



Research article

Do financial inclusion, stock market development attract foreign capital flows in developing economy: a panel data investigation

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Abstract: Do financial inclusion and stock market development play the deterministic role of attracting foreign capital flows in developing countries. With this study, we tried to figure out the answer by investigating the magnitude of financial inclusion and stock market development towards capital flows in the economy considering a panel of 58 developing countries for the span of 1993–2017. Dynamic panel System-GMM estimation was performed by decomposing the development and degradation namely, positive and negative shocks in financial inclusion and stock market development. Study findings ascertain the asymmetric relationship between financial inclusion, stock market development, and cross-broader capital flows in developing countries. We also observed positive shock in financial inclusion and stock market development positive linked with cross-broader capital flows. In particular, development in financial inclusion in the financial system encourages foreign capital flows in the form of FDI, on the other hand well developed and efficient financial market particularly stock market development encourage the positive trend in foreign portfolio investment. The study also revealed that past behavior of foreign capital flows could consider as the future predictor for foreign capital flows in recipients countries. Dumitrescu and Hurlin (2012) Panel Causality Test was performed and estimation unveiled bidirectional causality between stock market development and capital flows and unidirectional causality from financial inclusion to foreign capital flows in the short-run.

Keywords: financial inclusion; stock market development; capital flow; system-GMM; asymmetry

JEL codes: C21, E22

1. Introduction

Efficient capital market, globalization effect, and easy access to financial services tempt cross-broader capital flow over the past decade. It is because financial market efficiency, the abolition of information constraints along with easy access to information technology, and the emergence of new financial product and services act as key impute of deliberating capital flow in the economy. In theory, capital flow and economic growth relationship are well documented through identifying capital flows impact on productive investment, lower capital constraints, and diversifying in investment. The effect of capital flow may be observed in increasing efficiency level in the financial market, precisely in the capital market by exposing foreign competition, and the emergence of new financial products and services of attracting potential investors from both domestic and foreign. In particular, capital flow is immensely encouraged by an optimistic view of investment opportunities in the host economy.

Cross-broader capital flows immensely important for sustainable development, therefore, recipient countries brought initiatives and measures for attracting and handling foreign capital flows effectively and efficiently (Bluedorn et al., 2013). Measures include financial reform, efficient financial intermediation, adaption and diffusion of financial technology, the transformation of financial assists and efficient mobilization of economic resources along with financial market development (Fratzscher et al., 2012; Volz, 2012). Factor induce capital flows categories either push factor known as a global factor and pull factor relating to the host country economic situation, financial practices, and the financial market. No conclusive evident appeared in existing literature of answering the question of which factor is critical for capital flows. Nonetheless, a group of researchers tried to explain the effects of the pull factor on capital flows [see, (Baltagi et al., 2009; Chinn and Ito, 2006)]. The key country-specific factor established by researchers as pulling capital flow is financial sector development. Balance financial development requires equitable development in the financial system by ensuring institutional efficiency by allowing easy access to pertinent information as well as the well-accomplished financial market with diversified investment opportunities. Financial inclusion means availability, accessibility, and use of formal financial service for all (Kumar and Mohanty, 2011). It implies that access to desired financial products, credit availability with affordable cost, and service to financial security (Unnikrishnan and Jagannathan, 2015). The effects of financial inclusion, at the macro level, is critical for economic growth, it is because easy access to money management tools allows smooth consumption and built assets thus eventually improve welfare at the individual level and expand possibilities to overall economic growth.

The aims of the study to investigate the effect of financial inclusion and stock market development on foreign capital flows in developing countries covering for the span of 1993–2017 with a panel of 58 developing countries. As a proxy of capital flow, in this study, we considered total foreign investment in the economy, which includes in the form of direct investment well known as FDI and equity investment well known as portfolio investment. Finally, this study relies on a dynamic panel system generalized method of moments (SYS-GMM) technique, proposed by Blundell and Bond (1998), to deal with the potential simultaneity problems and to provide a richer understanding about the relationship between financial inclusion, stock market development, and capital flows. From a directional relational perspective, study performs panel causality test proposed by Dumitrescu and Hurlin (2012).

Durbin-Hausman Panel cointegration test proposed by Westerlund (2008) confirms the existence of a long-run association between financial inclusion, stock market development, and capital flows during the studied period. Furthermore, we also observed that the coefficients for financial inclusion and stock market development from System—GMM estimation is positive and statistically significant at 1% level of significance. This finding explained the positive change in financial inclusion and stock market performance can have positive effects on foreign capital flows in the economy by attracting foreign investors. In particular, foreign direct investment influenced by financial inclusion in the economy and stock market development positive influence on foreign portfolio investment during the studied period. Panel causality test unveiled bidirectional causality between capital flow and stock market development and unidirectional causality from financial inclusion to capital flow in the developing economy.

The novelty of this study lies: First, this study examines the effects from financial inclusion and stock market development on foreign capital flows in developing countries by addressing positive and negative shock in explanatory variable, it is implying that with this study we investigate both symmetry and asymmetry assumption in a system equation. Second, empirical studies suggest while addressing the stock market development impact on macroeconomic phenomenon studies predominately rely on a single indicator. However, during this study, we construct a stock market development index (SMDI) by applying principal component analysis (PCA) in order to capture a wider view rather concentrated on narrow estimation.

The rest of the paper structure as follows. In section II, we bring brief literature review pertinent to the study. Section III deals with data and econometric methodology used in the study of exploring a relationship. In section IV, we examine the nexus between financial inclusion, stock market development, and foreign capital flow. Finally, section V concludes with a summary of findings.

2. Literature review

Globalization, international financial integration, and faster mobility of cross-broader capital flow became the key features in the world economy in the recent decade. This expansion of cross-broader capital flows promotes industrialization in the emerging economy with higher productivity in GDP and growth in international trade. Widespread financial development with efficient financial institutions and financial market liberalization along with the elimination of information constraints, advancement in financial technologies and introduction of new financial products and services impute cross-broader capital mobility. In a study, Lusinyan (2002) explained that the efficiency of the local financial market and economic growth play a deterministic role in attracting foreign capital flows in the economy. The effect of cross-broader capital flow is clear. It promotes efficient mobilizing world saving into productive investment as well as reduction of investment risk with diversifying investment. Furthermore, international capital flow also produces intensity in the financial market through foreign competition, innovative business skills, and technological development thus eventually bring positive changes in the financial market with boosting economic growth.

