approaches stability for a developed economy. [Li et al. \(2023\)](#) concluded that natural resource rent contracts FD for China. [He and Deng \(2023\)](#) found that total natural resources, mineral rents, and forest rents have an asymmetric impact on global financial development. While these resources show a positive effect at lower quantiles, their influence tends to be negative across most other quantiles. [Ding \(2023\)](#) provide clear empirical evidence that natural resources have a negative impact on FD in G7 countries, thereby lending support to the natural resource curse hypothesis. Their findings suggest that instead of promoting financial sector growth, resource abundance in these advanced economies may hinder it, possibly due to mismanagement of resource revenues, overreliance on extractive industries, or weakened institutional incentives.

## 2.2. Political stability and financial development (FD)

Political stability is widely regarded as a foundational pillar for FD. A stable political environment fosters investor confidence, reduces economic uncertainty, and supports the implementation of sound fiscal and monetary policies—all of which are crucial for the growth and resilience of financial systems. Conversely, political instability, manifested through frequent government changes, social unrest, corruption, or weak rule of law, can severely hamper FD. Empirical studies have shown that politically stable environments are positively correlated with financial and economic growth. [Girma and Shortland \(2007\)](#) argue that political stability plays a vital role in promoting economic progress, particularly in low-income countries. Their study underscores the idea that a stable political environment reduces uncertainty, enhances policy consistency, and fosters the conditions necessary for sustainable economic growth. However, a critical limitation of their analysis is the omission of FD as a core outcome variable. Therefore, while the findings of [Girma and Shortland \(2007\)](#) are valuable, a more comprehensive analysis would have included FD as a distinct and essential dimension of political stability's impact.

[Law and Azman-Saini \(2008\)](#) assert that political stability significantly accelerates FD in low-income countries. However, a critical shortcoming of their study is the exclusion of the BRICS-T region, a group of emerging economies that play an increasingly influential role in the global financial landscape. Despite their economic significance, many of these countries frequently grapple with political instability, which has direct implications for FD. In a similar context, [Enowbi-Batuo and Kupukile \(2010\)](#) explicate that political stability performs a fundamental role in improving FD in African nations. [Islam et al. \(2020\)](#)

deduce that for BRI nations, political stability functions as a fundamental part of expanding FD. [Odugbesan et al. \(2021\)](#) expound that Nigeria's political stability expedites enlarging FD. [Ofori et al. \(2023\)](#) interpret that for BRICS, MINT, and the G7 nations, political stability contributes to escalating FD in these nations. [Travkina et al. \(2023\)](#) discuss that for emerging nations, political stability functions as an effective tool to improve FD. [Bekana \(2023\)](#) elucidates that for Africa, political stability reinforces FD owing to its favorable impact on it.

## 2.3. Economic growth and FD

Economic growth and FD are closely interconnected, with each reinforcing the other. A sustained economic growth creates greater demand for financial services, driving further expansion and sophistication of the financial sector. Several studies have demonstrated a positive relationship between economic growth and FD. [Benhabib \(2000\)](#) deduce that economic progress serves as an effective means to escalate FD. [Calderón and Liu \(2003\)](#) elaborate that economic progress and FD are favorably interconnected for 109 low-income nations. [Loayza and Rancière \(2006\)](#) clarify that economic progress deals with magnifying FD. [Abu-Bader and Abu-Qarn \(2008\)](#) interpret that economic progress drives the nation towards augmenting FD in Egypt. [Hassan et al. \(2011\)](#) concluded that economic progress aids in improving FD for developing and emerging nations. [Yang \(2019\)](#) represents that economic progress is considered a dominant component in surging financial development. [Adu et al. \(2013\)](#) report that in the case of Ghana, economic growth has a positive influence on FD, suggesting that increased economic prosperity supports the expansion and strengthening of the financial sector. [Ehigiamusoe et al. \(2021\)](#) highlight that for a sample of 125 countries, economic growth serves as a primary driver of financial development. Similarly, [Usman et al. \(2022\)](#) find that economic progress acts as an effective catalyst for enhancing FD in eight Arctic nations. [Ahmed et al. \(2022\)](#) also confirm that in South Asian countries, economic growth plays a significant role in steering and supporting financial sector development.

Conversely, [Hao et al. \(2020\)](#) find that in China, economic growth significantly contributes to the decline of FD, indicating an inverse relationship between the two variables in this context. [Erdoğan et al. \(2020\)](#) reveal that, in the context of the Next-11 countries, economic growth is associated with a decline in FD, suggesting a negative linkage.

