

Financial Stability in Emerging Market Economies

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The paper attempts to establish the financial instability index. Representative variables are Real Effective Exchange Rate, Interest rate, Foreign Reserves, and relative Stock market index. These factors are found to be significant in fostering Periods of stress and vice versa in the Member States of BRICS. The Principal Components Analysis Technique is used to extract the Variation across the variables, while for the estimation, a dynamic Probit model is applied to identify the average duration and change in instability index across the sample countries. The proposed econometrical framework successfully identified the qualified episodes of instability in selected countries, that are fairly consistent with the real crisis. Policymakers utilized the framework of this paper to identify the early signaling for financial stress and respond with macroeconomic prudential policies to mitigate the severity of occurring events.

1. Introduction

The term 'Financial Stability' has gained significance over the last two decades, particularly within the purview of central banks and other public authorities (Anginer et, al 2018). The phrase originated with the Bank of England in 1944 and does not aim to replace the term 'Price Stability' but instead seeks to achieve objectives related to the efficient functioning of the financial system (Allen & Wood, 2005). Before the awareness of this term, it did not exist, and we were completely unaware of its significance, another important aspect to study is that there is unclear visibility for the stability of an entire financial system especially in emerging economies, as previous studies focus on the stability of an individual industry, sector or a firm (Ahmed & Mallick, 2019). Despite almost a decade passing, there is still no widely agreed-upon definition of "Financial Stability," making it unclear how to bring together mutually agreed-upon instruments and tools to achieve financial stability (Kellard et, al,2022). The Swedish Governor of the central bank stated that "the concept of financial stability is slightly vague and hard to define."

The indefinite nature of the financial system provides analysts with the opportunity to focus on the vulnerability and risk of the financial system (Tobal & Menna, 2020). While risks and vulnerabilities are relatively easy to understand and quantify, the degree of crisis is challenging to quantify due to different countries facing various crises (Cairo & Saim, 2023). Various methods exist to measure crises over different time horizons, such as quantifiable variables like the number of liquidations or insolvencies, the magnitude of losses to the banking sector, the degree of variability in exchange rate cycles, and fluctuations in the stock market index (Ahmed & Straetmans, 2015). The measurement and benchmark of financial stability depend entirely on the definition and measurement of crises Ahmed (2024).

The literature is replete with attempts to measure and predict various types of crises including equality and poverty concerning financial stability (Ratnawat, 2020). Furthermore, the true value of financial stability becomes evident in its absence, as demonstrated by Bauer and Granziera (2017). In episodes of financial instability, banks become reluctant to finance profitable projects, asset prices fluctuate significantly from their intrinsic value, and payments from different financial institutions are delayed, creating turmoil and preventing normal system functioning (UNCTAD, 2019).

Major financial instability can lead to hyperinflation, stock market crashes, and even bank runs, exposing vulnerabilities in the economy and severely affecting the financial system, ultimately eroding confidence in the financial system (Central Bank Malaysia, 2021). A thorough literature review reveals commonly used variables and their signaling properties related to different sectors.

The lack of a standardized definition for financial stability poses a significant challenge in stability analysis (Cihak, 2007). Establishing an operational definition becomes vital to identifying key and reliable determinants of financial stability, and addressing the financial

challenges faced by any economy (Tobal & Menna, 2020). The global economic crisis has prompted a departure from traditional policies and regulations governing financial systems, aiming to effectively mitigate systematic risks to some extent (Agenor et al., 2018). While previous research extensively employs credit booms and reserve ratios to establish their significance in ensuring financial stability in advanced economies (Guerineau & Leon, 2018), Agenor is credited for establishing the link between unsustainable credit growth and reserve requirement ratios.

This connection aims to prevent asset price pressure and achieve greater financial stability, particularly in middle-income countries (Klingelhöfer & Sun, 2019). Despite ongoing debates, there is still no consensus on the appropriate instruments and their application under varying circumstances in different economies (Basel Committee on Banking Supervision, 2011, 2013). The collection of factors influencing financial stability in emerging economies remains incomplete and is an evolving subject (Fed Reserve Report, 2016 & 2021). This paper seeks to collaborate on identifying factors for assessing financial stability in emerging economies (BRICS), aiming to determine policy measures for economic and financial stability (Singh, 2020).

The main objective of this study is to build a global consensus to formulate, promote, and adoption of certain sound principles and instruments that are essential to achieving Financial Stability in emerging markets (BRICS). So far it is quite clear that the global world can have several episodes of extreme vulnerabilities and variation in their financial system. It can occur through different external and internal shocks, mainly these shocks include the world interest rate fluctuation that may hurt the financial function of emerging economies. Furthermore, a stable economy should have some particular set of policies and instruments that combat this issue to remain in a state of stability Samia and Sofia (2019). Therefore, this study will have to assess the financial stability with proper identification and magnitude of internal and external shock of emerging markets. Thus, it will assist policymakers in establishing a set of tools and instruments that will sharply respond to that threat and maintain the financial stability of their system.

