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Capital Account Openness and Financial Stability in Asian Emerging Markets

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Abstract

Post the Global Financial Crisis (GFC) of 2008, there has been an increased focus on financial stability along with the growth objectives. The role of capital flow measures like capital controls and macroprudential regulations has gained prominence in increasing the resilience of the financial system of an economy. In this context, this paper examines the ramification of capital account openness on the financial stability indicators with controls for macroeconomic fundamentals, for the Asian Emerging Markets using the annual data of seven economies from 1980 to 2019. The methodology in the paper employs panel data cointegration techniques along with Augmented Mean Group (AMG) estimation to control for cross-sectional dependence, cross-sectional heterogeneity, and nonstationarity. The results indicate that capital account openness and trade openness increase financial instability in the economy while global risk shows mixed results. The economic development of the country, proxied by the size of the economy has a mitigating effect by reducing volatility in the financial sector.

Keywords: Capital Openness, Emerging Economies, Financial Stability, International Capital Flows
JEL classification: E44, F41

1. Introduction

With rising financial globalization, international capital mobility has reached unprecedented scales. Before the 1980s, the capital flows across nations were largely official in nature. However, with capital account liberalization across advanced and emerging economies, there has been an influx of private investors through capital markets and international investment by multinational corporations.

Excessive capital inflows can create overheating pressures in the economy leading up to an inflationary situation, at the same time undermining the competitiveness of the trade sector by appreciating the exchange rate. However, it is the volatile nature of the international capital flows which raises concerns about financial and macroeconomic stability in the host economy. The recurrent emergence of asset price bubbles and recessionary conditions are more common in the era of financial globalization with easing financing conditions, undermining financial stability[1,2]. In addition to the conventional global (push) and domestic (pull) factors determining the flow and direction of capital flows, the episodes of sudden stops, surges, flight, and retrenchment can disrupt the output and credit channels in the economy. This vulnerability will be higher for the economies with more liberalized capital account and lesser developed financial markets, as is the case with the emerging and developing economies. The nature and effect of more open capital account are found to differ for advanced and emerging economies as well.

The recurrence of the financial crisis over the past years presses for a careful examination of the implication of capital account openness on financial stability of an economy. The Reserve Bank of India, in its first Financial Stability Report in March 2010, acknowledges that financial stability needs to be pursued as an explicit policy

variable. The report interprets 'financial stability' as a robust functioning of financial markets, institutions, and infrastructure wherein the system is equipped to counter domestic and global shocks with minimal negative effects[3]. In general, financial stability is achieved with stable currency value, efficient allocation of resources in financial markets, stability in asset prices, and resilience of the financial system to withstand shocks. These factors are in turn influenced by the capital account openness and movement of capital in the economy. Financial stability also ensures well-functioning financial markets which make the intermediation of international capital more effective.

This paper attempts to study the impact of capital account openness on financial stability in the case of Asian Emerging and Developing Economies. The empirical model for estimation is based on the theoretical and empirical literature on the subject and the control variables include the economy's market size, macroeconomic instability, trade openness, exchange rate volatility, and the proxy for the global financial cycle.

The paper finds evidence of increased financial instability due to the capital account openness and trade openness with global risk having mixed results for different measures of financial instability. However, the economic development, proxied by the size of the economy has a dampening effect on the volatility of the financial system indicators. The macroeconomic instability and exchange rate fluctuations are not found to have a significant effect on financial stability indicators. The robustness check of the results is done using the Fully Modified OLS (FMOLS) technique which controls for endogeneity in the data and is discussed in Section 4.

