

Determinants of Financial Stress: Panel Data Analysis of Emerging Countries

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Abstract

This study explores the potential determinants of financial stress in the panel of emerging middle-income countries from 2000 to 2016. A variety of driving factors of financial stress classified into domestic, global, and institutional factors besides international linkages and regional dummies are taken. The study uses Principal Component Analysis to develop composite indices for the quality of institutions and financial stress. The authors apply various static and dynamic panel data techniques for robustness analysis. Findings underline the role of institutional quality in mitigating financial stress in these countries. Also, the authors conclude that deterioration in country characteristics and external factors stimulate financial stress in the selected countries. The study calls for strengthening the institutional setup that helps reduce political uncertainty, hence financial stress. It further suggests coordination in fiscal policy and mitigating recessionary trends to manage financial stress. It would have been insightful to evaluate the key drivers of financial stress in future through refined measures of political risk.

Keywords: *Financial stress, political uncertainty, principal component analysis, fiscal policy*

1. Introduction

The sources of financial stress acquired considerable attention in academic and policy discussions. This issue came into the limelight, especially after the global recession of 2007-2008 (Park & Mercado, 2014). A critical debate surfaced on the efficacy of policy institutions in predicting and explaining financial stress. Nonetheless, a higher degree of financial liberalization also carries some pitfalls, such as a higher likelihood of a financial crisis and financial contagion. Thus, exploring the driving factors of financial stress is vital to safeguard financial stability. Emerging economies possess highly integrated banking and non-banking financial services with the global markets. It exposes them to exogenous shocks as their financial systems are less resil-

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ient (Balakrishnan, Danninger, Elekdag, & Tytell, 2011). According to IMF (2017b), these countries are vulnerable to tight conditions and capital flow reversals. Moreover, they carry a legacy of high corporate debt and weak banking sector balance sheets.

A financial stress index measures the systemic risk prevailing in the financial markets. It stays uncaptured through individual indices for the various segments of financial market. Empirical literature adopts two approaches to inquire about the sources of systemic risk. The first and most widely followed strand of literature relies upon the economic approach. It highlights structural imbalances and their possible resolution to pull the economy out of financial crisis and periods of high financial stress. This approach is flawed as it thoroughly ignores the political economy aspects of the financial markets. The second is the political economy approach, which relates systemic failure to the non-economic trigger factors, such as political support or the government's will. These non-economic triggers may cause a financial crisis. Academic research rarely focuses on the political dimension of the problem. Empirical literature points out that the driving factors of financial stress vary across countries. The response to various episodes of financial stress is also asymmetric (Vasicek, Zigravova, Hoerberichts, Vermeulen, Smidkova, & De Haan, 2017). It may attribute to varying degrees of financial market integration. Further, the absence of global financial regulations also aggravates the problem. Another strand of literature believes that the quality of institutions mitigates financial stress stemming from the banking sector (Gamra & Plihon, 2007; Demirguc-Kunt & Detragiache, 1998; Rodrik, 2008). In this context, Abdessatar and Rachida (2013) acknowledge the importance of institutions in explaining financial stress. However, their model was miss-specified as they explicitly disregarded the other determinants of financial stress. This study aims to consider both approaches to reevaluate the determinants of financial stress in the context of emerging economies.

This study contributes to the empirical literature in many ways. It **empirically** discovers how institutions' efficacy helps in mitigating financial stress. Besides, it accounts for other trigger factors, classified as structural vulnerabilities, external factors, and contagion. It refines the measurement of the quality of institutions as the study develops a broad composite index. This index thoroughly accounts for the various dimensions of institutional quality. Also, the authors analyze whether regional financial contagion serves as a trigger for financial stress.

The rest of the study is organized as follows; section 2 documents the theoretical and empirical literature concerning determinants of financial stress. The third section elaborates on the conceptual framework, specifies the empirical model, and discusses issues about data. The next section provides a detailed commentary on the findings. The last section concludes the study and proposes policies accordingly.

2. Theoretical and Empirical Literature

Theoretical literature mentions two approaches for conceptualizing the determinants of a crisis. They are panic-based and fundamental-based approaches. The former suggests the financial crisis carries an element of panic (Friedman & Schwartz, 1963; Kindleberger & Aliber, 1978; Bryant, 1980; Diamond & Dybvig, 1983). Whereas the latter perceives that bad fundamentals serve as negative information. Such information deteriorates the balance sheets of banks and governments (Allen & Gale, 1998; Chari & Jagannathan, 1988; Jacklin & Bhattacharya, 1988; Obstfeld, 1984; Krugman, 1979; Obstfeld, 1996). A few empirical studies are related to the contagion in the context of potential drivers of financial stress. The standard information, trade, or linkages between the financial markets contributes to stress transmission (Kaminsky, Reinhart, & Vegh, 2003; Calvo & Mendoza, 2000; Gerlach & Smets, 1995; Kodres & Pritsker, 2002).

A chunk of empirical studies investigates financial stress transmission as a bidirectional process between emerging and developed countries (Park & Mercado, 2014; Fink & Schuler, 2015). But very little is known about the channels of stress transmission (Balakrishnan, et al. 2011). Similarly, a few studies pinpoint institutional factors as potential drivers of financial stress (Abdessatar & Rachida, 2013). Their findings suggest that better-quality institutions stabilize the financial system. While Vasicek et al. (2017) observe substantial heterogeneity across countries and various stressful episodes concerning leading indicators of financial stress in OECD countries. Their finding conforms to Slingenberg and De Haan (2011).