2. Literature Review

2.1 Leading Indicators of Financial Stress

Financial stress indexes play a crucial role in predicting the stability of financial systems, commonly utilized by policymakers and researchers. These indexes combine various indicators into a single equation to monitor financial stress effectively. They have been widely employed to assess the current state of financial stability across different eras and countries. According to Hollo et al. (2012), financial stress indexes not only provide real-time assessments of stress in the entire financial system but also enable policymakers to measure the impact of financial stress, allowing for timely interventions to eliminate financial instability.

Predicting the upward trend of financial stress is considered essential by many researchers and policymakers as it provides valuable time to implement prompt measures to mitigate financial instability. Vermeulen et al. (2015) have noted sudden and sharp spikes in financial stress indexes. These indexes are extensively used by policymakers and financial institutions to monitor and predict financial instability, facilitating the activation of macroeconomic tools to restore overall financial system stability. Despite the widespread use of financial stress indexes, limited attention has been given to identifying leading indicators. Existing literature primarily focuses on financial crises, particularly within the banking sector. Previous research by Demirguc, et al., (2005), Demyanyk and Hasan (2010), and Klomp (2010) has explored various methodologies related to financial crises.

Early studies suggested homogeneous factors across countries, allowing the use of standard panel models to determine financial stress indicators. However, later studies, such as Klomp (2010), indicated significant heterogeneity among factors and indicators related to banking crises. Gross and Zahner (2021) identified indicators like high credit growth, high real interest rates, low capital flow, and negative GDP growth as fundamental for banking crises, though 60% of major crises did not align with these indicators.

The literature includes three papers analyzing leading indicators for financial stress, each with differing results. Illing and Liu (2006) developed a Financial Stress Index for Canada, while Misina and Tkacz (2009) identified credit and real estate as significant indicators. Slingenberg and de Hann (2011) examined leading indicators for 13 OECD countries, finding that credit growth was the most influential predictor. However, predicting financial stress proved challenging, with varying results for different countries. Cardarelli et al. (2011) used the IMF Index in combination with 12 significant indicators, concluding that the composite stress index performed well. Vaicek et al. (2015) used the stress index established by Vermeulen et al. (2015) and highlighted the difficulty in predicting financial stress, emphasizing the need for policymakers to use updated tools to respond to sudden occurrences of financial stress.

2.2 Real Sector

The feedback effect of real sector incorporating in Financial Stability considered to be very significant while real sector comprised of GDP Growth, Fiscal Situation of Government and Inflation. GDP growth indicating the country's ability to generate wealth increment at each year corresponding to its base year and associated its risk of being overheating of economy. While fiscal position includes government capability to finance its expenses beyond its total revenue (also associated to weakness of country to unavailability of required financing). Inflation reflects or indicating the structure problem of Government policy while it may lead to Public dissatisfaction and can create the political instability in the country. Eventually, the real sector components are key indicators of economy that may reflect and contribute in Financial Stability and can cause it instability.

2.3 Financial Sector

Financial sector describes as monetary combinations, which include real interest rate fluctuation, riskiness of banking sector, their capital and liquidity ratio quality of their loan and chances of default, credit ranking and concentration of systematic loss. All these proxy's indication the problem with banking sector and financial sector, for instance if crisis of any sort shall occur the can measure the cost of such crisis of for real sector this it ultimately links with stability or instability of financial system.

2.4 Riskiness of Corporate Sector

It can be assessed through its leverage and expense ratio and riskiness can be gauge thorough no application received against the protection for creditors. Further the corporate sector riskiness also associated to its net foreign exchange exposure to its equity.

2.5 Household Sector

The household sector strength of its health associated to its net asset (Asset minus liabilities) and net disposable income (total earning minus principal payments and consumption and debt payments). Eventually, through net asset and net disposable income the ability of house hold in time crisis and downturn can assess and gauge. Their ability significantly links to the financial stability of system and can foster different signal make correction in the system.

2.6 External Sector

Fifthly, real exchange rate, foreign exchange reserve, the current account and capital inflow and currency mismatch are purely the reflection of external sectors. Sudden change in these variable can cause the loss of export competitiveness and change capital inflow and may loss the sustainability of foreign financing of domestic debt.

2.7 Financial Markets

The last variable that reflect the condition of financial market are equity indices, spread of corporate bonds, volatility and condition of liquidity. Risk of high spread may be linked with loss of investor risk appetite and lead to the financing problem for the rest of economy and that may contribute the disturbance in real sector and can cause instability for Financial system. On other end liquidity problem may be affect efficient allocation of surplus funds in relate to the investment opportunity with framework of economy. Fundamentally, the financial stability analysis done through sectorial indicators rather than individual variable. These variables can be used as individual or in combination with other. The determination of stress period can gauge or predict through these indictors and thus it develops the period of financial stability or instability. Moreover, these analyses also depend upon the identification of changing trends and major disruption and other outlies Worrell (2004).

2.8 Composite Variable indicator

A financial system comprises in many factors. Thus, it depends upon the interaction between the variable. Through individual Variable shall lead to construct different sectors as

discussed in table1. These sectors combine interact and affect the financial stability of an economy. The condition may become severely complicated as the non-linearities introduced and may cater the propagation of external shock. And it was clearly evident by (White (2004), ECB (2005) that transmission of shocks from one sector to another. For example, the financial stability has crossly links with monetary sector. Such as changes in monetary condition affect by the change in asset prices and vice versa and this it connects to affect the financial stability.

