

AN ENQUIRY INTO CAPITAL INFLOWS OF BRICS: INFERENCES DRAWN FROM VECTOR AUTOREGRESSION TECHNIQUE

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Abstract

This paper examines determinants of capital inflows in BRICS. The variables used for the study include Gross Domestic Product (GDP), Gross Capital Formation (GCF), Inflation and Exchange Rate. A multivariate time series approach namely Vector Autoregression has been employed for the analysis. Impulse response function is used to gauge the effects of shocks on capital inflows with World Bank's annual data (1992-2012). Johansen Cointegration and Augmented Dickey fuller test are also used for analyses. Surge in capital inflows can stimulate economic growth in developing countries and also lead to macroeconomic fluctuations. This makes the analysis of determinants of capital inflows in developing countries interesting. Such analysis could help to avoid undesirable consequences of surge in capital inflows. In Brazilian economy capital inflows is determined by GDP, GCF and Exchange rate. Moreover it is found that in Brazil capital inflows are associated in the long run with GCF, inflation and exchange rate. For Russian economy it is observed that capital inflows were found to be cointegrated with GDP and Inflation in the long run. In case of Indian economy capital inflows are determined by inflation and exchange rate. The results for South African economy suggests that capital inflows is determined by inflation. In general from the analysis we can conclude that growth of BRICS countries is an important factor in determining the capital inflows to these countries.

Keywords: Capital Inflows, BRICS, Vector Autoregression, Impulse Response Function

JEL Code: F3, G00, O1

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1.1 INTRODUCTION

BRICS (Brazil, China, India, Russia and South Africa) as a multilateral grouping countries represent widely differing political systems and have also reached varying levels of economic development. Brazil, China, India, Russia and South Africa share very little in common either culturally or politically but they share a common growth trajectory and these countries have a willingness to embrace global markets and explore opportunities for rapid future growth. (John, 2012). Although geographically separated, economically and politically distinct, with different levels of development and with not such strong economic ties during the initial period, these countries began to see themselves as a group largely because of foreign investors. (Ghosh, 2013). BRICS represent some of the fastest growing economic regions in the world and are also expected to become some of the world's largest energy consumers in the coming years. (Samir et al, 2013).

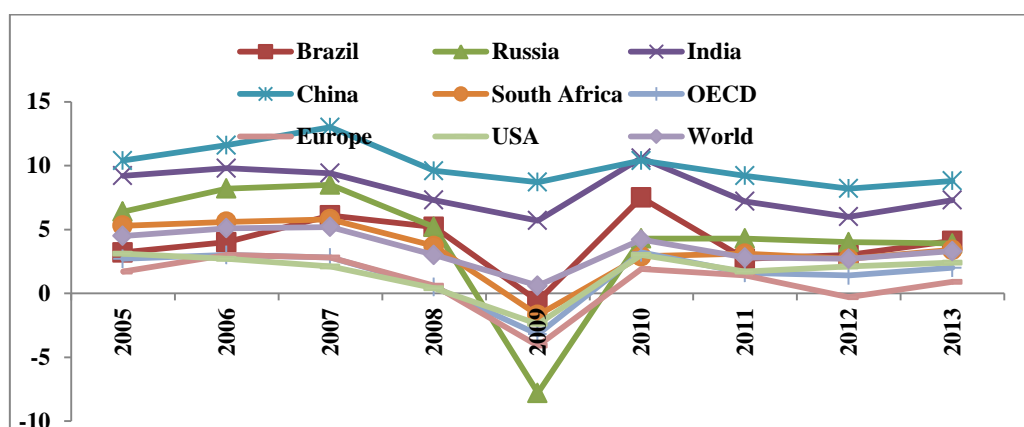
Table 1 illustrates the growth rate of BRICS countries over a period of eight years (barring a temporary decline in Brazilian, Russian and South African growth as the immediate aftermath of the global economic crisis). Sometimes exacerbated by world events beyond their control (e.g. the US mortgage and European Union debt crises), the BRICS nations often find themselves facing systemic global challenges.