Neoclassical growth model predicts that countries with faster productivity growth should invest more and attract more foreign capital. In a study, Sen Gupta and Atri (2018) suggests that financial sector development bring changes in financial structure with financial assets and instruments in the financial system. The adaptation of financial instruments in the domestic financial market ensures deeper integration in the financial market between domestic and international. The effect of capital

flow on the macroeconomic phenomenon is diversified including promote investment, human capital development, resource mobilization, deepen domestic financial sector, and economic growth with positive externalities (Wang and Wong, 2009; Azman-Saini et al., 2010). Further evidence found in Kose et al. (2009) and Obstfeld (2009) study, they explained capital flow ensure macroeconomic stability and international financial integration.

Efficient capital market and foreign capital flow exhibit in feedback relationship by affecting each other (Soumaré and Tchana Tchana, 2015; Odhiambo and Tsaurai, 2012). Furthermore, empirical literature also provided evidence of unidirectional casualty between foreign capital flows and financial market development. A group of researchers provide evidence and explain the role of well performed capital market encourage foreign capital flows in the economy see for example, (Soumaré and Tchana Tchana, 2015; Babatunde, 2011; Asiedu, 2002). on the other hand, another group of empirical studies also acclaimed that foreign capital flows positively caused capital market development see for example, (Fauzel, 2016; Alfaro et al., 2010; Adam and Tweneboah, 2009; Agbloyor et al., 2013; Zakaria, 2007).

Cross-broader equity investment become one of the key sources of investment diversification among developed countries, using equity investment channel developed countries can mobilize fund to developing countries. One obvious benefits of foreign portfolio investment are investment diversification for both domestic and foreign investors. Apart from that foreign portfolio investment reduce risk substantially due to the negligible correlation between domestic assets and foreign assets (Grubel, 1968; Levy and Sarnat, 1970). More recently, Choong et al. (2010) claimed that the stock market channel is more preferable to mobilizing foreign capital flow due to institutional efficiency and financial integration. Cross-broader capital flow relies on various push and pull economic phenomenon¹. In his study, Lusinyan (2002) argued that financial market efficiency and progressive trend in economic growth play a deterministic role in foreign capital investment. In a study, Rashid and Husain (2013) argued that intense inflation pressure and unstable exchange rate discourage capital flows in the host economy.

Foreign capital injects funds in the financial system which accelerate financial development through financial intermediation, increasing institutional quality, financial market development, and greater financial integration (Soumaré and Tchana Tchana, 2015). One of the prime motivators in the fiscal expansion is financial inclusion because its reduce financial gap by incorporating underserved population in the mainstream of financial function and create ample opportunities in the financial markets for innovative financial products and services. Improvement in financial inclusion also plays a key role in reducing income inequality in the economy. Neaime and Gaysset (2018) performed a panel data investigation of exploring the financial inclusion and stability effects on poverty reeducation and income inequality in MENA countries. Study findings unveiled that financial inclusion play a positive role in reducing income inequality of sample countries. It is because access to financial service, especially from banks based financial institutions, by countries population assists in capital accumulation and increase additional income generation possibilities (Demirguc-Kunt and Klapper, 2012).

Financial inclusion role in financial stability also investigated in empirical studies see, (Morgan and Pontines, 2014; Han and Melecky, 2013; García and José, 2016). As Schumpeter (1911) suggests that financial institutions play a critical role in economic resources reallocation and optimal utilization. Furthermore, Diamond and Dybvig (1983) argued that banking sector expansion in the

¹ See, Reinhart and Reinhart (2008), Glick and Hutchison (2009), Aizenman and Glick (2009), Cardarelli, et al. (2010), and De Gregorio (2012).

financial system allows greater accumulation of capital and investment in the economy by allowing the provision of liquidity. Liquidity provision in the financial system indicates financial efficiency in the economy that comes with institutional efficiency as well.

Institutional efficiency, precisely financial institutions, plays an intensifying role in attracting foreign capital flows in the economy. therefore developing countries over the past decade put the considerable effort of establishing strong financial sector comprising efficient and effective financial intuitions and well-performed capital market (Daude and Stein, 2007). In a study, Poelhekke (2015) posits that banks based financial institutions having operating both in the local and foreign banks in the economy accelerate foreign capital flows by facilitating financial transactions with efficiency. Furthermore, financial openness towards foreign banks allows financial market development in the host countries, in turn, foreign investment get positive motivation and encourage foreign investors channelizing capitals in prospective investment (Alfaro et al., 2010). Because of more financial integration and friction lower investment, risk and forced towards well structure financial sector in the host country (Giannetti and Ongena, 2012). In another study, Alguacil et al. (2011) investigate the effects of macroeconomic and institutional factors on FDI inflows in the economy. Study predominantly focused on institutional efficiency associating FDI inflows. Findings unveiled that institutional quality and efficiency positively induce foreign investment. A similar conclusion also explained by Rodrik et al. (2004), he claimed quality institutions as “trumps”.

In the context of the globalization effect, foreign portfolio investment immensely attracts by the efficient and well-developed capital market in the economy. Capital flows in equity form in the financial market extend risk sharing and investment diversification for a local investor. The flow of foreign portfolio influence on stock market performance by stimulating earning from stock commonly known as so-called revaluation effect (Errunza and Miller, 2000). Stock return and foreign portfolio nexus found in Loncan and Caldeira (2015) study, they claimed that foreign equity flows in the financial market boost market activities with symmetric information flows and assists in market unmotivated movement. The effects of foreign equity flow increase return with sectoral related commodities and allow greater investment diversification as well. Further evidence found in Bayar (2017) study, they investigate the relationship between FDI, Foreign Portfolio investment, and stock market development in Turkey. The study revealed unidirectional causality between foreign direct investment and stock market development and bidirectional causality from stock market development to foreign portfolio inflows. Akinmulegun Sunday (2018) Perform a study of investigating the effect of capital market on foreign portfolio investment in Nigeria by applying Vector Error Correction model. Study findings revealed positive linked between local capital market development and foreign portfolio investment in the long run. They argued that attracting foreign investment in the form of equity or/and debt efficient capital market immensely important.