There are five contributions of the paper to the literature. First, the openness in the economy is measured for both capital account and current account which is distinct from most of the empirical work on the subject. Second, Cross-Sectional Dependence (CSD) as well as endogeneity is controlled in the estimation whereas most of the papers ignore CSD among the economies and rely on pooled effects of the capital flows on stability for a panel of countries. Third, instead of taking dummies for the crisis period, like Asian Crisis, GFC, and European Debt Crisis as commonly done in the literature to control for them, a proxy for the global financial cycle is used to control for global financial turbulence. Fourth, the study focussed specifically on Asian Emerging Economies and therefore, facilitates regional analysis. Fifth, the paper uses a wider set of indicators with macroeconomic country-specific variables, extending the analysis in some key dimensions.

The roadmap of the paper is as follows. Section 2 discusses the literature review on the subject from theoretical and empirical perspectives. Section 3 presents the analytical framework and the empirical model constructed using the variables discussed in Section 2. Section 4 explains in detail the data, the measures used for each variable, and the econometric methodology employed in the paper. Section 5 presents the results obtained after estimation. Section 6 discusses the results and concludes the paper.

2. Literature Review

2.1 Theoretical Considerations

The issue of capital account openness and financial stability has been the subject of the rich theoretical and empirical literature. The early models of international capital flows were based on the interest rate differential theory which suggested that capital moves from a country with a low rate of return to a country with a higher rate of return. The developing countries ease their financial market restrictions with a reduction in the cost of capital and to meet the financing needs for development[4]. The role of capital market imperfections that can lead to adverse balance sheet problems and trigger financial difficulties in the emerging economies in the case of capital surges or stops are highlighted in the literature[5,6].

The theoretical literature on the effects of capital account liberalization on the host economy has no clear consensus and the findings are diverse in terms of the desirability of opening the capital account[7]. There is evidence to suggest that international capital mobility can play a catalytic role in fostering a stronger and stable financial market in the economy owing to greater access to capital[8,9]. On the other hand, opening up of capital account can be followed by financial instability due to an increase in risk-taking behaviour, weaker domestic institutions, and banking structure[10]. There is divergence in the policy prescription on the ways to manage capital flows with growth effects largely dependent on the macroeconomic policies of the host economy[11], while for countering financial instability concerns, financial controls rather than macroeconomic policy hold significance[12].

2.2 Empirical Literature Review

The empirical research reveals that the effects of capital flow on the volatility of financial stability indicators vary quite substantially across the economies and also across the different types of flows. The heterogeneity of effects across countries is explained by the domestic macroeconomic and financial factors[13] and the role of institutional factors affecting the intermediation of funds[14], among others. Moreover, it is found that at low levels of development, capital account liberalization can have detrimental effects on the economy, making the emerging markets different from the advanced economies[15].

2.2.1 Capital Account Openness and Financial Stability

There is evidence to suggest that an open capital account prompts the monetary authorities to be cautious in policymaking by raising the penalties of an expansionary monetary policy and therefore, has a negative relationship with inflation[16]. However, the critics of financial globalization argue that opening up of capital account with an underdeveloped financial market can have detrimental effects on growth, while a positive impact of capital flows on financial sector development entails prerequisite conditions of institutional environment and private sector development[17]. The capital account liberalization, by way of lowering economic growth in a study on Sub Saharan African countries[18], suggests that it increases the risk of financial fragility in the economy. The negative impact of a more open capital account on financial stability is found to be mitigated by economic growth in the recipient economy[19]. However, a study finds evidence in the case of emerging markets that international financial flows strengthen the financial market in the host economy[20].

The empirical studies also focused on the period over which openness can affect the financial sector. The capital account liberalization is found to improve financial stability indicators for the first two years before increasing the risks of the financial crisis through pressure on the foreign exchange market for the Sub-Saharan African countries as found in a study[21]. There is contrary evidence found in the context of China, that capital account liberalization dampens the stability indicators for the period of one year, while the overall impact facilitates financial stability in the long run[22].

