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# Do capital inflows affect domestic bank credit? Empirical evidence from India

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## Abstract

This paper studies multivariate dynamic analysis of capital inflows in relation with domestic bank's credit which has not been investigated earlier adequately in the context of Indian economy. Using autoregressive distributed lag (ARDL) model, we find the existence of co-integration over the period 1991 Q3 to 2022 Q1. The long-run ARDL regression model results show net equity inflows, i.e. net foreign direct investment, and net non-equity inflows, i.e. foreign loan, are significant to influence domestic bank credit. Result also reveals that depreciation of exchange rate and current account (trade) deficit increase bank credit. Outcome of this research contributes significantly to frame effective monetary policy in the Indian context.

**Keywords** Capital inflows, Domestic bank credit, ARDL model, Co-integration, India

**JEL Classification** E510, F330

## Introduction

Mounting deficit coupled with high inflation and gulf war led India to balance of payment crisis in the first half of 1991. At that time, official reserves of foreign exchange were just enough to finance fortnight imports. Lowered credit ratings, reduced foreign remittances, restricted external commercial borrowings and flight of non-resident Indians-(NRI) deposits (on account of expected exchange rate devaluation) forced the then finance minister to advocate for instant liberalization. Eventually, with liberalization in July 1991, India integrated with the rest of the world. The opening of the economy particularly financial sector created a conducive environment for foreign investment. The favourable result was advanced technology, participation in global trade, international competition, flexible exchange rate and rise in capital inflows. All the aforementioned factors led to high rate

of economic growth in India, but at the same time, the opening of the economy created external imbalances. However, the surge in capital inflows mitigated domestic credit gap to a large extent. Most of the developing countries including India went for structural adjustment which was put forward by International Monetary Fund (IMF) in 1990s [17]. The translation of foreign liabilities (capital inflows) into the domestic assets (credit) depends on the extent of economic integration. The liberalized norms, capital inflows and deregulation of the banking sector creates a conducive environment for the translation of capital inflows into domestic credit. Traditionally, there are two ways of relationship between capital inflows and domestic credit. First is direct method, which is domestic bank issuing bond in the international capital markets and holding assets of the foreign firms, even the large corporates also issue international bond and engage in external commercial borrowing. Second is indirect method, which is surge in capital inflows by the opening of the economy and intermediation through the domestic banking sector translating into domestic credit and also effecting macroeconomic variables of the domestic economy [17]. Thus, the impact of capital inflows on domestic variable including credit depends

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upon absorbing capacity of the economy [24]. Large capital inflows have significant effect on the economic growth and stability [9], [7]. Large body of research suggests that capital inflows leads to financial development and higher economic growth [9, 26, 27], investment in tradable goods and efficiency in domestic banking [9, 23] and instability in current account deficit [17], assets price boom [11], increase in monetary base [10], and exchange rate appreciation (Robin, 2014). The advanced countries were struggling with massive public and private debt and expansionary monetary policy resulted in 2008 financial crisis but large emerging economies is unaffected during the financial crisis in terms of capital inflows [2, 3, 9, 19]. Therefore, there is withdrawal of the capital from the advanced countries (push factor) and getting it invested in the developing countries (pull factor) [19]. In these circumstances, large emerging countries including India who faced the surge in capital inflows integrated with the rest of the world leading to eventual growth in domestic credit.

This paper aims at investigating the linkages between various components of capital inflows and domestic bank credit in case of India. The rest of the paper is organized as follows. Second section discusses the theoretical and policy relation between capital inflows and domestic credit along and presents review of related literature. Third section explains the data sources and methodology. Fourth section presents the empirical results and discussions. Final section concludes along with future scope of research.

### **Theoretical and policy relationship between capital inflows and domestic credit in India**

The theory explains that capital inflows have two impacts: one is increase in the foreign liabilities in bank's balance sheet [16, 17, 24], and second is rise in domestic private credit [16, 17]. However, the impact of net inflows was offset by policy intervention by the monetary authority through two ways. First is maintaining the same or less current account deficit means that capital inflows equivalent to same or more capital outflows and second Central Bank practised the sterilized intervention in the foreign exchange market [16].