Thus for all purposes and circumstances, it is not enough to focus on only one benchmark pertaining to any individual sector to analyze the financial stability or corresponding financial instability. However, it is notice from literature that individual variables are very useful to analyze the financial system and its associated relationship to them. However, for deep analysis of Financial stability widely connected to composite index of various variable. Thought, it would become easy through these indicators to predict the period of stress and rationale toward the financial stability.

The literature and policymakers have adopted various approaches to identify indicators signaling the potential occurrence of a crisis. Multivariate models, such as logit/probit models, have been utilized by researchers (Eichengreen et al., 1995; Demirgüç-Kunt & Detragiache, 1998; Davis & Karim, 2008). Another approach involves the signaling method proposed by Kaminsky & Reinhart (1999), Borio & Lowe (2002), and Gardner et al., (2014) While the former identifies macrofinancial variables, it lacks the optimal threshold for triggering regulatory/supervisory attention. The latter focuses on variables transmitting signals early, offering thresholds for each variable based on specific criteria. Both approaches require the identification of periods of financial stress to compare predicted probabilities and assess the indicators' validity and usefulness. Therefore, the first step is to date the periods of financial stress in BRICS.

3. Research Methodology

Financial stress episodes are identified through common variation (CV) in different financial market segments: money, forex, and capital. Representative variables include stock indexes,

Real Effective Exchange Rate, and the 6-month interbank rate. Principal

$$p_1 = \alpha_{11}X_1 + \alpha_{12}X_2 + \dots + \alpha_{1n}X_n$$

$$p_2 = \alpha_{21}X_1 + \alpha_{22}X_2 + \dots + \alpha_{2n}X_n$$

$$\dots \quad \dots \quad \dots \quad \dots$$

$$p_r = \alpha_{r1}X_1 + \alpha_{r2}X_2 + \dots + \alpha_{rn}X_n,$$

With constraint that

$$\alpha' \alpha = 1$$

The α 's can be thought of as the eigenvectors of $\mathbf{X}'\mathbf{X}$, whose eigenvalues are λ 's. The α 's are also called the loadings of each component (Brooks 2014). If λ_i are ordered in descending order, then each component explains ϕ_i variation of total variation in $\mathbf{X}$, i.e.,

$$\phi_i = \frac{\lambda_i}{\sum_i \lambda}$$

Using Kaiser criterion, only factors with eigenvalues greater than unity are retained. The retained

PC's are further combined into a single factor (y_t) by taking weighted average, with weights equal to the proportion of variation of each variable in the total explained variation. Let

$$\Phi = \phi_1 + \phi_2 + \dots + \phi_r$$

be the total variation explained by the first r selected principal components, then

$$y_t = \frac{\phi_1}{\Phi} \times p_{1t} + \frac{\phi_2}{\Phi} \times p_{2t} + \dots + \frac{\phi_r}{\Phi} \times p_{rt}.$$

We extract two components and arrive at y_t using above procedure

3.1 Bry and Boschan 1971 Algorithm

After obtaining, it signifies the shared variation within the financial market. We then identify periods of financial market stress using the procedure outlined by Bry & Boschan (1971). Bry & Boschan's non-parametric pattern detection algorithm recognizes upturns and downturns in the series y_t based on specific censoring criteria. This algorithm has been utilized for extracting financial cycles by researchers such as Pagan and Sossounov (2003), Candelon et al. (2008), Claessens et al. (2012), and Ahmed et al. (2018). More specifically, a turning point is identified as a peak at time t if

$$y_{t-k}, \dots, y_{t-1} < y_t > y_{t+1}, \dots, y_{t+k}$$

Whereas, it represents a trough if;

$$y_{t-k}, \dots, y_{t-1} > y_t < y_{t+1}, \dots, y_{t+k}.$$

The periods from peak to trough are classified as financial downturns ($S_t = 1$) while those from trough to peak are classified as upturns ($S_t = 0$). In terms of censoring criteria, we follow (Pagan & Sossounov, 2003) and set window of eight months ($k = 8$), a phase duration of 4 months and a complete cycle of 16 month.

4. Results and Discussion

The empirical analysis undertaken in this research employs monthly data pertaining to the BRICS nations, encompassing over the period spanning from October 1997 to October 2023.

The data sources utilized in this study encompass information from reputable entities such as Thomson Reuters, the State Bank of Pakistan (SBP), the International Monetary Fund (IMF), and the central banks of all BRICS member countries. Reported results in Panel A of Table-1 summarizes the duration of instability episodes of financial system and vice-versa, while the average change in financial instability along with standard deviation and autocorrelations can be seen in Panel A. As per the reported statistics in panel B, duration from Trough to Peak signaling the instability, and vice-versa from Peak-Trough. The duration of instability episodes is found to be higher than that of otherwise fairly stable periods in all member countries. However, Brazil showing a highest average duration of instability phase of approx. 38 months, while remaining member countries average duration of instability episodes ranging from 15 to 20 months. Eventually, results are quite consistence with economics conditions in Brazil and all the member countries.