TABLE 1: GROWTH RATE OF GROSS DOMESTIC PRODUCT (PERCENT)

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013
Brazil	3.2	4.0	6.1	5.2	-0.6	7.5	2.7	3.0	4.1
Russia	6.4	8.2	8.5	5.2	-7.8	4.3	4.3	4.0	3.9
India	9.2	9.8	9.4	7.3	5.7	10.6	7.2	6.	7.3
China	10.4	11.6	13.0	9.6	8.7	10.4	9.2	8.2	8.8
South Africa	5.3	5.6	5.8	3.7	-1.7	2.9	3.1	2.7	3.4
Africa									
OECD	2.7	3.0	2.8	0.5	-3.2	3.2	1.6	1.4	2.0
Europe	1.7	3.0	2.8	0.6	-4.1	1.9	1.4	-0.3	0.9
USA	3.1	2.7	2.1	0.4	-2.4	3.0	1.7	2.1	2.4
World	4.5	5.1	5.2	3.0	0.6	4.2	2.8	2.7	3.3

Source: World Economic Outlook (2012), International Monetary Fund

FIGURE 1: GROWTH RATE OF GROSS DOMESTIC PRODUCT



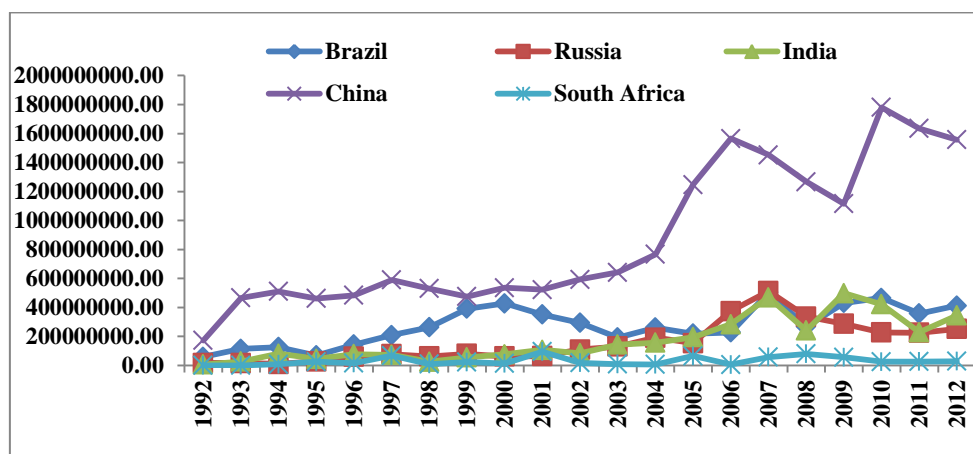
Source: Derived from Table 1.

Capital flows across borders lead to efficient allocation of resources which increases productivity and economic growth. But a surge in capital inflows can also make it difficult to maintain economic growth without rising inflation. (Ahmed and Zlate, 2013). Global liberalization in recent decades has resulted in rapid movement of resources among developing and developed countries. Moreover the decline in borrowing cost, interest rate and risk due to global monetary conditions during 2008 witnessed large capital inflows in most developing countries. (Arshad et al, 2012).

Capital inflows consist of Foreign Direct Investment (FDI), portfolio equity, bank lending, non-bank lending and official inflows. Since 2005 Brazil, Russia, India and China (BRIC) have received almost half of all net capital inflows to developing countries. Out of \$1,130 billion net capital inflows to developing countries in 2010, almost 60 percent went to BRIC. In 2010, aggregate net capital inflows to BRIC increased by an average of 75 percent compared to 58 percent for the other 125 developing countries. China is the dominant member within BRIC with regard to capital inflows. Between (2005-2010) it received half of the net capital flows to the group with the other half divided evenly between the remaining three BRICS countries. (Pollock, 2011).

Figure 2 depicts the nature of capital inflows for a period of 20 years in BRICS. It is evident from the above figure that China is predominant in attracting capital inflows among BRICS countries.