Capital inflows cause rise in the domestic money supply through the accumulation of the foreign currency. Higher capital inflows in the domestic economy mean higher supply of foreign currency. The central bank buys excess foreign currency in exchange for domestic currency, and this leads to increase in the monetary base of the domestic economy to avoid appreciation or to maintain fixed exchange rate. This is called non-sterilized intervention. Whenever there is no policy intervention by the central bank to sterilize the capital inflows through open market

operation, capital inflows will not alter monetary base, but there will be appreciation in the exchange rate [14, 15]. Hence, in India managed float exchange rate means that increase in the money supply reduces cost of borrowing and will lead to increase in the domestic credit.

The Economic reforms took place in 1991 including Banking sector and Balance of Capital Account. To promote diversified, efficient and competitive financial sector, the financial sector reforms was initiated by P.V Narasimha Rao Government in early 1991. The reforms were not only the nationalization of banks, but at the same time giving the same treatment of public and private sector bank, reduction in cash reserve ratio at four per cent (15 per cent in 1991) and reduction in statutory liquidity ratio at 23 per cent (38.5 per cent in 1991). Foreign bank opens our branches and subsidiaries in India. Domestic bank not only facilitates trade finance but also extends to new method and product such as merchant banking, underwriting, retail banking and mutual funds with the joint venture of the foreign banks. Foreign direct investment and foreign investment inflows allowed up to 74 per cent in private banks. Public sector banks listing on stock exchange market and participate in the business of the capital market for augmenting equity.

There have also been reforms in the Capital Account like "The High-Level Committee on Balance of Payments" led by Rangarajan in 1991. The committee identified inappropriate exchange rate, unsustainable current account and an increase in the short-term loan in relation to official reserve, which caused 1991 crisis. Thus, the committee recommended on the market-determined exchange rate and adopted Liberalized Exchange Rate Management System in March 1992. The liberalized exchange rate management system based on dual exchange rate regime (a combination of fixed and flexible) was adopted specifically to check deterioration of foreign reserves. Finally, in March 1993 country adopted market-determined flexible exchange rate. It was a step towards current account convertibility, shift from debt to non-debt or equity (FDI, FPI); strict regulation in external commercial borrowings, short-term debt, and NRI's deposit. NRI's deposit regulated through specification of interest rate ceilings and maturity requirement also. The FDI was allowed through dual route: first one is automatic, and second one is discretionary. The automatic route was enlarged in the entire sector, and FPI was allowed to be channelized by the institutional investor.

Committee on Capital Account Convertibility (Tara-pore, 1997) recommended phased liberalization of capital account, in 2000, to meet the requirement of fiscal consolidation, lower inflation and stronger financial system. The composition of capital inflows in the pre-reform period was official and private debt, whereas in

the post-reform period it was changed into non-debt (FDI, FPI) and debt [22]. As a policy tool, the economy was liberalized and privatized even in the banking sector and this paves the way to study the relationship between capital inflows and domestic credit in the present open economic scenario.

### Review of literature

The relationship between capital inflows and domestic credit is studied in open macro-economy. The capital inflows are foreign liabilities and are transformed into domestic credit (assets) via the central bank of the country. The empirical literature upon this can be found only after globalization. Lane and McQuade [17] investigated the relationship between international capital inflows and domestic credit in 54 countries from 1992 to 2008 and found that debt inflows affect credit but not the equity inflows. Similar result was found by Lotto [18] on Tanzania economy, which shows debt inflows affect credit but not the equity inflows and current account deficit. Furthermore, domestic credit leads to the rise in current account deficit and credit to GDP ratio. Igan & Tan [13] extended the study to disaggregate corporate credit and household credit by using panel data from 33 countries from 1980 to 2011. The result shows that FPI and other inflows affect household credit but not FDI, and on the other hand, other inflows and FDI affect corporate credit. Furthermore, flexible exchange rate regime reduces corporate credit. FDI is significant in the bank-based economy. [28] extended the research by using GMM model on 26 advanced countries for the period 1999 to 2011. They found that loan allocation for business credit reduces, but household credit rises. Capital inflows lead to rise in credit allocation that result into high credit-to-GDP ratio. The current account surplus and deregulation in interest rate reduce capital inflows. FDI, inflation and interest rate do not affect credit. Furceri et al. [9] studied 112 developed and emerging countries during 1970 to 2007. They found that debt inflows increase credit but not FDI and FPI. They also found capital inflows increase credit in short run but reduces in medium term, and flexible exchange rate regime reduces capital inflows. Magud et al. [19] investigates on 5 Asian, 13 European, 7 Latin countries from 1990 to 2002 and empirics found that capital inflows surge in inflexible exchange rate regime. Peg exchange rate increases capital inflows, which resulted into credit expansion. Raghavan et al. [20] studied on Australian economy through SVAR model from 1989 to 2008. The result shows that portfolio and credit shocks lead to exchange