3. The conceptual framework of the study

The focus of this study is not intended to a comprehensive investigation of identifying the key determinants of foreign capital flows in developing countries. Rather, we wished-for to investigate nexus between financial inclusion, stock market development, and foreign capital flows in the developing economy for the first time in the panel form by applying dynamic System-GMM and panel causality test. We test the following six (06) hypothesis pertinent to the conceptual model of the study.

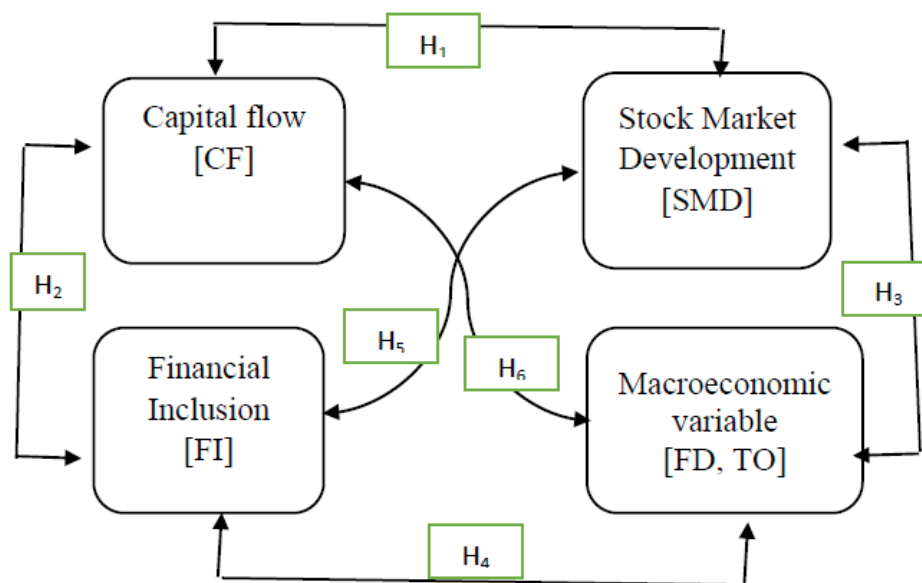


Figure 1. Conceptual framework and possible casualty.

- ❖ $H_{1A,B}$: Stock market development cause capital flows and vice-versa.
- ❖ $H_{2A,B}$: Financial Inclusion cause capital flows and vice-versa.
- ❖ $H_{3A,B}$: Stock market development cause a Macroeconomic variable and vice-versa.
- ❖ $H_{4A,B}$: Financial inclusion cause a Macroeconomic variable and vice-versa.
- ❖ $H_{5A,B}$: Stock market development cause financial inclusion and vice-versa.
- ❖ $H_{6A,B}$: Capital flow cause a Macroeconomic variable and vice-versa.

4. Data and methodology of the study

In this study, we use annualized time series data, which is collected from the World development Indicator published by World Bank (2017) and international financial statistics published by IMF (2018) for the span of 1980–2017.

As suggested by empirical literature, the economy can absorb foreign capital flows in various form, Therefore, in this study, we consider two important sources as a proxy of capital flow in the economy namely, foreign direct investment and foreign portfolio investment. The study also considers two important independent variables namely, financial inclusion and stock market development.

Financial inclusion means accessibility, availability, and use of all formal financial service to all (Kumar and Mohanty, 2011). It is implying that the provision of access to financial service with minimum cost along with efficient financial intermediation by the financial system. Financial inclusion aims at dragging down the ratio of the unbanked population by offering financial services from formal financial institutions ranging from savings, credit, and fund-transferring in the economy (Hannig and Jansen, 2010). In a similar aspect, Khan (2011) postulates that financial inclusion is the process of ensuring financial services to low-income groups in the country with affordable cost. Furthermore, Demirguc-Kunt and Klapper (2012) explained that financial inclusion commonly termed as access to credit form formal financial intuitions. In empirical studies a number of proxy indicators used of addressing and capturing the effect of financial inclusion. however, the prime proxy of financial

inclusion repetitively used as the number of depositors with commercial banks (per 1,000 adults) is used as a proxy for financial inclusion, see, for example, (Evans, 2015; Naceur et al., 2015; Sarma, 2012; Mbutor and Uba, 2013).

While addressing stock market development, the study developed Stock Market development Index developed considering three key proxy indicators as proposed in empirical literature such as three indicators of stock market development widely used in similar studies. The ratio of stock market capitalization to GDP (SMC/GDP), i.e. the value of listed shares to GDP, the weight of stock market trade to GDP (SMT/GDP), i.e. the total shares traded to GDP, and turnover ratio (TURNOVER), i.e. the ratio of the value of total shares traded to the average real market capitalization. We performed principal component analysis applied for developing SMD index, following Pradhan et al. (2014).

In order to increase robustness in estimation, we include two important macroeconomic variables as control variable namely, Trade openness (TO) as a proxy for degree of openness is found by adding imports and exports as a percentage of GDP and financial development (FD) as a proxy for domestic credit to the private sector as a percentage of GDP.

Use of panel data in econometric investigation becoming popular, over the past decade, it is because, over time series, panel data investigation has the capacity to addressing the unit's comparison. In this study, our panel data contains both times series and cross-section. The baseline model of this study can express in the following ways:

$$Y_{it} = \beta Y_{i,t-1} + \beta X_{it} + \mu_{it} \quad (1)$$

$$i=1\dots n, \text{ and } t=1\dots\dots\dots T$$

where Y_{it} represents dependent variable, $Y_{i,t-1}$ for lagged dependent variable, X_{it} denotes for Endogenous variable in the model, and μ_{it} for random error in the equation. Model estimation with Equation (1) by OLS is biased, overcoming inherent limitation in OLS alternative pooled regression model evolved like Random effects (RE) and Fixed Effect (FE).