Table No 1: Summary Statistics for Changes in Financial Stability Index (ΔS_t) and F-S Cycle (S_t)

BRZ	0.503	0.290	0.00	1.80	0.98	0.94	0.88	38.33	11.60
RS	0.502	0.289	0.00	1.80	0.97	0.91	0.85	15.33	21.75
IND	0.502	0.289	0.00	1.80	0.99	0.98	0.97	15.25	34.60
CH	0.502	0.289	0.00	1.80	0.97	0.89	0.78	18.00	19.00
SAF	0.502	0.289	0.00	1.80	0.99	0.98	0.96	22.33	45.40
Panel A (ΔS_t)								Pane B Financial Stability Cycles	
	Mean	SD	Skew	Kurt	rho1	rho3	rho6	DTP	DPT

Note: i) table include data from 1997 M1 to 2023 M10. ii) (ΔS_t) refers to the change in Financial Stability index. iii) $\Delta S_t = 1200 * [s_t - s_{t-1}]$ is the change of annualized percent in Financial instability (S_t) iv) D is the mean duration of FS cycle while A is correspondence to its Amplitude v) Further TP represent the from trough to peak and PT from peak to trough or (Instability) phase (bear mode) and bull accordingly.

Another significant finding is the gap between average duration of stability and instability are relatively higher in all member countries other than China Which is D-TP 18 and A-TP-19 months respectively. Additionally, the pattern of average change in instability index are quite similar in all member countries of BRICS includes the value of 0.50, that depicts the common binding among the member countries and carry on trade among the members.

4.1 Discussion

We shall, now direct to our principal findings, Figure 1 to figure 5 representing the financial instability index and its constituents for each member country of BRICS. Upward movement of index shows the instability and vice versa. Shaded area of each correspond figure

1.5, 2.5, 3.5 and 4.5 labeled as combine effect on financial stability showing episodes of stress. Let examine the