rate appreciation and higher GDP, and debt inflows impact to higher GDP.

### Rationale of study

The earlier studies in this context are largely based on advanced countries that use panel data analysis. Although there are very few studies which analyse the relationship between capital flows and domestic credit for single country, by using time series data, such as Tanzania and Australia, none of them distinguishes between short-run and long-run effects of capital inflows on domestic credit. The present study is an attempt to fill this gap. Furthermore, a lot of structural changes in Indian financial market took place since 1991, of which most important are deregulation and entry of new investors in the market. Hence, the chosen time period for the study is post-reform period that incorporates the structural changes mentioned above. Finally, there are different components of capital inflows (FDI, FPI, foreign loan) which may have effect on domestic credit. Hence, this study looks at the effect of all the components of capital inflows on domestic credit in case of one of the emerging Asian countries—India.

### Data and methodology

The quarterly data are used for the period 1991 Q3 to 2022 Q1. The variables in the regression model are capital inflows disaggregated into foreign direct investment (FDI), foreign portfolio investment (FPI) and foreign loan. FDI has equity, reinvestment earning and other capital. FPI has Foreign Institutional Investment and Global Deposit Reserve/American Deposit Reserve. The foreign loan includes external commercial borrowing (ECB) and short-term borrowing in India. Current account balance (CAB) consists of trade of goods and services. In India, CAB remains negative (current account deficit) most of the time. Real effective exchange rate (REER) index is 36 countries trade-based weight of exchange rate with base year 2004–05. The decrease in exchange rate index means depreciation of Indian currency (Rupee). All data are obtained from Reserve Bank of India's database except bank credit which is sourced from Bank of International Settlements' database.

All the variables are transformed into natural logarithms form and then differenced once to reduce heteroskedasticity and coefficient is interpreted as elasticity. The time series data is either stationary or integrated of order one  $I(1)$ . To test the unit root (non-stationary) we employ (augmented Dickey–Fuller) ADF, Phillips–Perron (PP) and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test where our main concern is that none of the underlying variables should be  $I(2)$ . Furthermore,

to investigate the co-integrated relationship among the variables we employ ARDL regression model because the model in question takes into account stationary as well non-stationary data series. Besides, it also estimates short-run and long-run relationship simultaneously. Finally, the casualty test in Granger sense is used to check the direction of causality among the variable.

The hypothesized relationship is expressed in natural logarithmic form are as follows:

$$\ln Bcredit = \beta_1 \ln FDI + \beta_2 \ln FPI + \beta_3 \ln Loan + \beta_4 \ln REER + \beta_5 \ln CAB + \varepsilon_t \tag{1}$$

where Bcredit is bank credit and  $\varepsilon_t$  the error term in long-run regression. The capital inflows (FDI, FPI and loan) is our variable of interest and other variables are control variables in the model. ARDL model takes care of the possible endogeneity problem in the model.

ARDL model specification in unrestricted error-correction form:

$$\begin{aligned} \Delta \ln Bankcredit_t &= c + \sum_{i=1}^{n1} \beta_i \Delta \ln Bankcredit_{t-1} + \sum_{i=1}^{n1} \beta_i \Delta \ln FDI_{t-1} \\ &+ \sum_{i=1}^{n1} \beta_i \Delta \ln FPI_{t-1} + \sum_{i=1}^{n1} \beta_i \Delta \ln Loan_{t-1} \\ &+ \sum_{i=1}^{n1} \beta_i \Delta \ln REER_{t-1} + \sum_{i=1}^{n1} \beta_i \Delta \ln CAB_{t-1} \\ &+ \Delta(\ln Bankcredit_{t-1} - \sigma_0 \ln FDI_{t-1} \\ &- \sigma_2 \ln FPI_{t-1} - \sigma_3 \ln Loan_{t-1} \\ &- \sigma_4 \ln REER_{t-1} - \sigma_5 \ln CAB_{t-1}) + \nu_t \end{aligned} \tag{2}$$