2.2.2 Different Measures of Financial Stability and Financial Openness

The issue of defining financial stability is complex, unlike price stability which is measured by a change in the inflation rate. In absence of any operational definition, the empirical literature employs a variety of measures for the financial stability depending on their effect on different dimensions of the economy. Some of the measures in the literature reviewed include Exchange Market Pressure Index[21] to measure the degree of financial risk, financial system deposits to GDP ratio for measuring the size of the financial system[20], domestic credit to private sector to GDP ratio to capture the depth of financial system[17], frictions in financial intermediation is proxied using bank's net margin index[13], the extend of intermediation is proxied by M2 to GDP ratio[17], bank non-performing loans to gross loans to gauge the performance of banking system in the economy, and liquid assets to deposits ratio to have an assessment of liquidity in the economy[13,18,19].

The empirical papers used both *de jure* and *de facto* measures of financial openness in an economy. Chinn-Ito index of financial openness[17-19] is used in various empirical investigations, while d*e facto* measures like the ratio of foreign liabilities to GDP are also used to measure the extent of financial liberalization[20].

2.2.3 Role of Capital Flow Measures

The empirical literature also assesses the role of capital flow measures like capital controls and macroprudential regulations in mitigating the impact of financial liberalization on financial stability in the economy. Capital controls as discussed in the literature create distortions in the financial system of an economy by reducing the favourable financial inflows alongside the unfavourable ones[23]. Therefore, they should be used once the macroeconomic policy alternatives like, monetary, fiscal, and exchange rate policies have been exhausted[23]. Moreover, the capital controls should be circumvented to the country's macroeconomic and financial concerns, for a better response mechanism and reduced distortions.

In recent years, Brazil, Indonesia, Korea, and Turkey have tightened capital inflow controls and restrictions targeting bank flows and bond flows to mitigate financial stability risks[24]. The example of Korea is such where the policy response to the capital inflows are constrained by the international obligations but the capital flow measures helped in mitigating the risks while simultaneously

safeguarding the financial stability[23]. Variety of studies finds evidence that capital controls and macroprudential policies can help reduce the risks to financial stability associated with large capital inflows[4,25].

The timing and the nature of the effect of capital account liberalization on financial stability are studied using the finite distributed lag models and the time series panel techniques of cointegration to facilitate the estimation of long run relationship among the variables[21]. However, dynamic panel models with the system GMM technique are extensively used in cross-country analysis[17,18]. There is a lack of focus on the cross-sectional dependence in the present literature and therefore, this paper fills this gap by employing Augmented Mean Group (AMG) estimation to assess the effect of financial liberalization on financial stability.

3. Analytical Framework and Empirical Model

In order to construct the empirical model to estimate the link between financial stability and capital account openness, there is a recent focus on macroeconomic indicators to be used as control variables in a cross-country analysis. This study contributes to that literature. These control variables are drawn from the theoretical and empirical literature and the macro theoretic linkages of the included variables with financial stability are explained in this section.

Based on Minsky's "financial instability hypothesis", economic growth in an economy encourages an overleveraged situation and a rise in risk-taking behaviour by financial institutions, making the economy susceptible to crisis and financial instability[26]. It postulates a positive relationship between growth and financial instability. However, the empirical evidence on the subject is inconclusive and the present study attempts to check for this hypothesis.

Another important variable is macroeconomic instability which is measured by inflation in most of the literature. Inflationary conditions elevate the uncertainties associated with the future returns and can interfere with the efficient allocation of financial resources in the economy, thereby creating financial instability[27]. Inflationary pressures in the economy reflect higher consumption spending on goods and services and squeeze on the volume of savings, thereby limiting investment and growth in the economy. With low and stable inflation, investors can take better long-term investment decisions; therefore, it is expected to have a positive effect on financial instability indicators[28].

The effect of currency fluctuations, induced by global shocks, on financial stability is also of significance. In this context, the exchange rate is found to be associated with financial crisis[29] with such periods largely followed by currency mismatches. The exchange rate volatility abstains the private investors from a false sense of security regarding the financial risks in the economy. Therefore, low volatility can elevate the speculation regarding the future value of the currency and be detrimental to financial stability in the economy[30].