Figure 2: Capital Inflows of BRICS



Source: Derived from World Bank Data

1.2 REVIEW OF LITERATURE

At a macroeconomic level, capital inflows are supposed to be welfare improving. The behavior of capital inflows in the long and the short run has been under study. Traditional literatures on determinants of capital inflows are classified into two categories push (external) and pull factors (internal). Studies have proved that the main causes of the capital inflows is the increasing demand of the domestic currency through stable exchange rate associated with the decreasing inflationary pressure, stable set of policies and other feasible economic conditions. (Fernandez and Monteil, 1996).

Calvo et al. (1993) concentrated only on external factors and conclude that declining US interest rates and economic growth are the main drivers of funds into Latin American countries. Chuhan et al (1998) investigated the respective importance of both external and internal factors. The study concludes that in the 1990s, push factors explained more capital flows into Latin America than internal factors, while pull factors explained more capital flows into Asia than their global equivalents. Kamin and Kleist (1999) find that traditional push factors - US interest rate, GDP growth rate of OECD countries - are not a determinant of capital inflows. It is evident from the above discourse that capital inflows as well as short-term inflows into Asia are predominantly due to pull factors throughout the 1990s.

Kim (2000) investigates the causes of capital flows in four developing countries: Mexico, Chile, Korea, and Malaysia. The study finds that the recent resurgence in capital movements is largely due to external reasons such as decreases in the global interest rate or recession in industrial countries. Domestic factors, including country-specific productivity shocks and demand shocks, are relatively less important. Another interesting finding is that the fundamental causes of capital flows differ slightly across the countries under study.

Hernandez et al (2001) analysed the determinants of private capital inflows to developing countries in 1970s and 1990s. The results suggest that private capital flows are determined mainly by a country's own characteristics i.e. pull factors and external or push factors were not significant in determining the inflows.

Canela et al (2006) adopt an empirical approach to explain portfolio flows allocation towards emerging countries. Canela et al (2006) used panel data analysis to assess the local and global factors influencing portfolio capital flows to BRIC. It is found that portfolio capital flows are principally driven by global risk factors, openness and short term interest rates. Brana and Lahet (2010) investigated the impacts of both external factors and domestic fundamentals on the evolution of capital inflows with a panel of four Asian countries over the period of (1990-2007).

With the rapid development of the BRICs, many researches are performed on the determinants of capital inflows. Cheng et al (2007) summarise the features of economies of Brazil, Russia, India and China (BRICs) which affirms the role of (BRICs) to take up pivotal position in the largest global economic group. They attempt to analyse the difficulty of doing business within each country and discuss how this affects the potential of BRICs market to lead the future world economy. Cheng et al (2007) discuss several hurdles like social frictions, demographic changes, legislative and regulatory obstacles preventing BRIC from realizing desired

growth. The study identifies unambiguous, clearly stated legislation, simplified tax systems, lesser administrative burdens, and more flexible employment markets for stable economic bases in BRICs.

Mohan (2008) analyses the issues related to strong capital flows developments in India. His paper elaborates on various aspects of capital flows to India and their policy implications. According to him capital inflows in India gained momentum from the 1990s after the initiation of economic reforms. Duan (2010) compares the overall trends and industrial patterns of inward foreign direct investment in the BRICs. He finds that the overall trend of the inward FDI in the BRICs is increasing. He pinpoints three main factors; develop courses, resources and the business environment that determine the industrial patterns of inward foreign direct investment in the BRICs. The study found that in Brazil, Russia and India, the tertiary sector receives the most inward FDI on average over the past decade, followed by secondary sector and the least for primary sector. But in China the secondary sector attracts majority of the inward FDI and the primary and tertiary sectors receive only a bit.

Byrne and Fiess (2011) examine international capital flows to emerging and developing countries and their determinants. Researchers assess individual country coherence with global capital flows and measure the extent of co-movements in the volatility of capital flows. It is found that the long run real interest rate of US is an important determinant of global capital flows, and real commodity prices are relevant but to a lesser extent. Reinhart and Reinhart (2008) present evidence of a statistically significant and positive as well as negative relationship between commodity prices (economic growth) and capital inflows between 1967 and 2006. Frankel (2008) illustrates a potential link between strong commodity prices and low real interest rates.