where  $\nu_t$  is the error term in short-run regression.  $\alpha$  is error corrected term. In this equation, the short-run variable is in the first difference and the long-run variable is one quarter lag. To estimate short-run coefficient, the optimal lag is selected which is based on Schwarz Information Criterion which gives least residual value.

To test the co-integration, the bound test (F-statistics) checks for the significance of the joint coefficient of lag variables. If the coefficient is significant, there is long-run relationship which means that we reject null hypothesis  $H_0 = \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = 0$ . In this case, estimated F statistics is greater than upper bound critical value indicating that there exists a long-run relationship among the variables.

Finally, the diagnostic and stability tests were employed to diagnose the reliability and appropriateness of the model which are LM test for autocorrelation,

Harvey test for heteroscedasticity, CUSUM test for residual stability and Hansen test for the stability of parameter over time.

### Empirical results and discussions

The empirical result starts with identification of stationary process through unit root test and then estimation of regression equation through autoregressive distributed lag model (ARDL).

To check stationary process augmented Dickey–Fuller (ADF), ADF with structural break (ADF-S), Phillips–Perron (PP) test, Kwiatkowski–Phillips–Schmidt–Shin (KPSS) are applied (Table 1). The null hypothesis of augmented Dickey–Fuller, augmented Dickey–Fuller with structural break, Phillips–Perron test which are data series has unit root (non-stationary), and we reject the null at different significance levels (1%, 5% and 10%), but null hypothesis of KPSS that is data series is stationary and we accept the null at different significance levels (1%, 5% and 10%).

Table 1 indicates that bank credit is difference stationary either at 10% significance level in ADF test and at 5% in PP test, ADF with structural break test and KPSS test. The net FPI, net foreign loan and current account balance are level stationary at 1% significance level in all fours used unit root tests. The net FDI is stationary either at 10% significance in ADF test and at 1% significance level in ADF with structural break and PP test. Lastly, real effective exchange rate index is level stationary at 5% significance level in ADF test and at 10% in PP, ADF with structural break test and KPSS test.

The results of all the unit root tests (Table 1) reveal that the selected variables are a mix of I(0) and I(1) and no I(2) confirming the appropriateness of the employed ARDL model. Bank credit which is dependent variable is having structural break at 2003 in fourth quarter (Q4). ARDL model also takes into account of endogeneity among variables as well as distinguish between short run and long run. The bound test in Table 2 indicates that the estimated F-statistic exceeds upper bound critical value means that we reject the null (no co-integration), vector at 1% significance level. Therefore, it confirms that bank credit growth holds the long-run relationship with all the stated variables.

The next step is to estimate long-run relationship, short-run dynamics and co-integrating vector. Table 3 represents short-run and long-run results. The optimal lag selected through Schwarz information criteria (SIC), which is two for dependent variables (bank credit) and zero for all independent variables.

The long-run coefficients in Table 3 are more or less similar to short-run equation. The FDI (physical

**Table 1** Unit root test for stationary process. *Source:* Authors' calculation

Variables	ADF		ADF-S		PP		KPSS	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
LnBcredit	- 1.390 (- 1.579)	- 2.606* (- 2.579)	- 3.783 (- 4.193)	- 4.562** (- 4.193)	- 1.686 (- 2.579)	- 2.606* (- 2.579)	1.331 (0.347)	0.417** 0.463
LnFDI	- 3.213* (- 3.148)	-	- 16.765*** (- 4.607)	-	- 5.942*** (- 3.148)	-	0.233 (0.216)	0.116* (0.119)
LnFPI	- 7.680*** (-2.579)	-	- 10.385*** (-4.193)	-	- 7.285*** (-2.579)	-	0.208* (0.347)	-
LnLoan	- 6.929*** (- 2.579)	-	-7.581*** (- 4.193)	-	- 7.085*** (- 2.579)	-	0.353** (0.463)	-
LnCAB	- 7.339*** (-3.148)	-	- 10.181*** (- 4.193)	-	- 7.470 (- 3.148)	-	0.068*** (0.119)	-
LnREER	- 3.652** (- 3.148)	-	- 4.703* (- 4.607)	-	- 3.555** (- 3.148)	-	0.097* (0.119)	-