## 2.4. Gaps in literature

This study examines the “resource curse” and “resource blessing” hypotheses within the BRICS-T nations by assessing the effects of natural resource rent, specifically oil, coal, and mineral rents, on FD, while incorporating critical factors such as political stability and economic growth (GDP) that have been largely overlooked in prior research. The literature review reveals several notable gaps in the existing body of research that this study aims to address. First, unlike many prior studies that have overlooked the role of political stability in the relationship between natural resources and FD, this analysis explicitly incorporates political stability, underscoring its critical influence on FD. Second, the study provides a detailed examination of whether resource abundance serves as a curse or a blessing for financial development in BRICS-T nations by disaggregating natural resource rents into specific categories—namely, oil and coal—offering a more refined analysis. Third, it employs a comprehensive, multidimensional measure of FD that captures both the efficiency and depth of financial systems, an aspect often neglected in earlier research, thereby ensuring more accurate and meaningful insights. Finally, it employs advanced econometric techniques, notably the CS-ARDL model, to account for cross-sectional dependence and heterogeneity, ensuring robust and unbiased results. Through this integrated approach, the research delivers a more nuanced and policy-relevant understanding of how resource wealth, political conditions, and economic performance collectively influence financial

development in these strategically important emerging economies.

### 3. Data and methods

#### 3.1. Description of research data

For the BRICS-T nations, this study evaluates the validity of the “resource curse hypothesis” by incorporating a range of natural and mineral resource rents into the analysis. Moreover, it tends to discuss the influence of political stability and economic activities on FD. We have taken the data from 1990 to 2023. Our analysis tends to have the succeeding expressions to evaluate the resource curse assumption:

$$FD_{it} = f(MR_{it}, CR_{it}, OR_{it}, PS_{it}, GDP_{it}) \quad (1)$$

$$FD_{it} = \gamma_{1it} + \gamma_{2it}MR_{it} + \gamma_{3it}CR_{it} + \gamma_{4it}OR_{it} + \gamma_{5it}PS_{it} + \gamma_{6it}GDP_{it} + \eta_{it} + z_{it} \quad (2)$$

To overcome the challenge of skewness, we took the natural log of the chosen economic indicators, which is expressed in equation (2). The source of data is the “World Development Indicators”. MR, CR, and OR are the mineral, coal, and oil rents, respectively, measured as a percentage of GDP. PS is the political stability index, and it ranges from 0 to 100 and shows the higher and lower risk, respectively. GDP is “gross domestic product,” which is the proxy of economic growth. FD is the domestic credit to the private sector (% of GDP).  $\eta_{it}$  reflects the cross-sections, and  $z_{it}$  is the error term. The chosen sample is based on six nations, namely, Brazil, Russia, India, China, South Africa, and Turkey.

#### 3.2. Theoretical underpinning

As the resource curse assumption, primarily inspected by [Prebisch \(1962\)](#), is a conceptual dilemma, it emerges as entirely distinct that natural resources comprise supreme causes that hinder economic progress and financial development (FD). This phenomenon is commonly referred to as the “natural resource curse” hypothesis—an enigma where resource abundance paradoxically hinders economic and FD. However, contrasting views suggest that natural resources can, in fact, drive economic growth and FD when managed effectively ([Ozcan et al., 2023](#)). In such cases, countries successfully utilize resource rents to invest in social welfare infrastructure and promote broader development goals. Simultaneously, ineffective usage of resources evolves to be the primary reason for the “resource curse assumption” ([Ding, 2023](#)). Nevertheless, developed nations have achieved economic prosperity through the efficient utilization of resources. So, it is a requisite to efficiently utilize the resources for transforming the “natural resource curse” into a “natural resource blessing”. Basically, we have perceived two normally used integrations beyond the “resource curse assumption”. The first is known as the rent-seeking effect, and the second is the “Dutch disease” ([Teng, 2023](#)). Nations endowed with natural resource reserves are apparently subject to economic crisis. “Dutch disease” can be characterized by a surge in natural resource exports and rising wages, which often lead to currency appreciation. This, in turn, can reduce the competitiveness of other sectors, particularly manufacturing and consumer goods, ultimately weakening domestic demand. This phenomenon offers a comprehensive explanation for declining employment opportunities and rising poverty levels, regardless of a country’s income level. Moreover, the notion of rent-seeking explains that the abundance of natural resources expedites an elevation in resource rents, which then leads to crime and rent-seeking management in the nation. Numerous rent-seeking activities are perceived owing to the institutional limitations in low-income nations ([Huang, 2023](#)).