For dynamic nature of panel data, in this study will be used generalized moments of the method (GMM) proposed by Arellano and Bover (1995) and further improvement made by Blundell and Bond (1998) is well known as System-GMM. Initial dynamic panel investigation proposed by Arellano and Bond (1991) on first difference regressions. Since the initial model possesses limitations like when the explanatory variables are persistent over time. In this case, the lagged values of these variables are weak instruments for the difference equation. Moreover, this approach biases the parameters if the lagged variable (in this case, the instrument) is very close to being persistent. To deal with this drawback several improvements made by Blundell and Bond (1998). This estimator has benefits over other traditionally applied panel regression estimators. In order to capture the dynamic relationship between capital flow, financial inclusion, and stock market development the dynamic framework of panel regression can be specified as follows:

$$Y_{it} = \alpha + \gamma Y_{i,t-1} + \gamma FI_{it} + \gamma SMD_{it} + \sum_{j=1}^K \mu_j X_{itj} + \varepsilon_{it} \quad (2)$$

$$i=1\dots\dots\dots n; t=1\dots\dots\dots T; j=1\dots\dots\dots k$$

In the above Equation (2), Y_{it} for dependent variable; $Y_{i,t-1}$ represents lagged dependent variable; FI_{it} denotes for financial inclusion; SMD_{it} for Stock market development index; X_{itj} for control variables in the equation; and ε_{it} for random error.

We also move one-steps further in an investigation by testing the pattern of relationship between financial inclusions, stock market development, capital flows. For doing so in the model equation, two sets additional variable incorporated namely, positive and negative shock in financial inclusion, (e.g., FI^+ and FI^-) and stock market development(e.g., SMD^+ and SMD^-). Using new notation, we create two sets of additional variables representing financial inclusion (FI) and stock market development (SMD) in the following ways, where FI^+ denoted by a positive change in financial inclusion and FI^- denoted by negative shock in financial inclusion and similarly, SMD^+ denoted by a positive change in stock market development and SMD^- denoted by negative shock in stock market development. Series can drive using the following equations:

$$\begin{cases} FI_t^+ = \sum_{k=1}^t \ln FI_k^+ = \sum_{k=1}^T \text{MAX}(\Delta FI_k, 0) \\ FI_t^- = \sum_{k=1}^t \ln FI_k^- = \sum_{k=1}^T \text{MIN}(\Delta FI_k, 0) \end{cases} \quad (3)$$

$$\begin{cases} SMD_t^+ = \sum_{m=1}^t \ln SMD_m^+ = \sum_{m=1}^T \text{MAX}(\Delta SMD_m, 0) \\ SMD_t^- = \sum_{m=1}^t \ln SMD_m^- = \sum_{m=1}^T \text{MIN}(\Delta SMD_m, 0) \end{cases} \quad (4)$$

5. Results and discussion

5.1. Unit root test, cointegration test, and cross-section dependency test

For the preliminary investigation, we perform panel unit root rest applying t-test proposed by Levin et al. (2002) and W-stat proposed by Im et al. (2003). The results of the panel unit root test exhibits in Table 1. The panel unit root estimation revealed that the proxy of Stock Market Development is stationary at level and Capital flow, financial inclusion, Stock Market Development, Domestic Credit to the private sector, Domestic Credit by the bank, and Trade openness become stationary after first difference. The most important issues are neither variable becomes stationary after second difference.

Table 1. Panel unit root test.

Variables	Levin, Lin&Chu t-test		Im, Pesaran and Shin W-stat		Order of integration	Autocorrelation
	At level	1 st diff	At level	1 st diff		
CF	-	-6.15659	-	-9.20136	I(1)	No
FI	-	-8.15668	-	-10.4527	I(1)	No
SMD	-9.80824	-	-7.31554	-	I(0)	No
TO	-	-8.54858	-	-31.3895	I(1)	No
FD	-	-7.95871	-	-32.0563	I(1)	No

The study also investigates cross-section dependency; Table 2 reports estimate statistics and study results strongly rejected the null hypothesis of cross-section independence at 1% level of significance. It is implying that Capital flow, financial inclusion, and stock market development variables seem to exhibit some dynamics common to all countries.

Table 2. Test for cross-section dependence.

Test	Regression Model	
	FDI/FI/SMD	PI/FI/SMD
LM_{BP} (Breusch and Pagan, 1980)	1247.296***	1328.484***
LM_{PS} (Pesaran, 2004)	85.71036***	100.1189***
LM_{CD} Pesaran (2006)	34.08334***	35.89984***

Notes: ***, **, and * denote a significance of 1%, 5%, and 10%, respectively.

Next steps to investigate the existence of possible cointegration test. Study perform panel cointegration test proposed by Pedroni (2001), Pedroni (1996) and Kao (1999). Table 3 exhibits the results of panel cointegration test. Study findings ascertain the existence of cointegration among variables by rejecting the null hypothesis of “no cointegration” between Capital flow, financial inclusion, and stock market development.

Table 3. Panel Cointegration test.

	FDI/FI/SMD	PI/FI/SM	CF(FDI+PI)/FI/SMD
<i>Pedroni cointegration test</i>			
W_v -Statistic	-3.699(0.999)	-2.664(0.996)	-4.191(0.000)
W_{ρ} -Statistic	-1.588(0.056)	-6.543(0.000)	4.184(0.879)
W_{PP} -Statistic	-3.342(0.000)	-4.486(0.000)	-22.809(0.000)
W_{ADF} -Statistic	-7.852(0.000)	0.984(0.837)	-7.687(0.000)
Panel v -Statistic	-5.376(1.000)	34.325(0.000)	-2.024(1.000)
Panel ρ -Statistic	-3.480(0.000)	-9.226(0.000)	4.104(0.000)
Panel PP-Statistic	-2.234(0.012)	-3.630(0.000)	-25.235(0.000)
Panel ADF-Statistic	7.835(1.000)	-1.052(0.146)	-3.441(0.000)
Group ρ -Statistic	-2.166(0.015)	-9.043(0.000)	6.091(1.000)
Group PP-Statistic	-1.763(0.038)	-7.030(0.000)	-36.971(0.000)
Group ADF-Statistic	10.449(1.000)	4.440(1.000)	-7.258(0.000)
<i>Kao cointegration test</i>	-5.893(0.000)	-13.982(0.000)	-8.605(0.000)

Note: p-values are in parentheses.