Recent literature has also examined the effect of trade openness on financial stability, which can be in either direction. An increase in the level of trade openness can amplify the demand for international capital and therefore, nudge the financial sector development by increasing its depth. On the other hand, if countries import financial intensive goods due to increased openness, the development of their financial sector cans suffer[31].

The domestic macroeconomic variables included as controls are in line with the empirical literature[13], with *globalrisk* added as an additional variable in the paper. With a rise in financial globalization, the effect of factors like global liquidity, global risk, and global uncertainty in policy have gained prominence and this paper includes a measure of global risk in the analysis to proxy for the global financial cycle[32].

Based on the above discussion, the following empirical model is estimated to analyze the impact of capital account openness on the financial instability indicator of the host economy with the mentioned expected signs.

$$fininstab_{it} = \alpha + \beta kaopen_{it} + \gamma gdp_{it} + \delta macroinst_{it} + \theta exrate_{it} + \mu tradeint_{it} + \rho globalrisk_{t} + \varepsilon_{it} \quad (1)$$

where

fininstab is the measure of financial instability

kaopen refers to capital account openness in the host economy

gdp refers to the market size of the economy

macroinst refers to macroeconomic instability in the host economy

exrate refers to the exchange rate volatility in the economy
tradeint refers to trade openness in the host economy
globalrisk refers to the measure of global uncertainty and risk
with the expected signs as: β >or<0, γ >or< 0, $\delta > 0$, $\theta < 0$, μ >or< 0 and $\rho > 0$.

4. Data and Methodology

This section describes the data sources, the criterion for selection of countries for analysis, measures used for the variables, and the estimation technique adopted to examine the effect of capital account openness on financial stability. The annual data for the period 1980-2019 is used in a panel framework with a set of financial instability indicators, capital account openness measure, and a set of control variables as mentioned in the empirical model above. The seven countries included in the analysis are Bangladesh, China, India, Indonesia, Malaysia, Philippines, and Thailand. The selection of the countries is based on the Gross Domestic Product (GDP) criterion which required selecting an economy if the share of its GDP in the total GDP of Emerging and Developing Economies in the region exceeds one percent throughout the period of analysis[1].

The concept of financial stability cannot be defined uniquely, therefore, there is no common perspective among economists and often practical considerations are given significance in understanding it. The goal of financial stability entails developing efficient and stable institutions, competitive markets, and efficient financial pricing perspectives[11]. The present study looks at financial stability from the perspective of two measures based on the availability of data for the set of selected countries, with data from the World Bank's Global Financial Development Database and the World Development Indicators.

Traditionally, *deposits-to-GDP* (DEPOSITS) ratio is taken as a measure of the size of the financial sector and the extent of financial intermediation through banks. This measure also signals the access to financial savings in the economies where the financial structure is dominated by the banking system[17], as is the case of the selected countries for this study.

The depth of the financial sector from the perspective of assets is captured by *domestic credit to private sector by banks – to- GDP ratio* (CREDIT). It is one of the proxies for financial development in the economy as well. Other commonly used financial soundness indicators include regulatory capital to risk-weighted assets, non-performing loans to total gross loans, and liquid assets to short-term liabilities, but they are not included in the present analysis due to the unavailability of data for the period under consideration.

The standard deviation over a rolling three-year window of DEPOSITS and CREDIT ratios are used as dependent variables in estimation. Higher values indicate higher volatility in the measures and thus, increased financial instability.

Chinn-Ito index is used to measure capital account liberalization in the economies overtime[18]. The index is constructed using the principal component analysis of capital account restrictions based on the IMF's *Annual Report of Exchange Arrangements and Exchange Restrictions (AREAER)* which categorically enumerates the restrictions on capital account transactions. The higher value of the index indicates a higher degree of financial openness.