We carefully examine the existing literature to outline the expected relationships among the variables under investigation. Assume the mineral, oil, and coal prices disclose a favorable/unfavorable influence on FD in the following manner:

$$\gamma_{2it} = \frac{\partial FD}{\partial MR} > 0 \text{ or } \gamma_{2it} = \frac{\partial FD}{\partial MR} < 0$$

$$\gamma_{3it} = \frac{\partial FD}{\partial CR} > 0 \text{ or } \gamma_{3it} = \frac{\partial FD}{\partial CR} < 0$$

$$\gamma_{4it} = \frac{\partial FD}{\partial OR} > 0 \text{ or } \gamma_{4it} = \frac{\partial FD}{\partial OR} < 0$$

The linkage between political stability and FD is predicted to be favorable.

$$\gamma_{5it} = \frac{\partial FD}{\partial PS} > 0$$

We have incorporated GDP in our ongoing analysis. Observing our preceding literature, we anticipate that GDP demonstrates a favorable impact on FD.

$$\gamma_{6it} = \frac{\partial FD}{\partial GDP} > 0$$

#### 3.3. Empirical methodology

Interconnections among countries, such as those arising from pandemics, fuel price shocks, and economic downturns, are often driven by unobserved common factors, resulting in what is known as “cross-sectional dependency (CS).” Therefore, the topic of CS needs to be addressed in ongoing research. To overcome the challenges of residual CS, the current research applied Pesaran’s ([Pesaran, 2015](#)) CS methods. It is preferable to perform CS testing before assessing the stationarity of selected economic indicators. Then, the ongoing research determines the unit root of selected economic indicators following CS statistics.

In the current discourse of resource economics and econometrics, there are “three generations of unit root tests: first, second, and third”. Although there are a few well-known and interesting tests in the first generation ([Choi, 2001](#); [Levin et al., 2002](#); [Maddala and Wu, 1999](#)), they mostly deal with homogeneous panels. The difficulties associated with heterogeneous panels have been considered by [Im et al. \(2003\)](#). Additionally, to overcome the challenge posed by structural breaks, the study uses a method outlined by “[Luís Carrion-i-Silvestre et al. \(2005\)](#)”, but these tests cannot meet the difficulty of CS and heterogeneity. In this regard, [Bai and Carrion-I-Silvestre \(2009\)](#) and [Pesaran \(2007\)](#) tests have been applied in this study.

As previously discussed, after conducting various unit root tests, we now aim to examine and interpret the long-run relationships among the selected economic indicators. Although numerous cointegration tests exist in the literature, many have limitations. For example, the tests developed by [McCoskey and Kao \(1998\)](#), [Pedroni \(2004\)](#), and [Westerglund \(2005\)](#) often perform poorly when cross-sectional dependence (CS) is present in the panel data, limiting their reliability in such contexts. Our objective is to cope with various issues in the panel data that our study is confronting; it includes CS, structural breaks, and heterogeneity. Therefore, the most suitable techniques are [Westerglund and Edgerton \(2008\)](#) and [Banerjee and Carrion \(2017\)](#) to test the co-integration among the variables.

To handle the issue of slope heterogeneity and CS, our research employs the most precise technique of CS-ARDL. The CS-ARDL model was employed in this study due to its ability to account for CS and slope heterogeneity across panel data, which are common features among BRICS-T countries. This model provides robust long- and short-run estimates even in the presence of unobserved common factors and structural differences among countries. Its suitability for small sample sizes and non-stationary variables further strengthens the reliability of the empirical results. Another advantage of this test is its flexibility in handling coefficient homogeneity or heterogeneity across groups. It allows for different estimation approaches, including the average group (AG), pooled (P), and pooled mean group (PMG) methods, enabling

more accurate modeling based on the nature of the data. However, it cannot be used if dynamic models are allowed to be created by solving endogeneity problems (Chudik et al., 2016; Mohaddes and Raissi, 2017), which is not the case for this research. Our research began with,

$$Y_{i,t} = \sum_{j=0}^{n_s} \zeta_{j,i} Y_{i,t-1} + \sum_{j=0}^{n_f} \hat{w}_{j,i} M_{i,t-1} + l_{i,t} \tag{3}$$

Expression (3) signifies the autoregressive distributed lags model, despite the fact that it yields misleading empirical results when there is CS dependence. Nevertheless, in expression 4, our research employs a cross-sectional average for explanatory variables. To subdue the challenge of CS (Chudik and Pesaran, 2015), the expression mentioned in 5 provides merit to resolve unsuitable conclusions linked to the existence of threshold effects.