Calvo et al. (1993), Fernandez-Arias (1994), Kim (2000) and Ying and Kim (2001) give support to the ‘push’ factors for both developed and developing countries, while Dadush, Dasgupta and Ratha (2000), Hernandez et al. (2001) and Culha (2006) find the dominance of ‘pull’ factors over ‘push’ factors in determining capital flows. Chuhan et al. (1998) and Taylor and Sarno (1997) estimate that both domestic and global factors explain bond and equity flows to the developing countries. This research focuses on pull factors determining the inflows of capital.

2.2 DATA AND METHODOLOGY

This research uses annual data from World Bank database for five countries namely Brazil, Russia, India, China and South Africa; for a period ranging from 1992 to 2012. The variables used include capital inflows (sum of FDI and portfolio equity), inflation (measured by the consumer price index which reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals), exchange rate (exchange rate is determined by national authorities or to the rate determined in the legally sanctioned exchange market), Gross Capital Formation (consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories), Gross Domestic Product (calculated as the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products). All the variables are constant at 2005 U.S. dollars. Data for FDI and portfolio equity was available in current prices, it was converted to constant using GDP deflator. This research tries to identify main determinants of capital inflows in BRICS using Vector Autoregression (VAR) technique. Johansen Cointegration and Augmented Dickey fuller test are also used for data analyses. The Vector Error Correction model (VECM) which is a restricted VAR is used for the analysis since Johansen Cointegration test suggested cointegration among the variables in the long run for BRICS. The lag length of the model is determined by performing Schwarz Information Criterion. The research also uses Impulse Response Functions (IRF) to trace the responsiveness of future values of endogenous variables in a VAR system when one standard deviation shock is imposed in the system.

Following Ying and Kim (2001), the VAR model can be specified as follows:

$$Y_t = \sum_{i=0}^{\infty} A_i U_{t-i} = A(L)U_t \quad \dots\dots(1)$$

where $Y_t = (\text{Capitalinflows}_t, \text{Exchangerate}_t, \text{Inflation}_t, \text{GDP}_t, \text{GCF}_t)$,

$$U_t = (u_t^{\text{Capitalinflows}}, u_t^{\text{Exchangerate}}, u_t^{\text{Inflation}}, u_t^{\text{GDP}}, u_t^{\text{GCF}}) \quad \dots\dots (2)$$

$$A(L) = \sum_{i=0}^{\infty} A_i L^i = \{a_{ij}(L)\} \text{ as } L \text{ lag operator.} \quad \dots\dots (3)$$

A_i is the matrix of impulse responses.

3.1 DETERMINANTS OF BRICS: A CROSS COUNTRY SCENARIO

In this section results generated with the help of Eviews software for Brazil, Russia, India, China and South Africa are explained.

3.1a Brazil

In Brazilian economy from 1993 to 1996 capital inflows reached levels that prompted the monetary authorities to adopt restrictive measures, some of which were temporarily relaxed after the Mexican crisis. Capital inflows had an increasing trend till 2000 after that it has shown a decline, which may be attributed to several restrictions imposed by the Brazilian Government. GDP and GCF also show an increasing trend which may be attributed to increasing capital inflows to the country. (Goldfajn and Minella, 2007). While Brazil's northeast remains the country's poorest region, it has recently become a star economic performer. The region's illiteracy rate is double the national average and contains a disproportionate number of impoverished persons. However, Brazilian Government's antipoverty programs, increased minimum wages, and a successful micro-credit program have led Northeast's GDP to rise 4.2 percent outpacing the 3.6 percent of the country as a whole. (Samir et al, 2013).

The time series analysis requires data to be stationary. For verifying stationarity of the data Augmented Dickey Fuller (ADF) test is used. For Brazil, GDP, GCF, capital inflows, inflation are found to be stationary at first difference as the probability values are less than 0.05 (5 percent level of significance). In order to test whether variables are cointegrated Johansen Cointegration test is used. The results reveal that for Brazil there are three cointegrating equations which implies that in the long run the variables are associated with each other. To test whether series are normally distributed Jarque-Bera test is used. It is found that all five variables are normally distributed. It is also found is no heteroscedasticity as the null hypothesis is accepted at 5 percent level of significance. Since these conditions are satisfied Ordinary Least Square (OLS) method is used to estimate the equations and to find p-values.