More recently, Kosedagli and Onder (2021) analyze the determinants of financial stress by allowing spatial linkages between 13 emerging economies during 1996-2016. The study uses three different weighting matrices, namely geographic proximity, trade, and financial linkages to evaluate the transmission of financial stress among emerging markets. Using special panel data models, they find a strong spatial dependence between the sampled countries. The findings are robust to all weighting matrices. However, geographic proximity is the most important linkage between emerging markets.

The literature review underlines several weaknesses; first, trigger factors of financial stress acknowledge the role of banking crises and stress, with only a few investigations considering the idea of system-wide stress. Second, the theoretical literature on key determinants of financial stress is still maturing. Third, the abundance of criteria to choose potential indicators makes it pretty complicated to identify stressful episodes. Fourth, a thorough empirical analysis of institutional drivers of financial stress is

lacking. These drawbacks inspire us to empirically revisit the potential drivers of financial stress in the context of emerging middle-income countries.

3. Methodology

This section elaborates on the conceptual framework, specifies the empirical model, and discusses issues about data for investigating the trigger factors for financial stress in emerging countries.

3.1 Conceptual framework

This study extends the model proposed by Park and Mercado (2014). The driving factors of financial stress are grouped into four broad categories, as illustrated in Figure 1.

3.1.1 *First category: Domestic imbalances and structural vulnerabilities*

Domestic vulnerabilities create uncertainty and enhance financial stress. They refer to poor fundamentals. In this perspective, we consider four vulnerabilities. First, a decline in real output makes an economy more vulnerable to financial stress. Any slump in economic activity followed by a boom enhances the likelihood of a financial crisis (Guru 2016). Second, a deficit in the external account compels countries to rely on foreign financing. It exposes them to sudden stops and financial stress. Implied exchange rate depreciation deteriorates domestic balance sheets and initiates currency and banking crises with a subsequent increase in financial market instability (Claessens, Kose, & Terrones, 2009; Fratzscher 2009). The third set of drivers is fiscal vulnerabilities, such as significant government budget deficit and debt. A negative government balance magnifies financial stress as it confines the capacity of fiscal authorities to enhance spending during periods of a financial crisis. Likewise, high government indebtedness elevates concerns about rollover risk. Debt sustainability problem create repercussions for the financial side of the economy, such as a squeezed supply of credit to the private sector, enhanced financial market instability, and financial stress (Afonso, Baxa, & Slavik, 2011; Cardarelli, Elekdag, & Lall, 2011). The fourth macroeconomic imbalance is a decline in the level of foreign exchange reserves held by central banks. The dwindling foreign currency reserves before the financial crisis exert pressure on the banking sector, and local currency as the monetary authority fails to support the domestic currency (Olafsson & Petursson, 2010).

3.1.2 *Second category: External factors and linkages*

This study incorporates three external factors, namely global interest rate, global output, and global commodity prices index. A rise in the global interest rate indi-

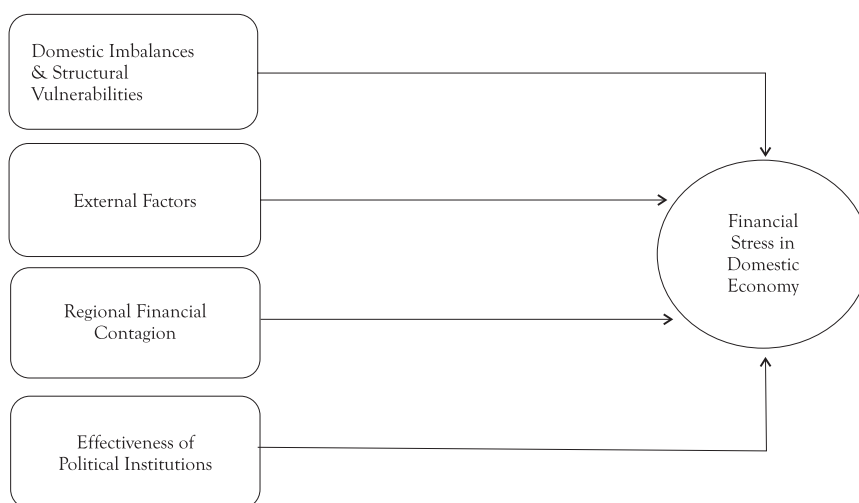


Figure 1: Driving Factors of Financial Stress

Source: Author's Construction

cates tight credit conditions in the global credit market. It limits the ability to use foreign financing for local imbalances. Thus, a credit squeeze enhances financial stress. Similarly, an increase in global output reflects higher demand in the world economy. It pinpoints an improvement in global demand conditions. Ultimately, this elevates the domestic economy's financial stress. The last factor, an adverse shock to global commodity prices, enhances the likelihood of a financial crisis through various channels, as explained by Kinda, Mlachila, and Ouedraogo (2016). Such shocks lower the export earnings and income of the domestic countries. This pile up the debt obligations and weakens the balance sheets of banks. A fall in export commodity prices creates fiscal deficits as the revenues of commodity-exporting nations dwindle. Likewise, lower commodity prices bring a surge in bank withdrawals, thereby causing a liquidity crunch for banks. Ultimately, the financial sector becomes fragile, which raises financial stress.