Figure No1: Financial Stability Index of Brazil

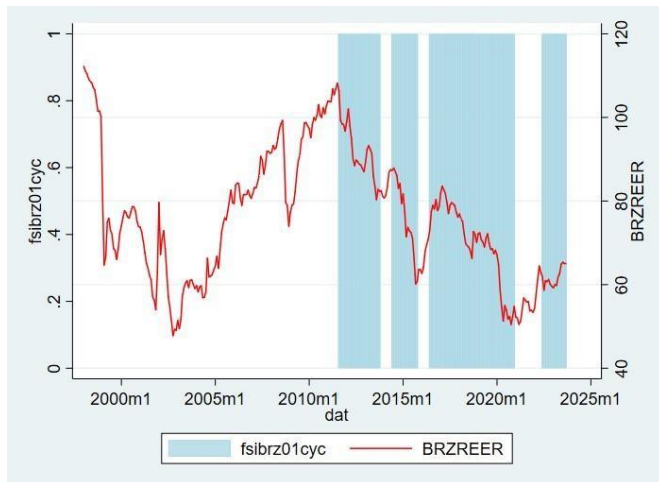


Figure 1.1-Effect of REER on Financial Stability



Figure 1.2- Effect of 3 months T-Bill

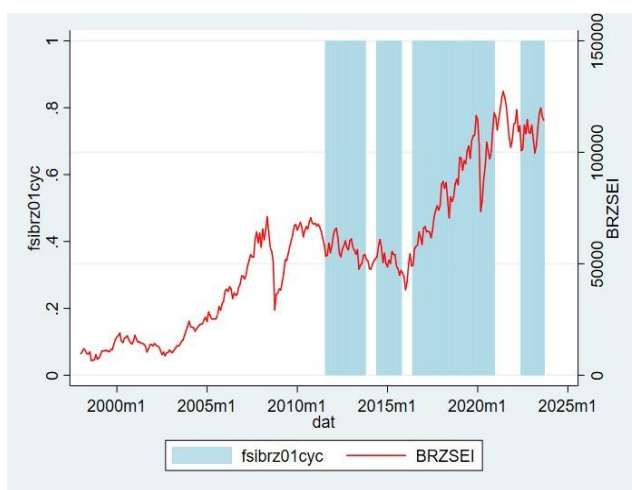


Figure 1.3- Effect of SEI on Financial Stability Index

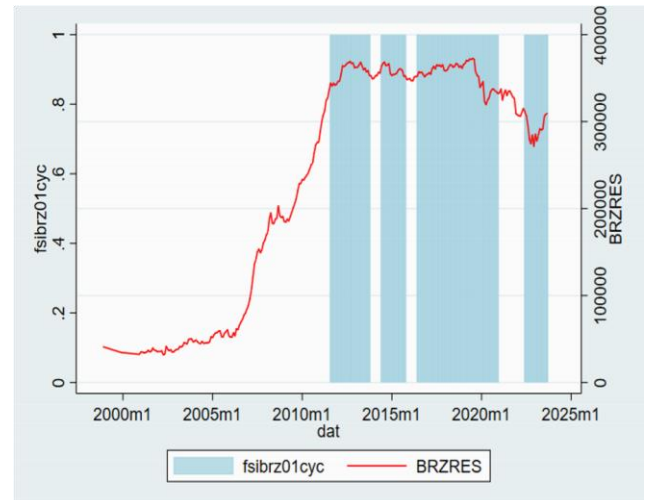


Figure 1.4- Effect of Reserves on financial Stability

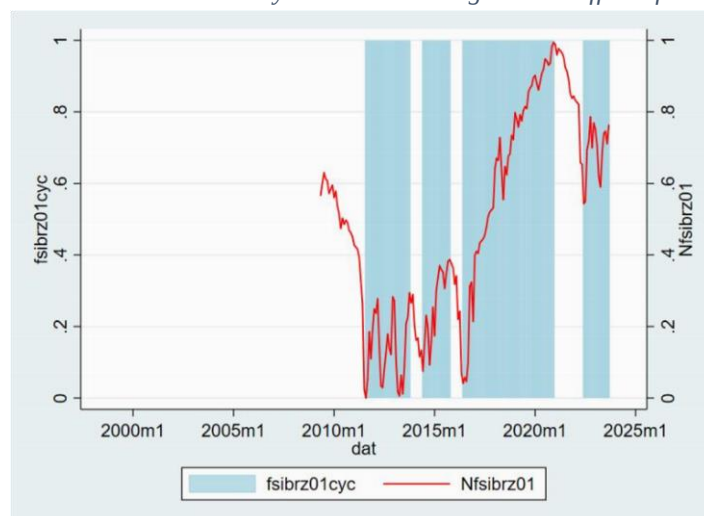


Figure 1.5- Combine effect of all Variables

Figure No 2: Financial Stability Index-China

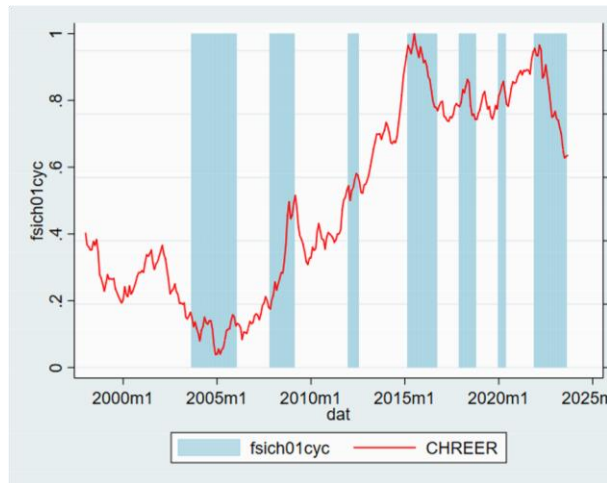


Figure 2.1 Effect of REER on Financial Stability

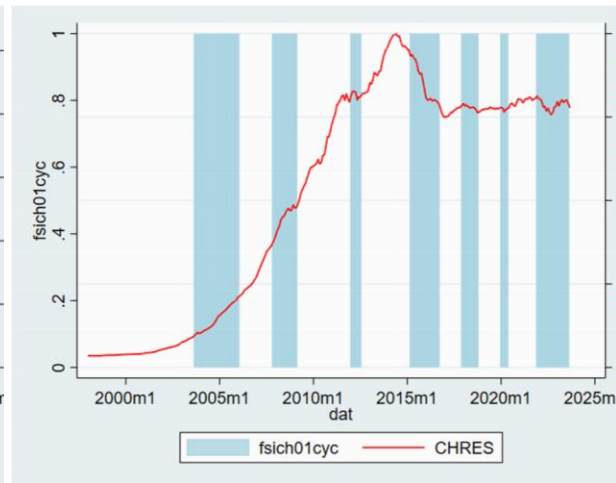


Figure 2.2 Effect of Reserve on Financial Stability

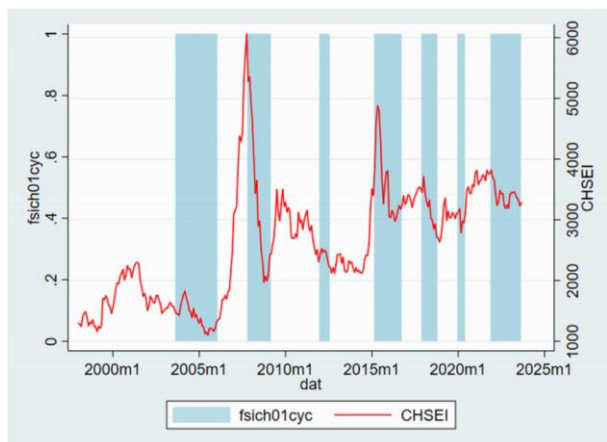


Figure 2.3 Effect of SEI on Financial Stability

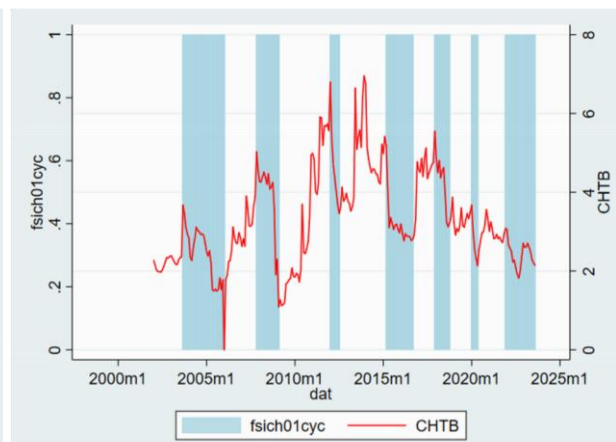


Figure 2.4 Effect of 3-month T-bill on Financial Stability

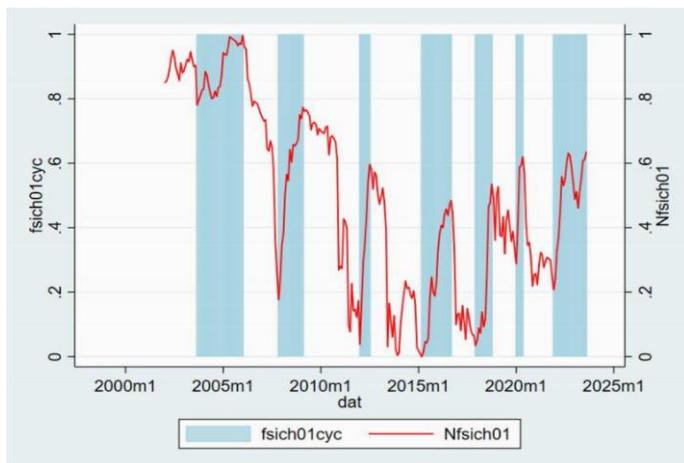


Figure 2.5 combine effect on Financial stability

Figure No 3: Financial Stability Index-India

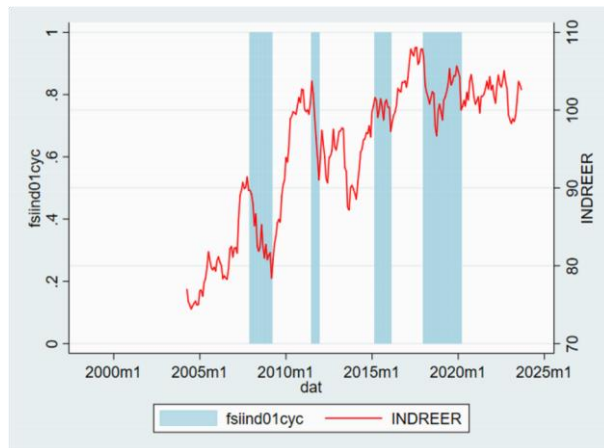


Figure 3.1-Effect of REER on Financial Stability

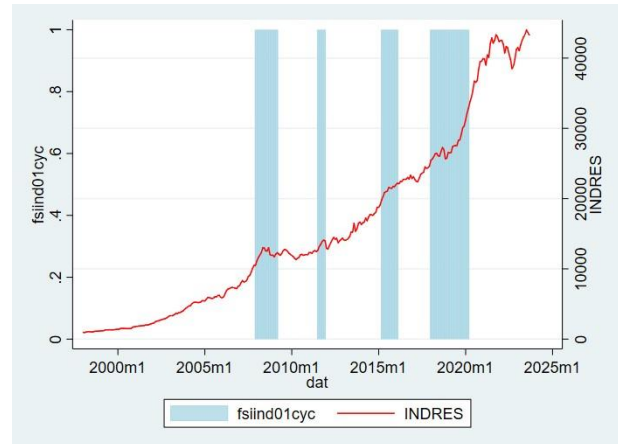


Figure 3.2-Effect of Reserve on Financial Stability

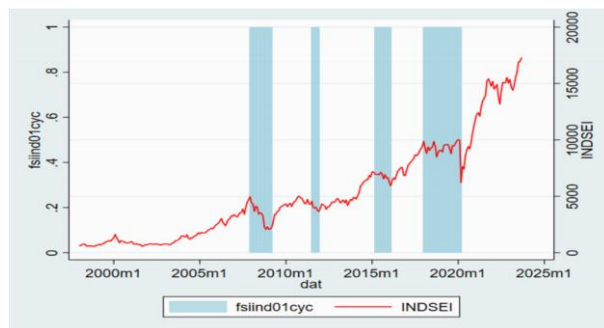


Figure.3.3-Effect of SEI on Financial Stability