Furthermore, the study also performs Durbin-Hausman Panel cointegration test proposed by Westerlund (2008). Durbin-Hausman panel cointegration estimation produce two test statistics, One for panel representing cointegration inference from the panel in general, the null hypothesis for panel inference is $H_0: \rho = 1$; No co – integration and alternative hypothesis $H_0: \rho = \rho < 1$; co – integration . The second test statistic for group inferring for individual variables in the panel. Table 4 represents the results of Durbin-Hausman panel co-integration test. Where DHP represent test statistics for panel and DHG represents the test statistics for group of inferring existence of a cointegration among tested variables in the model.

Table 4. Durbin-Hausman panel co-integration test results.

Dependent variable	Statistics	t-test	p-value
FDI	DH _P	25.234	0.000
	DH _G	11.654	0.000
PI	DH _P	2.231	0.000
	DH _G	1.342	0.000
CF=(FDI+PI)	DH _P	22.511	0.000
	DH _G	17.093	0.000

For panel statistics (DHP), according to Durbin-Hausman test, is statistically significant at 1% of the level of significance in all three-tested model. This finding convincingly rejected the null hypotheses of “no co-integration”. Therefore one can conclude in favor of overall cointegration relationship between financial inclusion, stock market development and capital flow in the economy. For group statistics (DHg), also unveiled the existence of the long-run association.

5.2. Empirical results of the system-GMM dynamic panel

Table 5. Impact of financial inclusion and stock maker development on the capital flow².

Dependent Variable	Δ Capital Flows: Foreign Direct Investment (FDI)				
	OLS [1]	FE [2]	RE [3]	SYS-GMM One step [4]	SYS-GMM Two-step [5]
FDI(-1)	0.021[0.083]***	0.176[0.43]**	0.098[0.232]***	0.122[0.112]***	0.124[0.424]***
FI	0.026[0.055]***	0.264[0.149]***	0.098[0.095]***	0.164[0.01]**	0.103[0.021]***
SMD	0.052[0.075]**	0.344[0.125]***	0.280[0.093]**	0.069[0.07]***	0.080[0.009]**
DCP	0.299[0.376]	0.316[1.088]***	0.874[0.778]	0.177[0.476]**	0.237[0.510]**
Inflation	-0.012[0.137]**	-0.008[0.163]	-0.009[0.143]	-0.003[0.101]**	-0.014[0.669]**
Trade	0.045[0.408]	0.022[0.075]*	0.037[0.782]	0.086[0.403]	0.048[1.187]
Openness					
Constant	-2.143[0.413]***	-0.897[1.393]***	0.233[0.771]***	-1.969[0.485]**	0.251[0.945]***
Hausman (p-value)				0.453	0.334
Observations	970	970	970	528	528
R ²	0.189	0.571	0.343		
AR(1) test, p-value				0.000	0.034
AR(2) test, p-value				0.345	0.412

Note: Standard errors are in parentheses, AR (1) and AR (2) are p-values for first and second order serial correlation tests, respectively. Hansen test is the p-value of instrument relevance. ***, ** and * denote significance at the 1, 5 and 10% level, respectively.

² For foreign direct investment.

In Table 5, we report estimates dynamic system-GMM with one-step and two-step robustness test treating direct investment (capital flows) as the dependent variable in the equation. The study revealed that the two key independent variables in the equation financial inclusion and stock market development positively influence on foreign capital flows and the coefficients are statistically significant at 1% significant level. However, the effect magnitude of financial inclusion is greater than stock market development. On the other hand, from control variable domestic credit to private sector and tread openness is positively linked with the foreign capital flow, as expected.

We also put the effort of assessing any future prediction can draw with the past trend of direct investment from the home economy to the host economy therefore lagged of FDI inserted in the equation in this regard. The coefficient of FDI(-1) (see Table 5) is positive and statistically significant with System-GMM, which is implying that past trend of foreign capital flow determine the future flows of capital from the host country to home country. Study findings indicate that a 1% increase in capital flow (FDI) will result in 0.124% increase of capital in the future.

Table 6. Impact of financial inclusion and stock maker development on the capital flow³.

Dependent Variable	Δ Capital Flows: Portfolio Investment				
	OLS [1]	FE [2]	RE [3]	SYS-GMM One step [4]	SYS-GMM Two step [5]
PI(-1)	0.042[0.08]**	0.176[0.798]***	0.098[0.786]**	0.114[0.07]***	0.102[0.10]**
FI	0.050[0.05]***	0.198[0.007]***	0.122[0.045]***	0.029[0.32]***	0.045[0.05]***
SMD	0.276[0.66]**	0.021[0.57]**	-0.028[0.34]**	0.161[0.13]**	0.314[0.01]***
DCP	0.059[0.25]***	-0.320[0.50]**	-0.261[0.43]**	0.025[0.62]**	0.065[0.01]
Trade	0.853[0.28]	0.647[0.51]	0.606[0.44]	-0.013[0.01]***	-0.023[0.03]*
Openness					
Constant	1.88[0.31]***	-2.08[0.80]***	0.060[0.51]***	1.608[0.02]***	-1.424[0.77]***
Hausman (p-value)				0.675	0.223
No of countries	58	58	58	58	
Observations	970	970	970	528	528
R2	0.271	0.546	0.391		
AR(1) test, p-value				0.002	0.000
AR(2) test, p-value				0.373	0.098

Note: Standard errors are in parentheses, AR (1) and AR (2) are p-values for first and second order serial correlation tests, respectively. Hansen test is the p-value of instrument relevance. ***, ** and * denote significance at the 1, 5 and 10% level, respectively.

³ For portfolio investment.

In Table 6, we further investigating relationship between capital in the form of portfolio investment with financial inclusion and stock market development. Both independent variable namely financial inclusion and stock market development positively influenced on inflows of portfolio investment in the home country. In addition, the coefficients of both variables are also statistically at a 1% level of significance. However, the quantitative magnitude of stock market development is higher than the effect of financial inclusion in the financial system on portfolio investment. Stock market development proxy explained 1% improvement in the capital market could improve in capital flow in the form of equity investment by 0.314%, while 1% improvement in financial inclusion can bring positive change in equity investment by 0.045%.