Real economy and financial market interdependencies/linkages cause spillover of shocks from one to another market. A higher degree of financial openness fosters financial stress transmission through capital outflows, reduction in trade credit, and foreign direct investment. An adverse shock to the financial system transmits to the domestic economy through unfavorable shifts in the international investors' perception. Such portfolio rebalancing helps investors minimize exposure to portfolio risk but raises financial stress. Likewise, in terms of trade openness, international linkages in the real economy improve economic performance through trade diversification. This further safeguards financial stability and ultimately lowers financial stress in the

domestic economy (Hwa, 2015; Park & Mercado, 2014).

3.1.3 Third category: Regional financial contagion

Region-specific contagion refers to the spread of crisis within specific regions. Contagion occurs if regions characterize similar macroeconomic conditions and common creditors (including international commercial banks). There are two channels of regional contagion. The first is an adverse shock to inter-connected banks located in the regions. The second is a common lender, which serves as a stress transmitter across regions. Thus, the heavy reliance of a country on a regional lender raises the possibility of regional contagion (Arvai & Driessen, 2009; Park & Mercado, 2014).

3.1.4 Fourth category: Effectiveness of political institutions

Well-functioning institutions play a vital role in minimizing systemic risk. Institutions refer to a broader term that combines non-market factors, such as social norms and public relations, politics, legal systems, culture, and religion. In the economic context, institutions shape the behavior of economic agents and markets. The efficacy of political institutions safeguards the stability of a financial system. Low-quality institutions make a financial system fragile. If an institution fails to regulate financial markets, it encourages excessive risk-taking behavior, and escalates financial stress. The present study is unique in evaluating the effectiveness of institutions for system-wide instability in emerging countries.

3.2 Econometric Techniques

This study uses various panel data techniques for analyzing the determinants of financial stress. These techniques have several advantages (Baltagi 2008). First, they permit heterogeneity and embed more information, variability, and efficiency. Second, they cater problem of endogeneity and provide consistent estimates. Third, panel data suffers less from aggregation biases. The present study has robust standard errors for heteroskedasticity and autocorrelation consistent (HAC) estimates. The study applies several static and dynamic panel data models, namely Pooled Ordinary Least Square (hereafter POLS), Fixed Effects (hereafter FE), Two-Stage Least Squares (hereafter 2SLS), system and difference Generalized Methods of Moments (hereafter GMM) methods. The purpose of applying various models is to check robustness of the results.

Diagnostics and Treatment of Outliers

Before estimation, two diagnostics are applied as proposed by Das (2017). The first test, the Arellano-Bond tests for serial correlation, rejects the null hypothesis of no first-order serial correlation. The test must accept the null hypothesis of no

second-order serial correlation. The second test, Hansen J, is designed to test for over-identifying restriction with the null hypothesis of no correlation of instruments with the error term. The data is further scrutinized for the possibility of outliers. The study applies Hampel Identifiers (hereafter HI) to control the outliers in data (Wilcox, 2005). It uses 2.24 and 3.5 as the cutoffs to declare an observation as an outlier (Bhatti, Haque, & Osborn, 2014). Further, the authors perform the *Hausman* test, proposed by Hausman (1978), to choose between fixed effect and random effect models.

3.3 Data and measurement

This study considers panel data of 18 emerging countries from 2000 to 2016, comprising 306 annual observations. We classify the countries as emerging economies according to IMF classifications provided in Fiscal Monitor (2017). The sampled countries are Argentina, Brazil, Chile, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Pakistan, Peru, The Philippines, Poland, Russian Federation, Thailand, Turkey, and Venezuela. The availability of high-frequency data at the measurement stage of stress indices remains the primary concern in selecting countries. We take a larger sample at the start. But data gets trimmed on the availability of consistent data. First, monthly financial stress indices are computed for each country. Those monthly indices are converted into annual frequency through period averages.

3.3.1 Model specification

The following empirical model is specified to analyze the determinants of financial stress:

$$FSIE_{i,t} = \beta FSIA_t + \delta_i D_{i,t} + \gamma G_t + \omega_i PRI_{i,t} + \theta_i RD_i + u_i + \varepsilon_{i,t} \quad (1)$$

where FSIE and FSIA indicate financial stress indices for emerging and advanced countries, respectively. The parameter β measures the intensity of the stress co-movement. Domestic and global factors are denoted by D and G, respectively. This study accounts for four domestic factors, namely growth in real output (GRY), current account (CA), government balance (GB), and change in forex reserves (DRES). Three global factors and two interlinkages are taken for the current study. Global factors include changes in global interest rate (GIR), global output (GY), and global commodity price (GCP). The international linkages are trade and financial openness. An index of political risk (PRI) is constructed to account for the effectiveness of political institutions. The study introduces three regional dummies (RD) to explore the regional financial contagion, namely Emerging Asia (DA), Latin America (DLA), and Emerging Europe (DE). The country-specific effects are captured through unobservable time-invariant shocks u_i . The stochastic error term (ε) varies with countries and time. We further assume $\varepsilon_{i,t} \sim iid(0, \sigma^2)$. The subscripts i and t denote country and time, respectively.