$$Y_{i,t} = \sum_{j=0}^{n_s} \zeta_{j,i} Y_{i,t-1} + \sum_{j=0}^{n_f} \hat{w}_{j,i} M_{i,t-1} + \sum_{j=0}^{n_m} d'_{i,j} \overline{FG}_{i,t-1} + l_{i,t} \tag{4}$$

In equation (4),  $\overline{Y}_{i,t-1} = (\overline{H}_{i,t-1}, \overline{X}_{i,t-1})$  denotes the means of the outcome variable, i.e., financial development and various regressors such as MR, CR, OR, PS, and GDP.  $n_s$ ,  $n_f$  and  $n_m$  are the lags of each economic indicator. Moreover,  $V_{i,t}$  describes the response economic indicator, and  $X_{i,t}$  represents the set of controlled economic indicators. Although  $\overline{Y}$  pertains to the cross-section averages, which aids us in subduing CS dependence brought about by any financial shock. In equation (5), the ongoing empirical research confabulates the short-run and long-run coefficients.

$$\hat{\omega}_{csardl,i} = \frac{\sum_{j=0}^{n_s} \hat{\delta}_{K,i}^{jw}}{1 - \sum_{j=0}^{n_s} \hat{\delta}_{j,i}} \tag{5}$$

Following this, our research extracted the mean group coefficients and long-run coefficients in the following way:

$$\hat{\omega}_{mg} = \frac{1}{n} \sum_{i=1}^n \hat{\vartheta}_i \tag{6}$$

The equations in (7) represent the long-run coefficients.

$$\Delta Y_{i,t} = \Theta_i [Y_{i,t-1} - \omega_i M_{i,t}] \sum_{j=0}^{n_s} \zeta_{j,i} \Delta Y_{i,t-1} + \sum_{j=0}^{n_f} \hat{w}_{j,i} \Delta_j M_{i,t-1} + \sum_{j=0}^{n_m} d'_{i,j} \overline{FG}_{i,t-1} + l_{i,t} \tag{7}$$

where  $\Delta_j = t - (t - 1)$ . Moreover, the short-run estimations are:

$$\hat{\tau}_i = \left( 1 - \sum_{j=1}^{n_s} \hat{\delta}_{j,i} \right) \tag{8}$$

$$\hat{\omega}_i = \frac{\sum_{j=0}^{n_f} \hat{\delta}_{j,i}}{\hat{\tau}_i} \tag{9}$$

$$\hat{\omega}_{mg} = \frac{1}{n} \sum_{i=1}^n \hat{\vartheta}_i \tag{10}$$

The CS-ARDL technique is closely related to the pooled mean group approach. Furthermore, as extensively documented in the literature, the error correction term (ECT) captures the speed at which variables adjust toward long-run equilibrium. It is always pertinent to check the robustness of the model. Therefore, we have applied two methods for the robustness check, such as the augmented mean group (AGM) and correlated effect mean group (CEMG) (Eberhardt and Teal, 2010; Pesaran, 2006; Yao et al., 2019). The main purpose of these two tests was to cope with the three challenges of the panel data analysis, namely, structural breaks, CS, and heterogeneity. In this context, the flow of the empirical methodology is shown in Fig. 1.

#### 4. Empirical findings and discussions

Our ongoing research discusses the influence of MR, CR, OR, PS, and GDP on FD for a panel of six middle-income nations, BRICS-T. Recently, the chosen nations have been connected on so many grounds, including economic and financial. Therefore, modifications in aggregate demand can be switched between nations. To minimize bias and uncertainty in the model, our study acknowledges the necessity of incorporating various shocks affecting these nations. If our research does not evaluate these effects, our research may not obtain unbiased results. Consequently, to subdue these challenges, our research pertains to the CS test, as suggested by Pesaran (2015). The empirical outcomes in Table 1 reveal that our alternative hypothesis is accepted, and thus, our research outcomes for chosen nations are cross-sectionally dependent.

Our research relates to the third-generation methodology by employing two appropriate unit root tests to notice the challenges, like structural breaks, slope heterogeneity, and CS. Table 2 indicates the results of Pesaran (2007) and Bai and Carrion-I-Silvestre (2009) unit root method. Based on the empirical results of Pesaran (2007), the acceptance of the null hypothesis at the level indicates that all variables are stationary at the level, except for coal rent (CR) and political stability (PS), which exhibit stationarity at first difference. In the case of Bai and Carrion-I-Silvestre's (2009) unit root method, our research's outcomes support the null hypothesis of non-stationarity for observed economic indicators. The main advantage of this method is that it deals with the challenge of structural breaks in the chosen time frame. Taking into consideration, our research has employed Bai and Carrion-I-Silvestre (2009) at the first difference. It is depicted in Table 2 that by not accepting the null hypothesis, our research elucidates that observed economic indicators, FD, MR, CR, OR, GDP, and PS, are stationarity at I (1).