On the other hand, we put a lagged dependent variable in the equation of divulging the answer to the question did the past trend can use as a predictor for future flows of equity investment. Study findings revealed that the coefficient of lagged PI is positive and statistically significant at 1% level of significance. It implies that, if future foreign equity investment increased by 1% can result in additional equity capital, flows in the home country by 0.10%. Therefore, it is reasonably assumed that past trend can consider as a predictor for future performance forecasting.

Table 7. Impact of financial inclusion and stock maker development on the capital flow.

Dependent Variable	Δ Capital Flows: Aggregate capital flow(FDI+PI)				
	OLS [1]	FE [2]	RE [3]	SYS-GMM One step [4]	SYS-GMM Two step [5]
CF(-1)	0.054[0.098]**	0.189[0.867]***	0.078[0.548]***	0.112[0.65]***	0.152[0.65]**
FI	0.034[0.72]***	0.105[0.77]***	0.144[0.94]***	0.036[0.72]***	0.075[0.41]**
SMD	0.071[0.41]***	0.137[0.32]**	0.078[0.33]***	0.132[0.42]**	0.114[0.21]***
FD	0.098[0.55]**	0.085[0.51]**	-0.029[0.43]	0.071[0.77]**	0.065[0.25]*
Trade Openness	-0.029[0.28]	0.647[0.31]**	0.096[0.61]**	0.013[0.551]	0.034[0.73]***
Constant	5.051[0.51]***	4.891[0.97]***	0.060[0.331]***	5.608[1.09]***	-
Hausman (p-value)				0.723	0.332
No of countries	58	58	58	58	
Observations	970	970	970	528	528
R2	0.375	0.634	0.452		
AR(1) test, p-value				0.000	0.000
AR(2) test, p-value				0.239	0.198

Note: Standard errors are in parentheses, AR (1) and AR (2) are p-values for first and second order serial correlation tests, respectively. Hansen test is the p-value of instrument relevance. ***, ** and * denote significance at the 1, 5 and 10% level, respectively.

Table 7 reports the panel regression estimation where aggregated capital flow considered as a dependent variable in the equation. We represent estimation based on OLS in column [1], the Fixed effect in column [2], Random effect in column [3], and dynamic System-GMM in column [4] for step one estimation and in column [5] for two-step estimation, respectively. In columns [1] to [3] OLS based estimation, the effects of financial inclusion and stock market development are positive

towards capital flow during the studied period. The coefficients magnitude of financial inclusion and stock market development are also statistically significant at 1% level of significance.

Moving to column [4] and [5] estimation based on system-GMM, it is obvious from the estimation that the effects of financial inclusion and stock market development on capital flows in the economy are continued to positive trend. These findings implying that any further development in financial inclusion and stock market performance can positively attract greater capital flows from foreign investors. However, the coefficients elasticity is less in comparison to OLS based estimations.

Empirical findings suggests that countries can attract foreign capital flow in the economy in either foreign direct investment or/and portfolio investment with ensuring greater extension of financial services availability and easy accesses to financial benefits from financial institutions in the financial system, furthermore, efficient and effective capital market also can contribute key role of encouraging equity investment. Second, the coefficient of the lagged dependent variable is positive and statistically significant at 1% level of significance. It is implying that past capital flow trend can be used as a future predictor.

The AR (1) test of no first-order serial correlation in the first-differenced residuals is rejected as expected at the 1% level. The AR (2) test of no-second order serial correlation in the first-differenced residuals is not rejected, however. The Hansen test of instrument relevance together with the serial correlation tests suggest that the system-GMM is correctly specified.

5.3. Symmetry and Asymmetry test: GMM estimation

In the section, study performs an empirical investigation with symmetry and asymmetry pass through from financial inclusion and stock market development to capital flows in system GMM estimation with considering of additional two sets of variable constructing in Equation 3 and Equation 4. Table 8 reports a new system—GMM estimation and optimal lag is determined based on SIC. Panel-A represents long-run coefficients along with Wald test statistics for the null hypothesis of long-run symmetry. Panel-B reports short-run coefficients along with Wald test statistics for the null hypothesis of short-run symmetry.

It is obvious from Wald test statistics for ascertaining the pattern of relationship either symmetry or asymmetry. The null hypothesis of both short-run and long-run symmetry is rejected at 1% level of significance. Finding suggests a strong impact on foreign capital flows in the developing economy from financial inclusion and stock market development. Furthermore, both AR (2) and sara test statistics is insignificant at 1% level of significance, which is implying that the GMM model specification with valid instruments.

Table 8. GMM estimation for symmetry and asymmetry tests (The effect of the real exchange rate on remittances).

	Dependent variable: FDI		Dependent variable: PI		Dependent variable: CF	
	Coefficients	p-value	Coefficients	p-value	Coefficients	p-value
<i>Panel-A: long-run</i>						
SMD ⁺	0.171	0.0023	0.227	0.004	0.114	0.000
SMD ⁻	-0.078	0.0118	-0.133	0.003	-0.088	0.000
FI ⁺	0.268	0.0232	0.296	0.001	0.094	0.000
FI ⁻	-0.041	0.1464	-0.237	0.021	0.011	0.009
W _{LR(SMD)}	59.667	0.000	28.925	0.000	15.362	0.000
W _{LR(FI)}	26.478	0.000	11.261	0.000	12.991	0.002
<i>Panel -B: short-run</i>						
FDI (-1)	0.169	0.000	-	-	-	-
PI (-1)	-	-	-0.132	0.000	-	-
CF (-1)	-	-	-	-	0.025	0.002
SMD ⁺ (-1)	0.0179	0.002	0.257	0.169	0.015	0.010
SMD ⁻ (-1)	-0.022	0.001	0.054	0.946	-0.018	0.012
FI ⁺ (-1)	0.056	0.987	0.093	0.000	0.026	0.000
FI ⁻ (-1)	-0.021	0.000	-0.002	0.883	-0.007	0.101
W _{SR(SMD)}	18.442	0.000	36.921	0.000	19.131	0.000
W _{SR(FI)}	33.657	0.000	12.197	0.000	21.478	0.000
Speed of adjustment	0.534	-	0.562	-	0.791	-
Sargan	23.763	0.332	33.982	0.765	34.617	0.776
AR(2)	-1.412	0.315	-1.092	0.221	-2.091	0.332

5.4. Robustness check

While confirming robustness in System—GMM, the study also performs pooled OLS and Fixed effect regression as documented in empirical literature (Bond, 2002). The coefficient of lagged dependent variable, according to Bond (2002), lies between the estimation outcome from pooled OLS and Fixed effect provide another direction towards robustness in applying system—GMM. From Table 5, 6, and 7, it is observed that the lagged coefficient of dependent variable lies between pooled OLS and Fixed Effect estimation (FDI = 0.021 < 0.124 < 0.176; PI = 0.042 < 0.102 < 0.176; 0.054 < 0.152 < 0.189]

5.5. Dumitrescu and Hurlin (2012) panel causality test

In order to specify the directional relationship, we used panel causality test proposed by Dumitrescu and Hurlin (2012). Based on the proxy of the dependent variable, in this study, we perform three causality test, Tale 8 to Table10 represents the results of the causality test.