Measuring Financial Stress

This study constructs monthly financial stress indices for emerging and developed countries using principal component analysis (hereafter PCA). The authors follow Sadia, Bhatti, and Ahmad (2019) for details about constructing indices. For each group of countries, three dimensions of risks are taken, namely financial, economic, and political. A total of seven components of financial stress indices are selected to account for these three dimensions. These components are banking sector risk, stock market volatility, currency risk, sovereign risk, credit stress, output gap, and political risk.

Measuring the Effectiveness of Political Institutions

Institutional factors affecting financial stress get attention after Abdessatar and Rachida (2013). However, they take them as independent regressors for financial stress. This study refines their work by employing a composite index approach for institutional factors. The data set is extracted from the International Country Risk Guide (hereafter ICRG). This composite index accounts for the effectiveness of political institutions. The researchers apply PCA to compute a composite index of political risk. A high value of the political risk index refers to low political risk. It suggests that political institutions are strong enough to mitigate financial stress.

4. Results and Discussion

This section is about the visual analysis of financial stress and its determinants before the rigorous regression-based inquiry for factors determining financial stress in emerging economies.

4.1 Preliminary Analysis

The study conducts a graphical analysis of factors driving financial stress in emerging economies in Figure 2. Financial stress in emerging economies negatively correlates with growth in real output. The scatters plot in Fig 2 (a) shows that this relationship is nonlinear, and U-shaped. Current account and financial openness are associated with financial stress in emerging economies positively. Figures 2(b) and 2(f) indicate that the relationship is linear in the former case while nonlinear in the latter case. The graphs show that government balance, changes in foreign exchange reserves, and trade openness have an inverse correlation with financial stress in emerging economies. The correlations are somewhat linear, as shown in panels c, d, and e of Figure 2, respectively. The political risk index demonstrates the highest linear correlation with the financial stress index in emerging economies as shown in panel 2(g). Finally, financial stress in advanced economies correlates weakly with financial stress in emerging economies as this correlation is flat or possibly inverse, as

shown in Figure 2(h). The visual analysis of all the scatter plots confirms the presence of outliers. These outliers cast doubt on the actual relationship between financial stress and its determinants. Identifying these outliers in the multiple regressions is not possible merely by visual analysis. Instead, this study adopts the strategy to guard against the unwarranted role of an outlier, as outlined in section 3.2.

The findings of the PCA to construct financial stress indices for emerging and advanced economies are reported in Table 1. An index that captures at least 50-60 percent of the cumulative proportion of explained variation is recommended (Park & Mercado, 2014). The first component explains only 22.56 and 22.78 percent variation, respectively. Financial stress indices for emerging and advanced economies are constructed by taking a non-standardized average of the first three components having eigenvalues greater than 1.

These constructed financial stress indices explain 55.20 and 51.5 percent of the cumulative proportion of variation for emerging and developed countries, respectively.

4.2 Regression-Based Analysis

The researchers conduct a panel regression analysis to explore the factors affecting financial stress for emerging economies. The study estimates both static as well as dynamic models. To check robustness, the authors apply various econometric methods. A broader set of determinants of financial stress, categorized into domestic, global, and institutional factors besides regional dummies, are taken. The study applies POLS and reports results in Table 2 for the model specified as equation (1). The econometric procedure involves estimation using the whole sample. Results are reported in columns (1) and (3). Next, the researchers consider general and specific models after removing outliers. These findings are placed in columns (2) and (4), respectively. The study finds that the ineffectiveness of political institutions magnifies financial stress across all the models. It validates the notion that political economy aspects are crucial for adopting correct policies to avoid financial crises. The policy-makers get forced to pursue sub-optimal policies as they face political pressures. It contributes to the instability of the financial system.

Next, weak and insignificant evidence for financial stress transmission from developed to emerging countries is observed. This is in contrast to Balakrishnan et al. (2011) and Park and Mercado (2014). This finding accounts for the significant changes in the political and economic atmosphere in both emerging and advanced countries after the global financial crises. The emerging economies have become more resilient to external shocks while their economic activity converted into an economic boom, asset prices, and financial stress started to rise. The results further