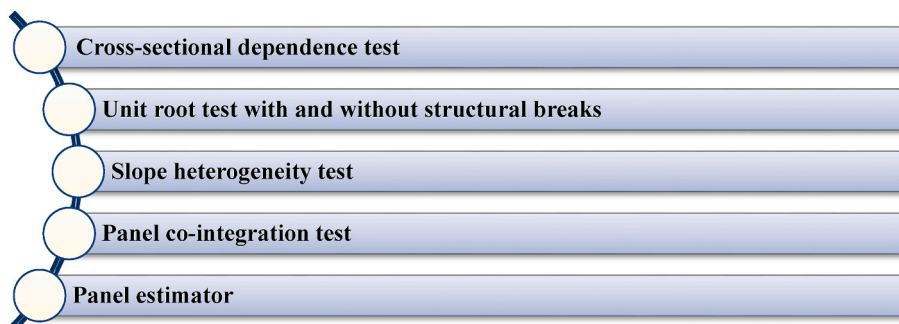


Fig. 1. The flow of the empirical methodology.

**Table 1**  
Cross-sectional dependence test.

Included variables	Test values
FD	22.133***
MR	17.324***
CR	19.109***
OR	29.299***
PS	19.982***
GDP	23.822***

Note: \*\*\* represents significance at 1 %.

The next step is to discuss whether the slope coefficients are heterogeneous or homogeneous. According to the empirical results presented in Table 3, based on Swamy’s slope homogeneity test developed by Pesaran and Yamagata (2008), our findings lead us to accept the alternative hypothesis of slope heterogeneity. Specifically, the test results indicate that the slope coefficients vary significantly across the cross-sectional units in our panel data, and this heterogeneity is confirmed at the 1 % significance level. This suggests that the relationships between the variables differ among the BRICS-T countries, highlighting the importance of employing econometric techniques that account for such cross-country variations rather than assuming uniform slope coefficients.

The first and foremost task was to check the order of integration, which is at I (1). After finding out the order of integration, the next step is to find out about the appropriate method to estimate the long-run connection among the chosen economic indicators. For the said purpose, we have used a well-known technique established by Westerlund and Edgerton (2008). The null hypothesis is “no cointegration”, but the best thing about this method is that it takes into account various issues in panel data analysis, for instance, CS, serial correlation, heterogeneity, and structural breaks. The empirical findings of the said technique vividly revealed the existence of a long-term association among the selected variables (Table 4).

Our research has also explained the outcome of Banerjee and Carrion’s (2017) cointegration analysis in Table 5. The estimates authenticate the cointegrating linkage between GDP, MR, PS, CR, OR, and FD at a 1 % level. This is also authentic for each nation observed in the panel. The empirical outcome for both methods, i.e., Westerlund and Edgerton (2008) and Banerjee and Carrion (2017), is consistent with the preceding scholarly work, for example, Sharif et al. (2022) and Wei and Lihua (2022). Furthermore, the estimated outcome for Banerjee and Carrion (2017) for FD also reinforces the cointegrating linkage.

As previously discussed, the CS-ARDL model is the most suitable

**Table 2**  
The stationarity testing with and without structural breaks.

Included variables	Level		1st difference		
	CIPS	M-CIPS	CIPS	M-CIPS	
FD	-4.203***	-6.136**	-	-	-
MR	-5.312***	-6.311**	-	-	-
CR	1.982	2.091	-6.192***	-7.330**	-
OR	-5.219***	-5.506**	-	-	-
PS	2.334	2.765	-7.138***	-5.242**	-
GDP	-5.247***	-6.361**	-	-	-

Uni root test – “Bai and Carrion-I-Silvestre (2009)”						
	Z	P <sub>m</sub>	P	Z	P <sub>m</sub>	P
FD	0.532	1.367	15.776	-4.662	14.544***	57.133***
MR	1.247*	0.673	19.232	-3.177	25.122***	67.221***
CR	6.544***	0.557	17.741	-1.832	10.573***	51.163***
OR	3.214***	0.691	19.662	-5.635	17.116***	81.288***
PS	0.225	1.201	8.435	-2.910	10.671***	70.446***
GDP	0.782	1.381	7.213	-3.791	9.482***	69.810***

“Note: \*\*\*, \*\*, & \* represent significance at 1 %, 5 %, and 10 % level, respectively. In the case of Bai & Carrion-i-Silvestre’s (Bai and Carrion-I-Silvestre, 2009) approach, the usual 1 %, 5 %, and 10 % critical values for Z and P<sub>m</sub> stats are as under: 2.326, 1.645, and 1.282. In addition, P’s critical values are 56.06, 48.60, and 44.90.”