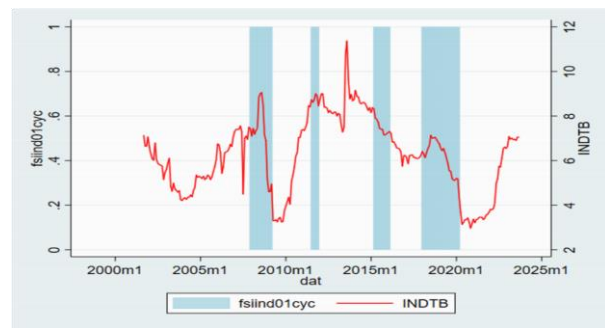


Figure 3.4-Effect of T-bill on Financial Stability

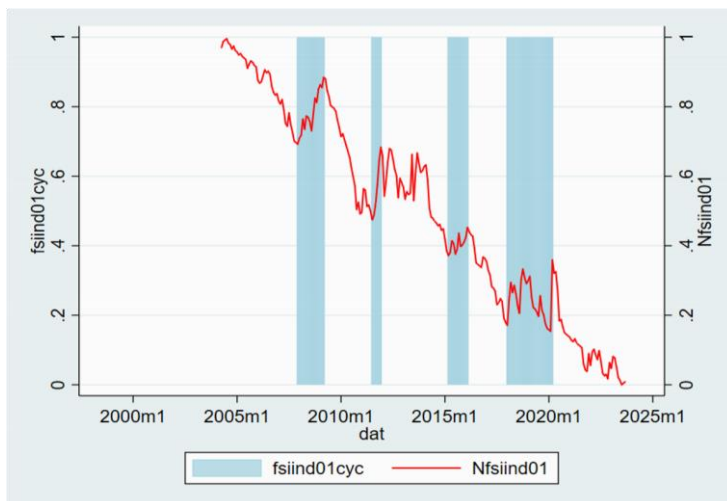


Figure 3.5-Combine effect on Financial Stability

Figure No 5: Financial Stability Index South Africa

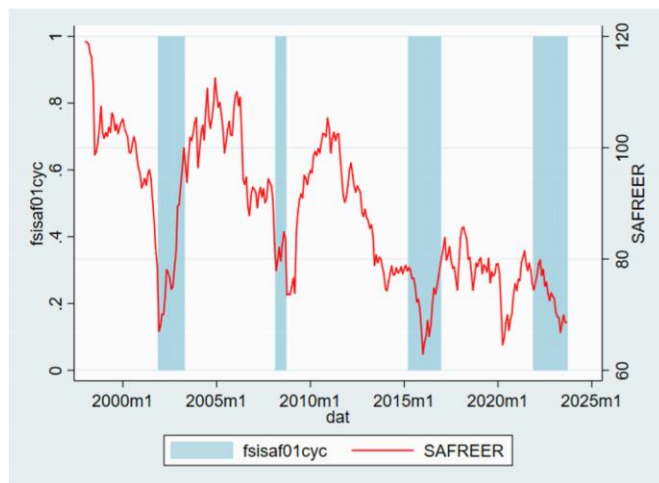


Figure 5.1-Effect of Reer on Financial Stability

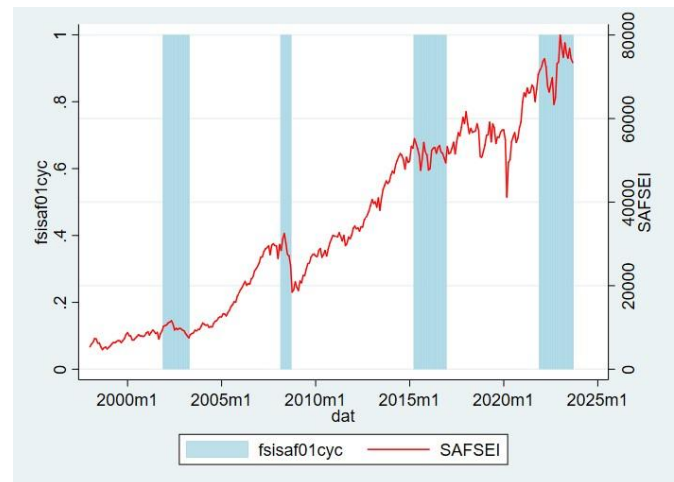


Figure 5.2-Effect of SEI on Financial Stability

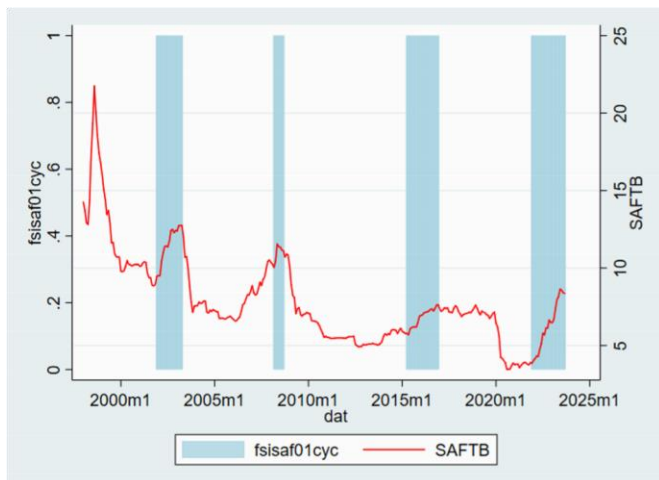


Figure 5.4- Effect of T-bill Rate on Financial Stability

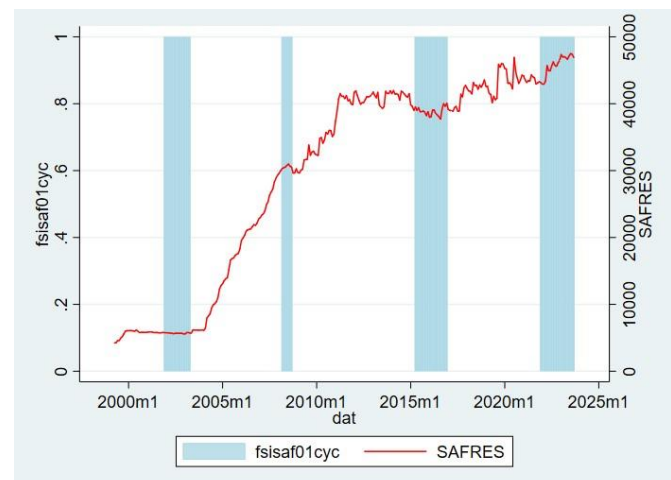


Figure 5.3-Effect of Reserves on Financial Stability

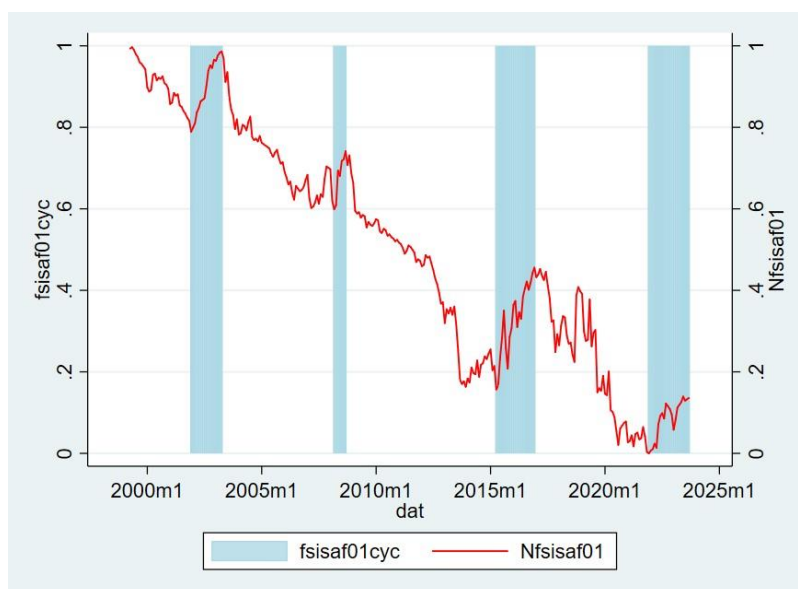


Figure 5.5-Combine effect on Financial Stability

crisis. instability episodes of Brazil in figure 1.5, it shows two major episodes of financial instability in year of 2009 and 2020 onwards. In 2014-2017, Brazil experienced a severe economic

The cause of the crisis was the aforementioned political, as well as the 2014 commodity price shock, which negatively affected Brazil's exports and reduced the entrance of foreign capital into the economy. Commodities Devaluation and political instability are the main causes. However, in 2020 Covid-19 was the significant cause for instability in all member countries. During, the period of financial instability, it can be seen clearly in figure 