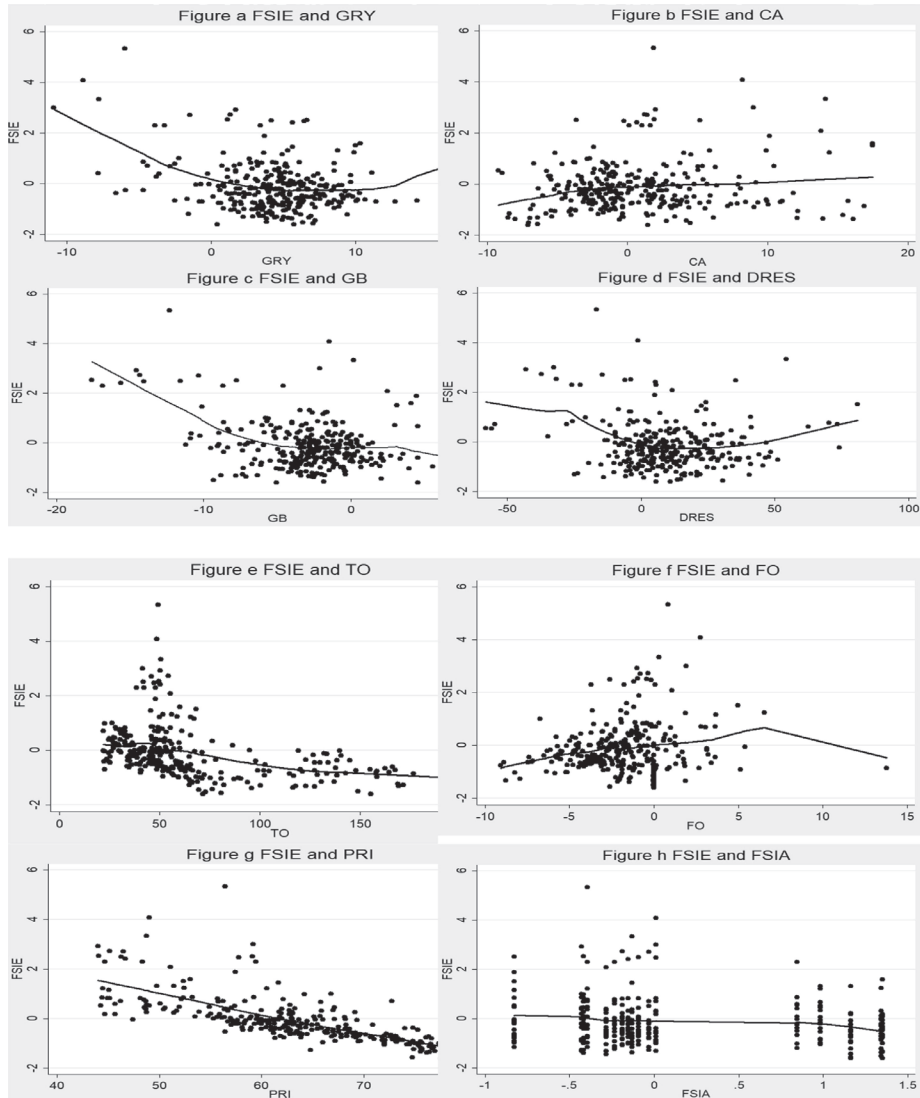


Figure 2: Scatter Plot for Financial Stress and its Determinants

Note: FSIE and FSIA indicate the financial stress index for emerging middle-income and advanced countries, respectively. GRY, CA, GB, DRES refer to growth in real GDP, current account balance, government balance, and change in foreign exchange reserves, respectively. TO and FO refer to trade and financial openness, respectively. PRI denotes the political risk index.

Source: Author's construction

Table 1: Results for Principal Component Analysis: Financial Stress Indices

Country Groups	FSIE		FSIA	
Components	Eigenvalues	Proportion	Eigenvalues	Proportion
Component 1	1.7892	0.2256	1.595	0.2278
Component 2	1.0603	0.1515	1.0110	0.1414
Component 3	1.0146	0.1449	1.0010	0.1427
Component 4	0.9563	0.1366	0.9710	0.1387
Component 5	0.8865	0.1266	0.9537	0.1363
Component 6	0.7717	0.1102	0.8648	0.1236
Component 7	0.5213	0.0745	0.6056	0.0867

Notes: FSIE and FSIA refer to financial stress indices for emerging and advanced economies, respectively.

Source: Author's Estimates

Table 2: Determinants of Financial Stress, POLS

Variables	General Model		Specific Model	
	(1)	(2)	(3)	(4)
	All Observations	Excludes Outliers	All Observations	Excludes Outliers
PRI	-0.068***	-0.066***	-0.068***	-0.066***
	(0.000)	(0.000)	(0.000)	(0.000)
FSIA	0.007	0.023	-0.217	0.0154
	(0.884)	(0.567)	(0.607)	(0.663)
GRY	-0.050**	-0.016	-0.050**	-0.015
	(0.013)	(0.106)	(0.012)	(0.112)
CA	0.066***	0.042***	0.065***	0.045***
	(0.000)	(0.000)	(0.000)	(0.000)
GB	-0.067***	-0.059***	-0.067***	-0.060***
	(0.000)	(0.000)	(0.000)	(0.000)
DRES	-0.004**	-0.003**	-0.004**	-0.004**
	(0.069)	(0.026)	(0.035)	(0.016)
GYG	-0.070**	-0.060**	-0.039	-0.060***
	(0.060)	(0.049)	(0.163)	(0.004)
GCPG	0.006***	0.0047***	0.006***	0.005***
	(0.000)	(0.000)	(0.000)	(0.000)

DA	-0.597***	-0.475***	-0.594***	-0.488***
	(0.000)	(0.000)	(0.000)	(0.000)
DLA	-0.257**	-0.166**	-0.252**	-0.175*
	(0.023)	(0.010)	(0.023)	(0.006)
TO	-0.004***	-0.003***	-0.004***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
FO	-0.004***	0.003	-	-
	(0.069)	(0.733)	-	-
GGIR	-0.001**	-0.0007	5.015*	4.56*
	(0.030)	(0.968)	(0.000)	(0.000)
Constant	5.11*	4.573*	288	277
	(0.000)	(0.000)	0.7740	
Observations	288	278	18	18
R-Squared	0.775	0.832	75.63* (0.000)	101* (0.000)
Number of Countries	18	18		
F-test Stat	57.99* (0.000)	84.30* (0.000)		