\*\*\*, \*\* and \* indicate data series are stationary at 1%, 5% and 10% significance level, respectively, and ADF-S denotes the ADF with structural break

**Table 2** Bounds test for long-run co-integration. *Source:* Authors' Calculation

Bound test	CV at 1%		CV at 5%		CV at 10%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
<b>F-Statistics = 16.68</b>						
	3.06	4.15	2.7	3.73	2.08	3.00

Computed F-statistic (Wald test) = 16.68. Pesaran et al. (2001) are used for the critical values (CV)

**Table 3** Estimated results. *Source:* Authors' preparation

Long-run estimation		Short-run estimation	
Variables	Coefficients	Variables	Coefficients
LnFDI	0.680*** (0.120)	D(LnBcredit)-1)	- 0.230** (0.089)
LnFPI	0.088 (0.210)	D(LnFDI)	0.008 (0.005)
LnLoan	1.822** (0.798)	D(LnFPI)	0.001 (0.003)
LnREER	- 2.678** (0.109)	D(LnLoan)	0.029*** (0.007)
LnCAB	0.217 (0.274)	D(LnREER)	- 0.094** (0.045)
Constant	- 0.478 (10.382)	D(LnCAB)	0.009** (0.004)
		ECT (-1)	- 0.015*** (0.001)

\*\*\*, \*\* and \* indicate data series are stationary at 1%, 5% and 10% significance level, respectively, and standard errors are in parenthesis

investment) and foreign loan increase bank credit by 68% and 182%, respectively. Theoretically, capital inflows into the domestic economy lead to appreciation in the exchange rate, but the case is not true for India because the fixed exchange rate (managed float exchange rate)

regime is following since 1991 reforms. In order to maintain manage float exchange rate, RBI intervenes in the foreign exchange market to sterilized capital inflows, but this sterilized intervention is partial (Gupta & Sen-gupta [12]) which leads to increase in the liquidity in the domestic economy. The increased liquidity in turn raises domestic bank credit in the country. The decrease in exchange rate will increase bank credit by 267%. The plausible reason is depreciation in exchange rate make import from India to foreign nation cheaper. That leads to more import from India, and this increase of Indian export requires more production and that can be meet through high bank credit in long run.

The short-run result indicates that lag bank credit reduces bank credit by 23%. The plausible explanation is the previous period bank credit may not be guaranteed in subsequent period because pervious credit is not obtained by bank. In other words, bank credit is assets of bank when assets are not realized (non-performing), then bank is reluctant to issue more credit in subsequent period. The coefficients of net FDI and net FPI are found statistically insignificant, but net foreign loan has positive and significant effect on bank credit by 2% in short run. The reason is that FDI and FPI are not easily transmitted for credit, but loan (foreign)

comes India can easily obtain for credit in short run. The decrease in exchange rate will increase bank credit by 9% in short. The current account balance which is almost negative means that is current account (trade) deficit. This trade deficit also increases bank credit. The reason will be payment of high import bill may be financed through bank credit in short run. The co-integrating coefficient of short-run equation is negatively significant. It indicates short-run error is corrected by 1%, and this speed of convergence is very slow.

The unit root test (ADF with structural break) identifies bank credit has structural break/change on 2003Q4. The graph of bank credit also shows that bank credit rising with increasing rate from 2003-(Q4) onwards (see Appendix). Bank credit with structural change is only our consideration because it is the only variable which is integrated of order 1 (non-stationary) and also dependent variable. Hence, dummy is introduced; it takes value of 1 after 2003-(Q4) and 0 before 2003-(Q4). The dummy and deterministic trend are incorporated in the ARDL model. Before estimating the long-run and short-run estimates, first we test the existence of co-integration by using bounds test.