**Table 3**  
Slope heterogeneity.

Stat	Test value
Δtilde	29.372***
Δtilde-adjusted	35.356***

Note: \*\*\* represents significance at a 1 % level. Probability values are in parentheses.

**Table 4**  
Panel cointegration.

Tests	No structural break	Mean-shift	Regime-shift
Z <sub>φ</sub> (N)	-6.446***	-4.232***	-5.121***
P-value	0.000	0.004	0.002
Z <sub>τ</sub> (N)	-4.541***	-4.330***	-5.271***
P-value	0.001	0.008	0.005

Note: \*\*\* represents significance at a 1 % level.

**Table 5**  
Cointegration analysis: Banerjee and Carrion (2017).

Economies	No deterministic specification	With constant	With trend
All	-5.661***	-5.332***	-5.223***
Brazil	-6.474***	-6.463***	-6.212***
Russia	-6.233***	-5.255***	-4.331***
India	-7.346***	-6.247***	-5.432***
China	-3.367***	-4.163***	-5.252***
South Africa	-5.467***	-5.233***	-6.411***
Turkey	-6.893***	-6.786***	-6.213***

Note: Critical Value (CV) at 5 %\*\* and 10 % \* with the constant is -2.32, -2.18, and with the trend is -2.92 and -2.82, respectively.

approach for this study because it accounts for both cross-sectional dependence and slope heterogeneity in panel data. The results from the CS-ARDL estimation are presented in Table 6. The current research demonstrates that natural resource rents exert a heterogeneous long-term impact on FD in BRICS-T nations, with distinct outcomes depending on the resource type. Specifically, mineral resources exhibit a “resource blessing,” positively contributing to FD by fostering economic diversification, attracting investment, and strengthening financial institutions. In contrast, coal and oil resources are associated with a “natural resource curse,” negatively affecting FD due to over-reliance on volatile resource revenues, which can crowd out other sectors and destabilize financial systems. This mixed influence is well-documented and aligns with prior scholarly work, such as Sachs and Warner, 1995,

**Table 6**  
Findings of the CS-ARDL model.

Economic indicators	Coeff.	T-stat	Prob.
<b>Long-run findings</b>			
MR	0.220***	4.055	0.000
CR	-0.121***	-5.112	0.000
OR	-0.223**	-3.101	0.022
PS	0.191***	4.401	0.000
GDP	0.230***	6.431	0.000
<b>Short-run findings</b>			
MR	0.137***	5.056	0.000
CR	-0.106***	-3.342	0.002
OR	-0.082***	-4.434	0.000
PS	0.063***	6.626	0.001
GDP	0.098***	4.726	0.000
ECT (-1)	-0.302***	-7.512	0.001

Note: \*\*\*, \*\* & \* represent significance at 1 %, 5 % and 10 %.

who highlight how resource abundance can lead to economic distortions. The resource blessing remains debated due to its potential to create short-term gains but long-term vulnerabilities if not managed prudently. The resource curse in BRICS-T nations, particularly linked to oil and coal, may stem from price volatility and over-dependence, which undermine financial stability and hinder diversified economic growth, as noted by [Auty \(2007\)](#). These findings underscore the need for strategic resource management to mitigate the adverse effects of resource dependence and maximize financial development benefits. Prior studies reveal varied impacts of natural resource rents on FD. [Zaidi et al. \(2019\)](#) highlight that in OECD nations, natural resources significantly enhance FD due to their positive relationship. Conversely, [Khan et al. \(2020\)](#) argue that natural resource rents in certain economies hinder FD by distorting economic structures. [Yildirim et al. \(2020\)](#) find that in 16 low-income countries, natural resource rents serve as an effective driver of FD, supporting financial system growth.