4.1 Control Variables

In addition, several control variables are used which affect the financial stability of an economy. The first variable is the *log of GDP* which measures the overall market size of the economy and captures a wide range of factors affecting financial stability. In order to capture macroeconomic instability, *inflation* is used as a measure. The *volatility in the exchange rate* is also used as a control in estimation, to proxy for foreign exchange interventions by the central bank which can have an impact on macroeconomic fluctuations and systemic financial risks. It is expected to have a negative effect on financial instability indicators. The final country-specific macroeconomic variable is trade openness and the measure used for the same is *trade as a percentage of GDP* (exports plus imports as

[1]The IMF classification of countries is used for identifying the Emerging and Developing Economies in Asia. Vietnam also qualifies for estimation based on the said criterion but is dropped from the analysis due to the unavailability of data. A similar criterion based on FDI as a percentage of the total FDI of Asian Emerging and Developing Economies and total external liability as a percentage of total for Asian Emerging and Developing Economies were also used for selecting the countries. The same set of countries was obtained with the one percent rule, except Bangladesh and Vietnam. A larger set of countries is, therefore, used and Bangladesh is included in the sample.

a percentage of GDP). The effect of trade openness on financial stability can be in either of the two directions.

The period of analysis, 1980-2019 encompasses various episodes of crisis and financial turbulence. The paper follows the approach discussed in the literature to control for the periods of elevated risk and uncertainty by taking a proxy for the Global Financial Cycle (GFCy) rather than assigning dummies to the individual crisis episodes[20]. The proxy used in the paper is CBOE *Volatility index (VIX)* which is a measure of expected price fluctuations in the S&P 500 index options over the next 30 days. The index is considered a reflection of investors' sentiments. It is a leading indicator and not a sign of immediate market movement.

The macroeconomic fundamentals included in the estimation as controls can have feedback effects and cause second-order bias due to endogeneity. For instance, the policy choices regarding capital account restrictions could be influenced by the level of inflation in the economy. A country with a stable inflationary situation is expected to lower controls on the capital account. The exchange rate regime can also be switched to a peg in the case of high inflationary pressures which acts as a nominal anchor in the stabilization attempt. Therefore, the estimation technique used in the paper for robustness check (FMOLS) and discussed below, controls for the endogeneity of variables arising due to feedback effects, omitted variable bias, and measurement errors.

Based on the measures, the empirical model is estimated as the following two econometric models.

Model 1

$$deposits_gdp_vol_{it} = \alpha + \beta kaopen_{it} + \gamma gdp_{it} + \delta macroinst_{it} + \theta exrate_{it} + \mu tradeint_{it} + \rho globalrisk_t + \varepsilon_{it} \quad (2)$$

Model 2

$$dcpvt_gdp_vol_{it} = \alpha + \beta kaopen_{it} + \gamma gdp_{it} + \delta macroinst_{it} + \theta exrate_{it} + \mu tradeint_{it} + \rho globalrisk_t + \varepsilon_{it} \quad (3)$$

where deposits_gdp_vol is the volatility in deposits-to-GDP ratio

dcpvt_gdp_vol is the volatility in domestic credit to private sector by bank-to-GDP ratio

The details of the measures for each variable in the econometric models in Equations (2) and (3) are presented in Table (1).

4.2 Econometric Methodology

The data collected for the study is macro country-level data and micro panel techniques may not be suitable for analysis. The static panel models of fixed effects and random effects fail to control for endogeneity and CSD while the dynamic panel models like system GMM and difference GMM[33,34] fail to account for cross sectional heterogeneity and assume the dynamics to be homogeneous across the different members of the panel. Therefore, in order to account for endogeneity, CSD and cross-sectional heterogeneity, the paper uses panel cointegration techniques.