Notes: Significance at 1, 5, and 10 percent are denoted by *, **, and ***, respectively. Dependent variable is FSIE. FSIA refers to financial stress index for advanced countries. Domestic factor are growth in real output (GRY) current account (CA), government balance (GB) and change in forex reserves (DRES). GYG, GCPG, and GGIR refer to growth in global output, growth in the global commodity price index, and growth in global interest rates, respectively. DA and DLA denote dummies for Asian and Latin American regions, respectively. Trade and financial openness are denoted by TO and FO, respectively. P-values of individual coefficients are presented in parenthesis. All models are estimated using robust standard errors. We remove outliers from Model (2) and Model (4) based on Hampel Identifiers applied to the residuals of models (1) and (3), respectively.

show that deterioration in the current account, which remained a permanent feature in the selected Emerging Latin American economies, particularly after 2008, elevates financial stress in the emerging middle-income countries. It had put downward pressure on the currencies of major emerging middle-income countries through induced depreciation. As a result, it increases the likelihood of currency and banking crises.⁴

Panics in the banking sector raise financial stress in emerging middle-income countries. The findings conform to previous studies by Claessens, Kose, and Terrones (2009) and Fratzscher (2009). The third factor is the worsening government balance, which has remained a persistent phenomenon in most of the selected Latin American countries besides major Emerging Asian Economies (for example, China, India, and Malaysia). This weakens the ability of the government to finance its spending and

⁴ Emerging middle-income countries experienced several currency crises in the decade of the 2000s.

raises borrowings. A higher level of debt creates sustainability problems, which cause repercussions from the real to the financial side of the economy. It escalates instability of the financial system, and hence, financial stress. Next, a decline in foreign exchange reserves has a significant positive impact on financial stress. It confines the central bank's authority to stabilize the currency value, which raises the banking sector's panic and high financial stress.

Trade and financial liberalization provide crucial linkages for the spread of financial stress. The findings reveal trade openness has a significant negative impact on the financial stress index in emerging economies. Periods of financial crisis lower the exports of emerging countries to developed countries in anticipation of reduced demand. Thus, a lower degree of trade openness raises financial stress. An increase in the degree of financial openness makes these countries more vulnerable to adverse shocks to capital accounts. A greater degree of financial globalization imposes the cost of higher financial stress as the financial market linkages between developed and emerging middle-income countries enhance volatilities in the former group of countries. But this impact is not statistically significant. Thus, we conclude that these linkages have opposite effects on financial stress.

Global factors play a vital role in exacerbating the financial stress index in emerging economies, particularly after the global financial crisis in 2008. The first global factor refers to an adverse change in global commodity prices, especially in 2014. This event hit hard to major exporting countries (Argentina and Brazil in our sample). Falling prices limited the growth prospects. Instead, it also lowered the export earnings of commodity-exporting countries. It caused an unfavorable change in terms of trade and put upward pressure on exchange rates. As a result, financial stress index in emerging economies rose significantly. The second global factor is changes in global output that manifest the changing demand in the world market compared to emerging countries. Recession in the world and the Chinese economy and massive Chinese currency devaluations account for lower growth in major emerging countries such as Argentina, Brazil, India, Indonesia, and Turkey. Thus, the share of these countries in global output dropped sharply post-global financial crisis. The third factor is a rise in global interest rates, reflecting a credit squeeze from the world market to emerging countries, thereby lowering the financial stress index in emerging economies. The impact of global interest rate remains insignificant even after removing outliers that force us to drop global interest rate from the final specific model. Next, the study reveals that financial stress is not regional by nature. The regional dummies for Asia and Latin America indicate that compared to Europe, the average financial stress index in emerging economies goes down by 0.488 and 0.175 points, respectively. Overall, the current analysis suggests that besides political risk, global factors and

domestic vulnerabilities play an important role in determining the financial stress in emerging economies. The lower part of Table 2 shows the goodness of fit and overall significance of the results. The reasonably higher value of R^2 indicates the model is a good fit. F-statistics confirm the findings are overall significant across all the models.

The researchers reinvestigate the potential determinants of financial stress in the emerging economies by various estimation methods for robustness. *Hausman* test results show that the chi-square test stat value is 2744.22 and the probability of the test statistics is less than 5 percent. This confirms that the Fixed Effect model is more appropriate to capture country-specific effects. Secondly, we apply Wu–Hausman specification test (Hausman, 1978) to check the endogeneity in the data. The null hypothesis states that there is no problem of endogeneity. The probability for the test statistics is less than 5%, indicating the rejection of H_0 . This confirms the presence of endogeneity in the data. Table 3 presents results for the FE model besides the System GMM. It caters problem of endogeneity besides the robustness check of POLS results.⁵ The findings of FE and 2SLS models confirm that the poor quality of political institutions escalates financial stress in the emerging economies. Similarly, the impacts of changes in current account, government balance, and trade openness on level of financial stress in the emerging economies stay consistent with the theoretical predictions. They are statistically significant in both methods.