1.1 the devaluation of currency and plummeted stock market. Nevertheless, the monetary policy adjustment to hike the interest rate ultimately response to Instability in Brazil. Reports results are also consistent with most recent study Ahmed (2024).

In addition, China and rest member countries showing the instability episodes are lesser duration as compare to Brazil. The consequences, nevertheless, display an asymmetry, manifesting more prominently during economic expansions and exhibiting a gradual yet protracted manifestation during recessions, persisting for a minimum duration of eight quarters. The phenomenon underscores the state dependence of monetary policy (, e.g., Saldías, 2017).

5. Conclusion

In this paper, we attempted to empirically examine the effect of different factors on financial instability. Represented factors were being selected based on their response variation towards the financial instability. Unlike the previous literature, we designed the instability index in the context of exogenous and endogenous factors and their marginal contribution to disassembled the Financial stability in BRICS. During empirical findings, our index of financial instability successfully captured the events of stress in corresponding member countries. Responses of selected variables are quite consistent with practical theories.

When there's a problem in financial stability, the central bank tends to make its monetary policy stricter, probably because things get worse due to outside factors, causing the real exchange rate to go down. While the response of monetary policy looks similar in different economic phases, there's a bit of a balancing act between monetary policy and financial stability when the economy is not doing well. The troubles and instability have a temporary effect on inflation, and this happens more often during times when the economy is growing

The practical implication of this study is to evaluate the financial stability of emerging markets by identifying and quantifying internal and external shocks, helping policymakers develop effective response tools. However, limitations include data availability and quality, dynamic market conditions, scope of shocks, model constraints, and generalizability of findings. Future research should focus on improving data collection, conducting longitudinal studies, expanding the scope of shocks, using advanced modeling techniques, analyzing policy impacts, performing cross market comparisons, and adopting interdisciplinary approaches to provide a more comprehensive understanding of financial stability in emerging markets.

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