Table 1. Definition of Measures

Variable	Measure
Capital account openness: *kaopen*	Chinn-Ito Index of capital account openness
Market Size: *gdp*	Log of GDP (WDI)
Macroeconomic Instability: *macroinst*	Inflation, annual % (WDI)
Exchange rate volatility: *exrate*	Standard deviation for three years rolling window for Exchange Rates, National Currency Per U.S. Dollar, Period Average, Rate IFS, IMF
Trade Openness: *tradeint*	Sum of exports and imports as a % of GDP (WDI)
Global Risk: *globalrisk*	CBOE equity volatility index, VIX (FRED)

Note: WDI: World Development Indicators
IFS, IMF: International Financial Statistics, IMF
FRED: St. Louis Fed Economic Data

The first step under econometric estimation is to check for the stationarity of the individual series. A nonstationary series has a changing mean, variance and covariance over time, and estimation based on such series can give spurious results. A battery of panel unit root tests is conducted. The first generation tests assume cross-sectional independence and two tests under this category are done, namely Im, Pesaran and Shin test[35] and Maddala and Wu Fisher-type test[36]. Pesaran CIPS test[37] is also conducted which is a second generation panel unit root test, controlling for CSD by augmenting the standard ADF regressions for each cross section with cross-sectional averages of lagged levels and first differences of individual series. The time series panel unit root tests are conducted for the variables that are cross-sectionally invariant. Three such tests are included in the analysis: Dickey-Fuller GLS test,[38] Phillips-Perron test[39], and Kwiatkowski-Phillips-Schmidt-Shin test[40].

Provided that the variables are nonstationary in levels and integrated of the same order, the long run dynamics among the variables can be modelled using the cointegration techniques. If the linear combination of integrated variables is stationary, then the variables are said to be cointegrated. The present study used residual-based cointegration tests namely, Kao test[41], Pedroni test[42], and Westerlund test[43]. The paper also checks for CSD using the approach discussed by Pesaran[37] which is defined as the contemporaneous correlation among individual members of the panel left after conditioning on individual characteristics[44].

The next step is to estimate the long run relationship or the cointegrating vector among the variables using FMOLS[45] and DOLS[46] estimation techniques. FMOLS is a semi-parametric technique that uses heteroscedasticity and autocorrelation consistent estimator of a long-run covariance matrix, while DOLS uses lags and leads of the first difference of regressors directly in the regression equation to control for endogenous feedback effect. For both of these methods, the group mean estimates are preferred over the pooled estimates as the former allows for different coefficient for each cross section, thereby allowing for cross-sectional heterogeneity and also has relatively minor size distortions in small samples. In case the series are found to have CSD, then the approach would be to use Augmented Mean Group (AMG) estimation[47] which deals with nonstationarity, cross-sectional heterogeneity and cross-sectional dependency. The approach is to control for CSD by including a proxy for unobserved common effects in the regression, called *common dynamic process* (cdp). The 'cdp' is extracted from the coefficient vector of year dummies in the pooled regression model of first difference OLS.

5. Results

The empirical models in Equations (2) and (3) are estimated in this section using the econometric methodology discussed in the previous section. The first step in panel time series data is to check for stationarity of the underlying series. The panel unit root tests conducted on the dependent and independent variables are presented in Table (2) below along with the inference. A series is taken to be nonstationary if at least two out of three tests suggest so. All the series are integrated of order one (I(1)), implying they are nonstationary in levels and stationary in first differences.