Table 4 reveals that the estimated F statistic exceeds upper bound critical value means that we reject the null no co-integration vector at 1% significance level. Bank credit holds the long-run relationship with all the variables including dummy for structural change. The SIC for lag selection remain same even including the dummy variable in ARDL model. The results reported in Table 5 reveal that the results based on ARDL model of Table 3 remain same in terms of sign and magnitude of causality of bank credit to independent variables (lag bank credit, foreign loan and exchange rate) in short run. The co-integrating coefficient is also negatively significant, and speed of convergence is increased to 5%.

The long-run results also presented in Table 5 indicate that FDI and foreign loan increase bank credit by 18% and 31%, respectively, at 5% significance level. This is because India is an emerging economy, which has high investment potential that raises credit demand in the domestic economy. The net FPI remains insignificant in ARDL regression. The plausible reason will be this FPI is liquid and volatile components of capital inflows, whereas bank credit is determined through long and complicated

**Table 5** Estimation including structural break. *Source:* Authors' preparation

Long-run estimations		Short-run estimations	
Variables	Coefficients	Variables	Coefficients
LnFDI	0.183** (0.084)	D(LnBcredit)-1)	- 0.287*** (0.084)
LnFPI	0.042 (0.062)	D(LnFDI)	0.006 (0.005)
LnLoan	0.312** (0.131)	D(LnFPI)	0.001 (0.003)
LnREER	- 0.490 (0.373)	D(LnLoan)	0.021*** (0.007)
LnCAB	- 0.142** (0.068)	D(LnREER)	- 0.087** (0.042)
Dummy	0.857** (0.388)	D(LnCAB)	0.004 (0.004)
@Trend	0.016** (0.006)	Dummy	0.029*** (0.025)
		Constant	0.639*** (0.102)
		ECT (-1)	- 0.053*** (0.009)

\*\*\*, \*\* and \* indicate data series are stationary at 1%, 5% and 10% significance level, respectively, and standard errors are in parenthesis

process. Hence, FPI does not affect bank credit. Current account (trade) deficit decreases bank credit by 14% at 5% significance level. The structural change dummy after 2003Q4 and deterministic trend is also increase bank credit at 5% significance level. This is stable model because the coefficient of foreign loan increases by 31% unlike 182% in without dummy long-run result of ARDL model.

Different diagnostic test is conducted on ARDL regression with structural dummy to check model strength. In Breusch–Godfrey serial correlation LM test, null is no serial correlation. In Harvey test for heteroscedasticity, null is the constant variance of residual. In Jarque–Bera test for residual normality, null is residual is normally distributed. In Hansen test for parameter stability, null is stable parameter. CUSUM and CUSUM of square for residual. Table 6 shows that the probability of all the test is greater than five percent, so we accept the null hypothesis meaning thereby there is no serial correlation, no heteroscedasticity, and residual is normally distributed.

**Table 4** Bounds test for long-run co-integration with structural break. *Source:* Authors' preparation

Bound Test	CV at 1%		CV at 5%		CV at 10%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F-Statistics = 4.46	3.27	4.39	2.63	3.62	2.33	3.25

Computed F-statistic (Wald test) = 5.00. Pesaran et al. (2001) are used for the critical values (CV)

**Table 6** Diagnostic and stability tests of ARDL model with structural break. *Source:* Authors' preparation

Tests	Coefficients	p-value
Breusch–Godfrey: autocorrelation	0.863	0.424
Harvey test: heteroskedasticity	1.200	0.298
JB test: normality	1.877	0.391
Hansen test: parameter stability	0.793	0.137

All necessary details of diagnostic and stability tests are provided in Appendix 1

**Table 7** Granger causality test. *Source:* Authors' preparation

Causal flow	$\chi^2$ -Statistics	Causal flow	$\chi^2$ -Statistics
LnBcredit to FDI	1.289	LnFDI to Bcredit	17.373***
LnBcredit to FPI	2.360	LnFDI to FPI	30.194***
LnBcredit to LOAN	4.343	LnFDI to Loan	13.309***
LnBcredit to ALL	8.383	LnFDI to All	68.623***
LnFPI to Bcredit	1.043	LnLoan to Bcredit	0.504
LnFPI to FDI	1.141	LnLoan to FDI	2.833
LnFPI to Loan	3.800	LnLoan to FPI	21.642**
LnFPI to All	5.123	LnLoan to All	37.464**

\*\*\*, and \*\* indicates significance at 1% level and 5% level respectively

CUSUM and CUSUM of square test show parameter coefficient lies within the band of five per cent significance means that parameter is stable over time. Hansen's test probability is greater than 10% significance level; it means accept the null that is stable parameter over time period.