The results in the specific model conform to the theoretical predictions except for a few striking differences. First, the co-movement parameter is negative and statistically insignificant. Second, change in foreign reserves is not vital in explaining financial stress in the specific models. Like the previous models, both R^2 and F-statistic confirm the model is a good fit across all the models. The global factors are used as instruments in 2SLS. Financial stress in advanced economies transmits weakly to emerging middle-income countries. As far as global factors are concerned, findings of the Fixed Effect are robust to the POLS model.

Next, we apply dynamic panel data models (One-Step System GMM and Difference GMM methods) to re-inquire determinants of financial stress in emerging economies. The authors perform two diagnostics tests as well. The first is a serial correlation test. Table 3 shows that probability for AR(2) is higher than 0.05, indicating no second-order serial correlation. However, both models confirm the presence of first-order serial correlation. The second is the Hansen test for over-identifying restrictions. Test results confirm the rejection of the null hypothesis of invalid instruments at a 5 percent level. Thus, we infer that the instruments are valid in both models. Models (5) through (8) in Table 3 present these results for the One-step system GMM. The

⁵ We also apply Two-Stage Least Squares and Difference GMM Models. The results can be obtained upon personal request.

Table 3: Determinants of Financial Stress, Fixed Effect and System GMM

Variables	Fixed Effect Model				One Step System GMM			
	General Model		General Model		General Model		General Model	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All Observa- tions	Excludes Outliers	All Observa- tions	Excludes Outliers	All Observa- tions	Excludes Outliers	All Observa- tions	Excludes Outliers
L.PRI	-	-	-	-	0.4089**	0.529***	0.540***	0.711***
					(0.012)	(0.003)	(0.009)	(0.000)
PRI	-0.034***	-0.04***	-0.037***	-0.040***	-0.0205	-0.04***	-0.0132	-0.0235**
	(0.000)	(0.00)	(0.000)	(0.000)	(0.148)	(0.002)	(0.231)	(0.027)
FSIA	-0.042	-0.028	-0.091	-0.044	0.0323	0.0915*	0.0497	0.0885*
	(0.414)	(0.406)	(0.119)	(0.143)	(0.409)	(0.041)	(0.606)	(0.032)
GRY	-0.076***	-0.061***	-0.078***	-0.056***	-0.0721	-0.03***	-0.0631***	-0.058***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.152)	(0.357)	(0.000)	(0.000)
CA	0.050**	0.023**	0.044**	0.024**	0.0299	0.0253	-	-
	(0.029)	(0.030)	(0.037)	(0.025)	(0.335)	(0.405)		
GB	-0.039	-0.021**	-0.037	-0.020**	0.0104	-0.0049	0.0008	0.0236**
	(0.205)	(0.030)	(0.210)	(0.037)	(0.670)	(0.870)	(0.975)	(0.018)
DRES	-0.001	0.001	-	-	-0.0088	-0.011**	-0.01*	-0.01***
	(0.343)	(0.358)			(0.102)	(0.024)	(0.055)	(0.007)

GYG	-0.063** (0.046)	-0.046** (0.018)	-0.019 (0.496)	-0.037** (0.013)	-0.0227 (0.381)	-0.0312 (0.176)	-	-
GCPG	0.005*** (0.007)	0.003*** (0.006)	0.005*** (0.005)	0.003*** (0.004)	0.0045*** (0.003)	0.005*** (0.003)	0.004** (0.026)	0.0034*** (0.003)
DA	NA	NA	NA	NA	0.2210 (0.353)	0.0915 (0.770)	-	-
DLA	NA	NA	NA	NA	0.2266 (0.690)	-0.0577 (0.880)	-	-
TO	-0.005** (0.022)	-0.005** (0.012)	-0.006** (0.027)	-0.004*** (0.006)	-0.0085 (0.202)	-0.0074 (0.258)	-	-
FO	0.001 (0.933)	-0.001 (0.981)	- (0.933)	- (0.933)	0.0215 (0.603)	0.0276 (0.537)	-	-
GGIR	0.001 (0.135)	0.001 (0.484)	- (0.484)	- (0.484)	0.0001 (0.495)	- (0.495)	-	-
Constant	2.867*** (0.000)	2.908*** (0.000)	2.857*** (0.000)	2.923*** (0.000)	2.1559** (0.049)	3.14*** (0.001)	1.1364* (0.085)	1.84*** (0.007)
Observations	288	252	288	278	288	286	288	282
R-Squared	0.706	0.849	0.7057	0.859	-	-	-	-
No of Countries	18	18	18	18	18	18	18	18

F-test Statistics	121.65***	27.85***	110.78***	36.18***	52.44***	193***	32.63***	41.5***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.007)	(0.000)	(0.000)	(0.000)
AR(1)	-	-	-	-	Z= -2.65	Z= -2.2	Z= -2.29	Z= -3.2
					(0.008)	(0.023)	(0.022)	(0.001)
AR(2)	-	-	-	-	Z= 0.34	Z= -0.69	Z= 0.5	Z= -1.43
					(0.733)	(0.493)	(0.6150)	(0.153)
Hansen Test	-	-	-	-	6.82	2.35	9.67	16.57
					(1.000)	(1.000)	(1.000)	(0.968)