Table 9 represents the results of the causality test when foreign direct investment (FDI) considered as a proxy of capital flow in the model. Study findings unveiled bidirectional causality between financial inclusion and FID [FI←→FDI] and stock market development [SMD←→FDI] by

rejecting the null hypothesis at a 1% level of significance. Findings suggest both financial inclusion and stock market development immensely important for attracting foreign direct investment.

Table 9. Causality test results (dependent variable as FDI).

Null Hypothesis	W-Stat.	Zbar-Stat.	Prob.						
FI \rightarrow FDI	2.622	0.972	0.009**						
FDI \rightarrow FI	4.023	3.419	0.000**						
SMD \rightarrow FDI	0.839	-2.146	0.031*						
FDI \rightarrow SMD	0.432	-2.852	0.254	Summary					
FD \rightarrow FDI	1.970	-0.112	0.910						
FDI \rightarrow FD	2.520	0.885	0.375						
TO \rightarrow FDI	1.692	-0.615	0.538	FDI	0	\rightarrow	0	0	0
FDI \rightarrow TO	1.977	-0.099	0.000**	FI	\rightarrow	0	\rightarrow	\rightarrow	0
SMD \rightarrow FI	3.003	1.164	0.244	SMD	\rightarrow	0	0	0	0
FI \rightarrow SMD	4.347	3.097	0.002**	FD	0	0	0	0	\rightarrow
FD \rightarrow FI	3.316	2.172	0.329	TO	\rightarrow	0	0	0	0
FI \rightarrow FD	4.831	4.810	0.006**						
SMD \rightarrow TO	3.008	1.596	0.114						
TO \rightarrow SMD	2.220	0.244	0.807	Where \rightarrow implies that there is significant causality running from the row-variables to the column-variables and 0 implies that there is no significant causality running from the row-variables to the column-variables.					
TO \rightarrow FI	3.522	2.508	0.121						
FI \rightarrow TO	4.118	3.539	0.223						
FD \rightarrow SMD	1.937	-0.240	0.810						
SMD \rightarrow FD	2.115	0.069	0.944						
TO \rightarrow FD	0.627	-2.546	0.010*						
FD \rightarrow TO	0.764	-2.297	0.021*						

Table 10 reports the results of causality estimation when capital flow proxy by portfolio investment in the equation. Study findings disclosed foreign portfolio investment influence by financial inclusion and stock market development. This finding suggests that having effective and efficient capital market does play an important role in encouraging foreign investors toward future investment in the stock market. On the other hand, financial inclusions signify the greater extension of financial services in the financial system along with easy access to financial benefits, at large. The study also observed that the effect of foreign portfolio investment on stock market development is noticeable. It is implying that foreign investment in the stock market creates pressure towards maintaining accountability and functionality, thus assists in stock market development as a whole.

Table 11 exhibits the causality test results by treating capital flow as a whole by bringing both proxies previously used in different equation estimation. Study findings unveiled bidirectional causality between stock market development and capital flows in the economy. It is implying that well development stock market does play an important role in attracting foreign investors and simultaneously foreign capital flows also play a catalyst role in continuous development in the capital market. The study also observed unidirectional causality from financial inclusion to capital flows. Finding suggests that financial services available in the financial system can boost future capital from froing investors into the home country in either form.

Table 10. Causality test results (dependent variable as portfolio investment).

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.	Summary					
SMD \nrightarrow FI	3.008	1.164	0.244						
FI \nrightarrow SMD	4.347	3.097	0.000**						
FD \nrightarrow FI	3.316	2.172	0.028*						
FI \nrightarrow FD	4.831	4.810	0.000**						
TO \nrightarrow FI	3.522	2.508	0.511						
FI \nrightarrow TO	4.118	3.539	0.983	PI	0	0	\rightarrow	0	0
PI \nrightarrow FI	1.103	-1.401	0.458	FI	\rightarrow	0	\rightarrow	\rightarrow	0
FI \nrightarrow PI	3.561	1.717	0.008**	SMD	\rightarrow	0	0	0	0
FD \nrightarrow SMD	1.937	-0.240	0.811	FD	0	\rightarrow	0	0	\rightarrow
SMD \nrightarrow FD	2.115	0.069	0.944	TO	0	\rightarrow	0	0	0
TO \nrightarrow SMD	1.588	-0.846	0.397						
SMD \nrightarrow TO	1.629	-0.774	0.438						
PI \nrightarrow SMD	2.055	-0.033	0.000**						
SMD \nrightarrow PI	2.573	0.867	0.005**						
TO \nrightarrow FD	0.627	-2.546	0.410						
FD \nrightarrow TO	0.764	-2.297	0.021*						
PI \nrightarrow FD	2.347	0.474	0.635						
FD \nrightarrow PI	1.139	-1.626	0.104						
PI \nrightarrow TO	1.823	-0.436	0.662						
TO \nrightarrow PI	1.010	-1.847	0.004**						

Where \rightarrow implies that there is significant causality running from the row-variables to the column-variables and 0 implies that there is no significant causality running from the row-variables to the column-variables

Table 11. Causality test results (dependent variable as Capital Flows).