Lastly, the vector autoregressive Granger causality test is also conducted. The result in Table 7 shows bank credit, FPI, foreign loan Granger cause FDI, but other variables do not Granger cause bank credit. The unidirectional causality was found in the FDI equation.

### Conclusion

The various previous studies show that capital inflows have the impact on domestic credit in advance and emerging countries whereas, In India, research on the relationship between capital inflows and domestic credit is entirely absent. Hence, this paper investigates the impact of capital inflows on domestic credit using ARDL approach to co-integration since liberalization periods (1990s onwards). The result confirms that co-integrating relationship exists among the variables. This study is quite different from the previous studies regarding

the relation between disaggregated components of capital inflows and domestic bank credit growth. FDI and foreign loan have the positive impact on domestic bank credit. Exchange rate depreciation and trade deficit also increase bank credit. Unlike Furceri et al. [9], Lane and McQuade [17] and Lotto [18], this study reveals both equity (net FDI) and non-equity inflows (net foreign loan) positively affect bank credit India.

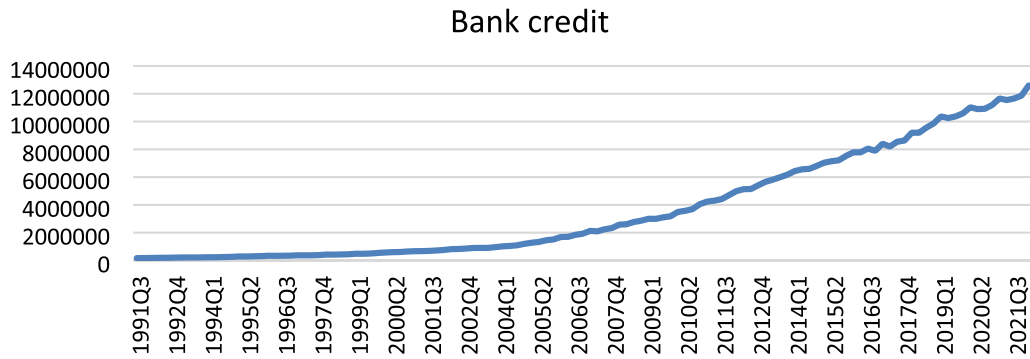
India is an emerging country; it has positive impact of the foreign variable in the domestic economy. Particularly, benefit of FDI (physical investment) transmitted to domestic economy in form of credit and foreign loan is liabilities, but it is also converted to domestic assets (credit). Based on these findings, our policy recommendation to Indian government is that Indian government can be liberalized FDI and foreign loan (external commercial borrowings and short-term loan) but not FPI that remains insignificant. Thus, this paper also guides the policy decision in the macroeconomics of India regarding FDI inflows and its impact on the domestic economy.

### Scope of future research

As this is the first paper, which investigates the study of the relationship between capital inflows and domestic bank credit by using time series dynamic analysis ARDL model in India. As India is emerging economy, it gives different result from the earlier studies. The previous researches used a combination of European and Asian countries by applying panel data regression model [9, 19]. In this regard, there has been no separate research done on the emerging economies of the world. By exploring on these emerging economies, we can get different results, which may be helpful in the macroeconomics policy guidance mainly regarding FDI liberalization. Developing countries have different political economy governance, fiscal economies (role of government), and phase of globalization. Therefore, different variables of fiscal economies and open-macro economy can be taken like credit booms, exchange rate regime, capital inflows cyclical, fiscal regulation, financial structure and financial development. Furthermore, emerging economies are laid stone to the privatization in the Structural Adjustment Programme, which has been prescribed by IMF. Hence, there is rise in Multi-National Corporation and foreign bank in the domestic economy. Furthermore, there is also a scope of micro-level analysis capital inflows and domestic credit. The direct method of capital inflows can be analysed at firms (industries) and banks/non-banks level.

**Appendix 1**

See Fig. 1, Table 8.