Notes: Significance at 1, 5, and 10 percent are denoted by *, **, and ***, respectively. Dependent variable is FSIE. FSIA refers to financial stress index for advanced countries. Domestic factor is growth in real output (GRY) current account (CA), government balance (GB) and change in forex reserves (DRES). GYG, GCPG, and GGIR refer to growth in global output, growth in the global commodity price index, and growth in global interest rates, respectively. DA and DLA denote dummies for Asian and Latin American regions, respectively. Trade and financial openness are denoted by TO and FO, respectively. P-values of individual coefficients are presented in parenthesis. All models are estimated using robust standard errors. Outliers are removed from Model (2), (4), (6), and (8) through Hampel Identifiers applied to the residuals of models (1), (3), (5), and (7), respectively.

coefficient of the lagged value of financial stress index in the emerging economies is positive and statistically significant at a probability of 1 percent in most of the models. This finding confirms the presence of dynamic effects as financial stress in the emerging economies follows inertia. A fall in institutional quality creates uncertainty in emerging countries. It, in turn, destroys the stability of the financial system. Our finding supports the notion provided by Herrera, Ordóñez, and Trebesch (2014). A high level of financial stress in the advanced economies tends to increase financial stress in the emerging economies for all the models. Thus, the study finds conclusive evidence for the non-regional financial contagion. This finding partially conforms with IMF (2009a); Balakrishnan et al. (2011), and Park and Mercado (2014). Similarly, an increase in real output reduces the financial stress in emerging economies across all the models. It indicates an economic boom. However, once the boom turns into a bust, it makes the financial system highly unstable, and, hence, financial stress in the emerging economies increases. Likewise, falling forex reserves tend to enhance financial stress in emerging economies significantly across all the models. These countries featured enormous debt liabilities denominated in foreign currencies besides relying heavily on imports. A fall in foreign reserves increased their debt liability in foreign currency owing interest repayments and import bills. These exerted pressure on the exchange rate. Thus, the stability of the financial system gets compromised. Both the dynamic models confirm that current account, trade openness, financial openness, growth in global output and interest rate turn out insignificant in explaining financial stress in emerging economies. These findings are in sharp contrast to Balakrishnan, et al. (2011) and Park and Mercado (2014). It may account for the new perils, such as external imbalances and political risks, which stayed much dominant in recent years.

Overall, the findings suggest that the quality of political institutions and external factors play a vital role in determining financial stress in emerging economies. Further, financial stress weakly co-moves between developed and emerging economies.

5. Conclusion

This study rigorously analyzes the potential determinants of financial stress for a panel of emerging middle-income countries. This study pinpoints factors determining financial stress for a balanced annual panel from 2000 to 2016. This study applies various estimation methodologies to explore the key determinants of financial stress to check robustness of the results. This inquiry lies in the sphere of fourth-generation models of crises. The results show that well-functioning political institutions lower the financial stress in emerging countries. Also, the findings provide little support for the co-movement of financial stress between developed and emerging middle-income countries. It is in stark contrast to the previous studies of IMF (2009a); Balakrishnan

et al. (2011); and Park and Mercado (2014). It may contribute to political uncertainty, which is a permanent feature in the emerging countries. Similarly, most of the models acknowledge the significant role of external factors in explaining financial stress in these countries.

The study highlights the need to design policies that strengthen the institutional setup in the emerging economies. Further, coordinated policy responses may help mitigate financial stress through external factors. In addition, lowering fiscal imbalances and recessionary trends helps safeguard the financial system's stability. Exploring better measures of political risks may help confirm the robustness of the results.

An effort to examine the interdependencies between monetary policy and financial stress in the context of emerging and developed countries may be a fruitful task. Similarly, exploring how country characteristics influence the transmission of FSI across various country groupings may be an interesting inquiry in the future.

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Appendix: Table A Variables, Description/Measurement, and Data Sources

Variables	Description/Measurement	Data Sources
Financial stress index for advanced economies	The weighted average of FSIA using PPP-based GDP weights. An index is built by employing PCA on 7 components.	Author's calculation
Financial stress index for emerging economies	The weighted average of FSIE using PPP-based GDP weights. An index is built by employing PCA on 7 components.	Author's calculation
Growth in real GDP	Annual percentage change in Real GDP	WDI, WB
Current account balance as a % of GDP	The ratio of the sum of exports and imports as a ratio of GDP	WDI, WB
General government overall balance as a % of GDP	General government expenditures net of taxes as a percent of GDP	WDI, WB
Change in foreign exchange reserves	Growth in the level of foreign exchange reserves	IFS, IMF

Global real interest rate	LIBOR (three months)	WEO, IMF
Global GDP	Growth in world output	WEO, IMF
The global commodity price index	Global Price Index of All Commodities Not Seasonally Adjusted	Fed Reserve Bank
Trade openness	The ratio of the sum of exports and imports to GDP	WDI, WB
Financial openness	The ratio of the sum of portfolio and foreign direct investment to GDP	WDI, WB
Regional financial contagion	Regional Dummies for Asia, Latin America, and Europe	Author's calculations
Effectiveness of Political Institutions	Political risk index constructed for 12 components of political risk	Author's calculations based on ICRG, PRS

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