Table 2. Panel Unit Root Tests

Variable	Maddala & Wu *Null: Unit Root*		Im Pesaran and Shin *Null: Unit Root*		Pesaran CADF *Null: Unit Root*		Inference
	Level	First Difference	Level	First Difference	Level	First Difference	
deposits_gdp	9.5408	30.6958***	0.225	-2.765***	-1.515	-4.049***	I(1)
dcpvt_gdp	9.576	31.412***	0.026	-2.731***	0.736	-2.367***	I(1)
kaopen	12.5917	40.9328***	-	-	0.920	-1.968**	I(1)
gdp	12.6896	29.1687***	0.2257	-2.5892***	-2.461	-3.145***	I(1)
macroinst	35.6625***	-	-0.546	-3.822***	-1.258	-3.445***	I(1)
exrate	20.9445	67.44***	0.136	-5.588***	-2.593	-3.777***	I(1)
tradeint	3.952	53.610***	2.295	-4.811***	-1.155	-3.042**	I(1)

Note: *** p<0.01, ** p<0.05, * p<0.1

Table 3. Time Series Unit Root Testing and Inference

Variable	DF-GLS *Null: Unit Root*		Phillips-Perron *Null: Unit Root*		KPSS *Null: Stationarity*	
	Level	First Difference	Level	First Difference	Level	First Difference
globalrisk	-2.926	-3.755**	-12.011	-19.455**	0.21***	0.0574
Inference	I(1)		I(1)		I(1)	

Note: *** p<0.01, ** p<0.05, * p<0.1

Table 4. Tests for Cointegration: Residual based Methods

Statistic	Model 1	Model 2
Kao Cointegration test *(Null: No cointegration)*		
Modified Dickey-Fuller t	-9.794***	-4.522***
Dickey-Fuller t	-5.867***	-4.145***
Augmented Dickey-Fuller t	-6.405***	-5.364***
Unadjusted modified Dickey-Fuller t	-10.888***	-9.466***
Unadjusted Dickey-Fuller t	-6.006***	-5.489***
Pedroni Cointegration test *(Null: No cointegration)*		
Modified PP test	2.571***	3.414***
PP test	-0.265	-3.252***
ADF t statistic	-1.576**	-1.353*
Westerlund (2005) test *(Null: No cointegration)*		
Variance-Ratio	-1.7853**	-0.699

Note: *** p<0.01, ** p<0.05, * p<0.1

Table 5. Test for Cross-sectional Dependence

Variable	CD-test *(Null: Cross sectional independence)*
deposits_gdp	19.32***
dcpvt_gdp	13.13***
gdp	28.26***
macroinst	7.52***
exrate	6.24***
tradeint	12.12***

Note: *** p<0.01, ** p<0.05, * p<0.1

The time series unit root testing is employed for *globalrisk* (VIX) as it cross-sectionally invariant. The results and the inference are presented in table (3). The series is integrated of order one.

If the variables are nonstationary in levels and integrated of the same order, then there may exist a cointegrating long run relationship between the variables. Three residual-based tests are conducted and the results for the two models are presented in the Table (4) below. Based on all the test statistics, it can be concluded that there exists long run relationship between the financial stability indicators and the capital account liberalization along with the macroeconomic control variables and global risk.

The estimation of cointegrating vector can be done using FMOLS and DOLS techniques but they assume cross-sectional independence in the series[2]. Therefore, the estimation proceeds with checking the CSD in the data based on the approach discussed in Pesaran (2007)[37]. The results of the test on individual series (except VIX which is cross-sectionally invariant) are presented in Table (5) below. In all the cases, the null of cross-sectional independence is rejected and thus, the estimation technique needs to account for that.

[2]To account for cross-sectional dependence in FMOLS and DOLS estimation, the time demeaned data can be used. However, such an approach is not applied in this paper due to the presence of cross-sectionally invariant variable in the model.