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.	Summary					
FI \nrightarrow CF	1.126	0.085	0.031*						
CF \nrightarrow FI	1.428	0.752	0.451						
TO \nrightarrow CF	0.335	-1.737	0.002**						
CF \nrightarrow TO	0.246	-1.957	0.000**						
FD \nrightarrow CF	0.612	-1.055	0.291						
CF \nrightarrow FD	0.252	-1.943	0.001**						
SMD \nrightarrow CF	0.378	-1.634	0.002**	CF	0	0	\rightarrow	\rightarrow	\rightarrow
CF \nrightarrow SMD	1.093	0.142	0.006**	FI	\rightarrow	0	0	\rightarrow	0
TO \nrightarrow FI	1.627	1.483	0.137	SMD	\rightarrow	0	0	\rightarrow	\rightarrow
FI \nrightarrow TO	2.875	4.595	0.456	FD	0	0	0	0	0
FD \nrightarrow FI	1.412	0.954	0.340	TO	\rightarrow	0	0	0	0
FI \nrightarrow FD	3.615	6.461	0.000**						
SMD \nrightarrow FI	0.617	-1.050	0.293						
FI \nrightarrow SMD	0.600	-1.088	0.276						
FD \nrightarrow TO	0.235	-2.009	0.344						
TO \nrightarrow FD	0.162	-2.198	0.227						
SMD \nrightarrow TO	0.095	-2.335	0.019*						
TO \nrightarrow SMD	0.926	-0.271	0.786						
SMD \nrightarrow FD	0.113	-2.29291	0.321*						
FD \nrightarrow SMD	1.029	-0.01459	0.988						

Where \rightarrow implies that there is significant causality running from the row-variables to the column-variables and 0 implies that there is no significant causality running from the row-variables to the column-variables

6. Concluding remarks and policy implications

Foreign capital flow becomes a critical factor in sustainable economic development, particularly in developing countries. With this study, we examined financial factors behavioral impact namely, financial inclusion and stock market development on foreign capital flows in the economy by applying dynamic panel system-GMM estimation proposed by Blundell and Bond (1998). Study finding revealed positive movement with financial sector improvement and foreign capital flows during the period 1993–2017. Financial inclusion act as an incentive for foreign investors who are likely to invest in direct forms like in the production and infrastructural development. Furthermore, the study observed, well-developed stock market encourage foreign equity investment, implying that stock market efficiency attracts portfolio investment. By sum, the study revealed that stock market development encourages cross-broader capital flows. These findings in line with Sen Gupta and Atri (2018). The study also investigates the nature of relationship either symmetry or asymmetry between financial inclusion, stock market development, and foreign capital flows by incorporating positive and negative shock in the model. Empirical investigation ascertains the asymmetric relationship between financial inclusion, stock market development, and foreign capital flows. Findings suggest financial inclusion and stock market development in the short-run and long-run impact on foreign capital flows is strong and obvious.

In order to unveil directional causality, a study performed panel non-causality test proposed by Dumitrescu and Hurlin (2012). Study finding disclosed, in the short-run, bidirectional causality between stock market development and foreign capital and unidirectional causality from financial inclusion to foreign capital flows. It is implying that further improvement in financial inclusion and stock market development can cause continual inflows of foreign capital flows. Therefore, government and regulatory authorities should put considerable attention on financial sector development and simultaneously formulate financial policy

Study findings unveiled new insights in regards to the pattern of the relationship between financial inclusion, stock market development, and cross-broader capital flows by incorporating both positive and negative shock in the equation. First, it is observed positive shock in Stock market development (SMD⁺) positively linked to Foreign Direct Investment, Foreign portfolio investment (PI), and cross-broader capital flows (see, Table 8). Study findings suggest 1% increase in positive shock in stock market development will increase inflows of long-term investment in the form FDI by 0.17% and 0.22% of equity investment in the for portfolio investment. The magnetite of positive shock in stock market development is higher in attracting forewing portfolio investment. On the other hand, the negative shock in stock market development (SMD⁻) positively linked with FDI inflows, and portfolio investments. Study finding suggests with 1% increase in negative shock stock market development might discourage foreign investment in the form of long-term investment (FDI) by 0.078% and equity investment in form of foreign portfolio by 0.133%, respectively. Likewise, positive shock in stock market development, negative shock in stock market development impact is obvious on foreign portfolio investment. In the short run, positive shock in stock market development (SMD⁺) positively linked with foreign direct investment and foreign portfolio investment. However, the shock magnitude is higher in foreign portfolio investment, the finding suggests 1% increase in positive shock in stock market development will increase foreign capital flows in the form of equity investment by 0.257%. On the other hand, the negative shock of stock market development negatively linked to inflows of FDI and positively linked with portfolio investment. Findings suggest, decrease of negative shock in stock

market development increase long-term investing in the form of FID and decrease foreign investment in portfolio by 0.022% and 0.54%, respectively.

Second, the positive and negative shocks in financial inclusion in the long run positively linked with inflows of foreign direct investment and foreign portfolio investment. Study finding explained that a 1% increase in positive shock in financial inclusion (FI^+) could attract foreign investors with increase of FID by 0.268% and foreign portfolio by 0.296%. Furthermore, 1% increases of negative shock in financial inclusion increase inflows of FDI by 0.041% and foreign portfolio by 0.237%, respectively. In the short run, positive shock in financial inclusion (FI^+) is positively linked within inflows of FDI and foreign portfolio investment and the negative shock in financial inclusion (FI^-) negatively linked to the inflows foreign direct investment and foreign portfolio investment.

The importance of foreign capital flows immensely appreciated in developing countries and therefore, the key macro-economic variables in the economy should be well and efficiently performed. On policy aspects, maintaining the continuous inflows of cross-broader capital in the form of FDI and portfolio investment by attracting foreign investors in developing countries. It is imperative to confirm well-balanced financial development with financial efficiency. From empirical findings by addressing positive and negative shocks in stock market development and in financial inclusion confirmed that stock market development and financial inclusion behave indifferently with the changes in stock market development and financial inclusions in the economy. One key aspect unveiled from study findings that positive shock in stock market development and financial inclusion influence positive development in foreign inflows in the form of FDI and portfolios. Therefore, the financial development program should put more emphasis on financial inclusion through easy access and affordable cost for availing financial services and effective regulatory policy formulation and implementation for capital market development with a well-structured framework.

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Conflict of interest

We, hereby, declaring that no support from any organization for the submitted work; no financial relationships with any organizations that might have an interest in the submitted work; no other relationships or activities that could appear to have influenced the submitted work.

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