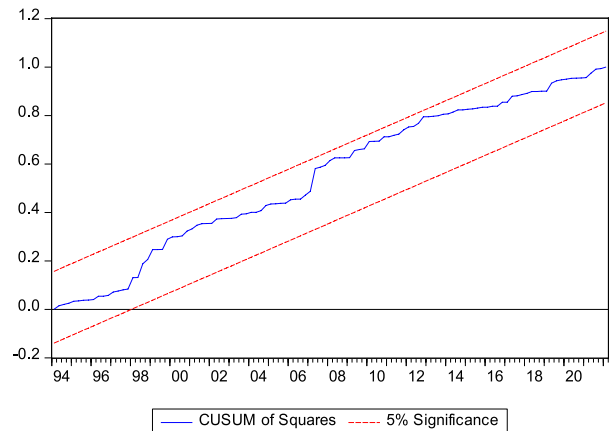
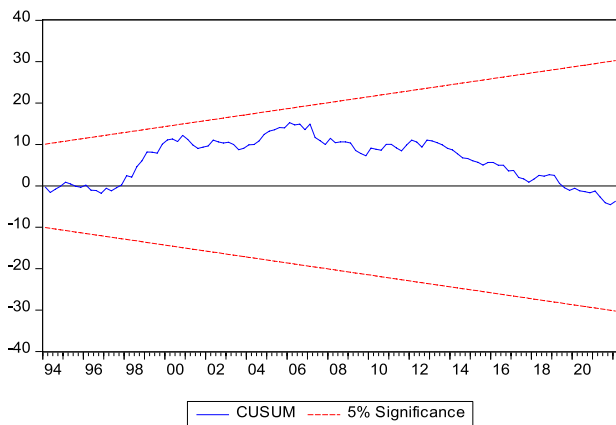


**Fig. 1** A Source: Author's preparation

**Table 8** Diagnostic and stability tests of ARDL model without Structural Break.

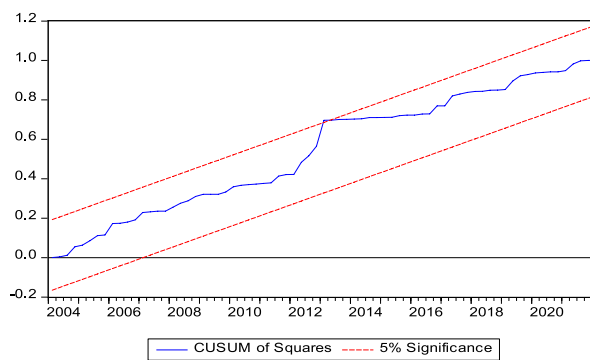
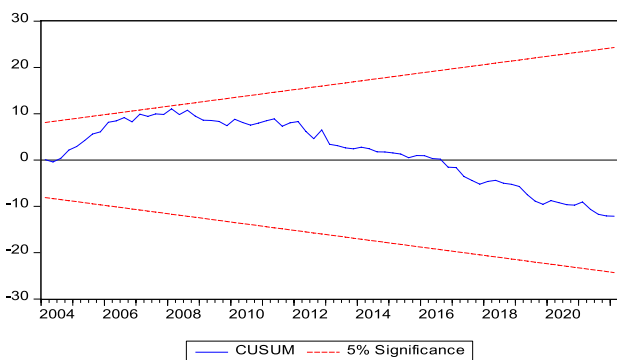
Tests	Coefficients	p-value
Breusch–Godfrey: autocorrelation	0.852	0.429
Harvey test: heteroskedasticity	1.828	0.088
JB test: normality	1.775	0.411
Hansen test: parameter stability	0.890	0.089

Residual stability tests: ARDL model without structural break. Source: Authors' preparation





**Residual stability tests: ARDL model with structural break.**



Source: Authors' calculation

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**Author contributions**

ZNA made the data collection and analysis part while SZ compiled introduction and literature review, and the overall formatting of the paper has been done by MHD.

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**Availability of data and materials**

All material and dataset are available on request.

**Declarations**

**Ethics approval and consent to participate**

Not applicable.

**Consent for publication**

Not applicable.

**Competing interests**

No potential competing interest of any form was reported by the authors.

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