Table 6. Augmented Mean Group Estimation

	(Model 1)	(Model 2)
Variables	**deposits_gdp_vol**	**dcpvt_gdp_vol**
kaopen	1.105***	0.285*
	(0.358)	(0.166)
gdp	-5.317***	-6.188***
	(0.636)	(2.249)
macroinst	0.030	0.031
	(0.069)	(0.029)
exrate	-0.304	-0.224
	(0.471)	(0.216)
tradeint	0.074**	0.125**
	(0.032)	(0.052)
globalrisk	0.296***	-0.272***
	(0.044)	(0.038)
Constant	129.787***	80.285***
	(16.989)	(12.309)
Observations	243	243
Number of countries	7	7

Note: Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The paper uses Augmented Mean Group (AMG) estimation in this case as this technique allows for heterogeneous slope coefficients and also unobserved correlation across members of the panel. The empirical model in Equations (2) and (3) are estimated using this technique and the results are presented in Table (6). For both of the indicators of financial system volatility, capital account liberalization has a positive and significant coefficient indicating that capital account openness can hamper the financial stability of the economy. On the other hand, GDP has a negative coefficient implying that a higher domestic market size helps in reducing the volatility in the financial sector indicators which refutes the Minsky's "financial instability hypothesis"[26], whereas trade openness is found to increase the financial instability. The effect of global risk is distinct in the case of both indicators. An increase in global risk, as expected, increases the volatility in the deposits-to-GDP ratio, while it decreases the volatility in domestic credit to private sector-to-GDP ratio. The latter trend is indicative of the 'flight to safety' phenomenon which potentially leads to the flight to liquidity in the case of elevated global risk and reduces the holding of less liquid assets[48,49]. However, the literature also suggests that changes in VIX explain more about the pricing of risk during the financial crisis[50], therefore, to assess its impact on financial instability a period-specific analysis is warranted with disaggregation based on the types of capital flows. Such investigation is left for future research. There is no evidence found for the effect of macroeconomic instability and exchange rate volatility on financial stability though both the variables have expected signs.

The *common dynamic process* estimated under AMG technique is extracted and used as an additional regressor in FMOLS estimation. This served as a robustness check for the above results where endogeneity is also controlled for in estimation, in addition to nonstationarity, cross-sectional dependence and cross-sectional heterogeneity. The results are similar to the ones obtained in the above estimation[3]. Moreover, different measures of global risk, namely overall equity market volatility index, and VXO are also used instead of VIX, but the results are robust to these changes.

6. Conclusion and Discussion

Capital inflows inflict macroeconomic and financial stability risks on the host economy but also present opportunities for financing the investment needs if channelized effectively. Therefore, the need is to reduce the vulnerability of the emerging economies to the crisis and financial instability with the opening up of the financial markets.

The study finds a positive and significant impact of capital account liberalization and trade openness on the financial instability in the recipient economy, while the elevated global risk gave mixed results. The latter trend is contrary to the expected sign and may reflect lesser movement in the credit market due to elevated global risk. A significant impact of GDP on financial stability implies that the market size of the economy or the overall development can help mitigate the negative effects of capital openness by reducing systemic risk in the financial

[3]Exchange rate volatility and macroeconomic stability remain insignificant for Model 2 but turn significant for Model 1 with expected signs. The results are not presented in the paper.

sector. The exchange rate volatility and inflation fail to have a significant impact on financial stability measures, though they showed the expected signs in regression. The reason could be the annual frequency of the data which fails to capture the short term movement in measures. Moreover, this paper studies financial stability based on only two indicators and further research is warranted in the field with more indicators. However, our results are credible given that our techniques control for endogeneity in the data.

The challenge for policymakers is, thus to develop a coherent approach for capital flows in the economy. First, the use of capital flow measures like capital controls and macroprudential policies should be adopted by the emerging markets to sail through the financially turbulent times without hampering their financial stability. Post GFC, IMF also changed its stance in 2012 to acknowledge the use of capital flow measures as a necessary policy in case of open capital account. Second, financial stability is found to be closely related to overall development in the economy which has feedback effects on the development of the financial market. Therefore, emerging economies need to pursue the goal of GDP growth to mitigate the negative impact of capital account openness on financial stability and reduce the vulnerability of the economy's financial system to global shocks. Third, the capital account reforms need to be sequenced based on the country-specific characteristics, the degree of financial sector development, and institutional quality in the economy for reaping the benefits of financial liberalization.

7. References

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