Moreover, in BRICS-T nations, a 1 % increase in GDP significantly boosts financial development by 0.230 % in the long run and 0.098 % in the short run ( $p < 0.01$ ). This positive relationship suggests that economic growth enhances financial systems, likely through increased investment and banking sector expansion. However, the stronger long-term effect indicates that sustained GDP growth is crucial for deepening financial development in these emerging economies. [Dhingra \(2023\)](#) stated that financial development in BRICS countries has strong long-term and short-term positive effects on economic growth. [Mtar and Belazreg \(2023\)](#) revealed that there is a one-way relationship between economic growth and FD for 11 European countries. [Song et al. \(2021\)](#) deduced that for 142 nations, GDP assists the economy in uplifting financial development. [Ehigiamusoe et al. \(2021\)](#) explained that for 125 nations, GDP is enacted as a powerful tool to surge FD.

To investigate the relationship between political stability and FD, our study incorporates political stability into the model and examines its impact on FD. The CS-ARDL model results reveal that political stability significantly drives financial development in the BRICS-T nations in the long run, as evidenced by its high significance in [Table 6](#). This finding underscores that stable political environments—marked by consistent governance, regulatory predictability, and institutional trust—foster investor confidence and policy continuity, enabling robust financial systems across these diverse emerging economies. In Brazil and India, stability supports banking reforms and market growth, while in China and Russia, it ensures policy consistency for financial innovation. This result is supported by institutional theories ([North, 1993](#)) and empirical studies ([Enowbi-Batuo and Kupukile, 2010](#); [Outreville, 1999](#); [Dutta and Roy, 2011](#); [Ayadi et al., 2015](#); [Haseeb et al., 2019](#)), this result highlights the need for BRICS-T policymakers to prioritize transparent governance to mitigate political risks and sustain financial sector growth, though the varying political contexts suggest tailored strategies are essential.

This research extends its analysis from long-term to short-term dynamics. Consistent with long-run findings, the short-term estimates reveal similar patterns, confirming a “resource blessing” for mineral resources, which positively contribute to FD by supporting financial sector growth. Conversely, oil and coal resources exhibit a “resource curse,” negatively impacting FD due to economic volatility and over-reliance on these commodities, as evidenced in [Table 6](#). Additionally, political stability maintains a positive association with FD in the short run, suggesting that stable governance fosters investor confidence and financial market activity even over shorter time horizons. Similarly, GDP demonstrates a positive linkage with FD, indicating that economic growth spurs financial development by expanding credit availability and banking sector activity. The error correction term (ECT) is negative and significant, confirming long-run convergence within the model, implying that short-term deviations from equilibrium are gradually corrected over time. These findings underscore the dual role of natural resources in shaping financial development and highlight the critical influence of political stability and economic growth in driving financial sector resilience in the short term across these emerging economies.

This study employs two additional tests, the Augmented Mean Group (AMG) and the Common Correlated Effects Mean Group (CCEMG) estimators, to validate the empirical results obtained from the CS-ARDL model. The AMG results reveal a significant positive coefficient for mineral resources (MR) at 0.156, indicating that mineral wealth contributes positively to financial development. In contrast, coal resources (CR) and oil resources (OR) exhibit negative and significant coefficients, suggesting that these resource rents may hinder financial development. Political stability (PS) shows a strong positive impact with a coefficient of 0.233, while GDP has a highly significant positive effect of 0.314 ( $p < 0.01$ ), underscoring the importance of economic growth and stable governance in promoting financial development ([Table 7](#)).

Similarly, the CCEMG estimator confirms these findings by showing positive and significant coefficients for MR, PS, and GDP, alongside negative and significant coefficients for CR and OR. The consistency of these results with the earlier CS-ARDL model—demonstrating uniform sign patterns across different estimation techniques—strengthens the robustness and reliability of the empirical evidence. Collectively, these findings provide strong support for policymakers in BRICS-T nations to carefully consider the distinct roles of different natural resources, along with political stability and economic growth, when designing strategies to foster sustainable financial development.

## 5. Conclusions and policy implications

### 5.1. Conclusions

Inefficient use of natural resources is linked to poor macroeconomic outcomes, negatively affecting economic growth and the financial sector of a country. Despite abundant resources, many countries struggle to harness them effectively due to unfavorable macroeconomic conditions. There is a scarcity of comprehensive studies examining the relationship between GDP and political stability in the six emerging BRICS-T nations, particularly through the lens of the “resource curse” hypothesis. To

**Table 7**  
Findings of the AMG & CCEMG.

Variables	AMG		CCEMG	
	Coeff.	T-stat	Coeff.	T-stat
MR	0.156***	5.222	0.212***	4.425
CR	-0.123***	-6.434	-0.181***	-3.134
OR	-0.282***	-4.343	-0.337*	-4.586
PS	0.233***	3.372	0.282***	3.243
GDP	0.314***	4.463	0.372***	5.223
Wald test	-	-20.421	-	11.124

Note: \*\*\*& \* represent significance at 1 %, and 10 % levels, respectively.

address this gap, the present study explores the connections between financial development (FD), natural resources (oil and coal), mineral resources, political stability, and economic growth in BRICS-T countries, utilizing the most recent 34 years of data (1990–2023). To examine both short-run and long-run effects, this study employs the CS-ARDL approach, ensuring all panel data analysis requirements are satisfied. A key contribution of this research is the confirmation of both the resource curse and resource blessing hypotheses within the selected nations. Specifically, mineral resources support the resource blessing hypothesis, while coal and oil resources hinder financial development, aligning with the resource curse hypothesis. Additionally, economic growth and political stability are found to have positive and significant impacts on financial development.

## 5.2. Practical recommendations

Our analysis offers several important policy recommendations for BRICS-T nations based on the empirical findings. Policymakers in these nations need to design strategies that ensure the efficient utilization of natural resources. Achieving this requires comprehensive approaches that address all economic aspects relevant to resource management. Furthermore, political stability plays a critical role in unlocking the benefits of financial development; countries with low political stability tend to struggle in effectively developing their financial sectors. Therefore, strengthening political institutions is vital for these nations to fully capitalize on their natural resource wealth. Additionally, given the study's findings that economic growth positively influences financial development, policymakers should be prepared to implement measures that maintain financial stability during periods of economic expansion. Tools such as interest rate adjustments and money supply management are crucial for sustaining stability within financial markets.

The study's finding of a negative and significant impact of coal rent (CR) and oil rent (OR) on financial development supports the validity of the "resource curse hypothesis." This indicates that CR and OR are not being efficiently utilized in the BRICS-T countries. Such reliance on resource rents often leads to economic disparities and income inequality, worsening social and economic challenges. Additionally, natural resources are typically subject to high price volatility, which can undermine economic stability due to fluctuating trade values. In this context, natural resources may fail to sustain long-term economic growth. Therefore, governments should diversify their economies by investing in other sectors to reduce dependence on volatile resource revenues.

The study's findings reveal a significant and positive relationship between mineral rents (MR) and financial development (FD), lending strong support to the "resource blessing" hypothesis. This suggests that mineral resources are being utilized more efficiently in BRICS-T countries. However, the positive impact of MR on FD should not be interpreted as a license for unchecked or excessive exploitation of mineral resources. On the contrary, BRICS-T countries must manage their natural and mineral resources prudently, balancing economic benefits with environmental sustainability. Adopting environmentally friendly technologies and sustainable extraction practices will help ensure that resource wealth supports long-term financial development without causing ecological degradation or compromising future generations' prosperity.

## 5.3. Limitations of this research and future research directions

This study acknowledges several limitations that provide important directions for future research. First, potential endogeneity between key variables such as resource rents, political stability, and financial development may bias our estimates, despite the use of advanced econometric techniques. Additionally, the omission of important institutional variables, such as governance quality, regulatory effectiveness, and corruption levels, may limit the comprehensiveness of our analysis.

Measurement constraints, including the aggregation of resource rents and the challenge of capturing nuanced aspects of financial development, could also affect the precision of our findings. To strengthen future research, incorporating interaction effects, such as those between political stability and resource rents, which were not examined in this study, could offer deeper insights into how governance dynamics influence the relationship between natural resources and financial development. Moreover, expanding the set of governance indicators to include broader institutional factors could strengthen the empirical contribution and policy relevance.

Building on these limitations, future studies could validate the resource curse hypothesis using similar country samples while integrating additional economic indicators like labor force characteristics, digitalization metrics, consumer price indices, other good governance metrics, in addition to political stability, and measures of financial inclusion. Further research might also focus on different regions or country groups, comparing strategies and outcomes between resource-rich and resource-poor nations to better understand the conditions under which natural resources become a blessing or a curse.

## CRedit authorship contribution statement

**Md. Emran Hossain:** Writing – original draft, Software, Methodology, Conceptualization. **Onur Yağış:** Writing – original draft, Validation, Resources. **Mohammad Haseeb:** Writing – original draft, Visualization, Validation, Formal analysis. **Khurshid Khudoykulov:** Writing – original draft, Validation. **Wisnu Wibowo:** Writing – original draft, Funding acquisition, Data curation. **Miguel Angel Esquivias:** Writing – review & editing, Supervision, Investigation, Funding acquisition.

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## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

Data will be made available on request.

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