Table 2 provides the estimates for the coefficients in Vector Error Correction Model (VECM). The R^2 of the model is found to be more than 60 percent which indicates that the model is fitted properly. VECM results give the dependence of all variables to the lagged values of each other. The aim of the research is to find the determinants of capital inflows hence, capital inflows equation is concentrated. It is found that capital inflows are influenced by lagged and current values of GDP (p-value 0.00), GCF (0.002) and Exchange rate (0.04) in Brazil. Moreover it is found that in Brazil capital inflows are associated in the long run with GCF, inflation and exchange rate.

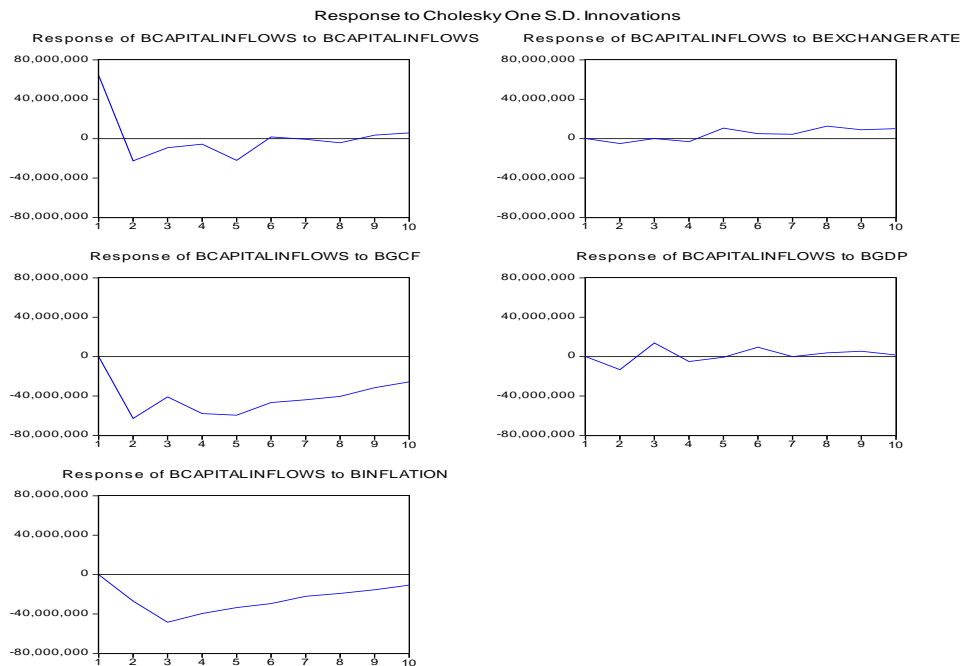
If other variables are taken into consideration like dependence of GCF, inflation, exchange rate and GDP, the following observations can be made. Inflation is found to be influenced by lagged values of GDP, GCF and exchange rate whereas GDP and GCF are dependent on lagged values of capital inflows. This implies that as capital inflows increases GDP and GCF also shows an increase. When the cointegrating equations of these variables are taken into consideration, it is observed that GCF is associated in the long run with inflation and exchange rate whereas exchange rate is associated in the long run with GDP and inflation.

TABLE 2: VECM ESTIMATES

Error Correction:	D(BGDP)	D(BGCF)	D(BCAPITAL INFLOWS)	D(BINFLATIO N)	D(BEXCHANGE RATE)
CointEq1	0.306281 (0.14438) [2.12141]	0.317829 (0.08665) [3.66790]	0.002681 (0.00070) [3.84952]	-4.23E-09 (3.3E-09) [-1.29208]	-5.03E-12 (1.7E-12) [-2.98026]
CointEq2	-0.919227 (0.50390) [-1.82424]	-1.050848 (0.30243) [-3.47471]	-0.009212 (0.00243) [-3.79001]	1.12E-08 (1.1E-08) [0.97651]	1.35E-11 (5.9E-12) [2.28630]
CointEq3	-39.34480 (41.4793) [-0.94854]	-39.84902 (24.8950) [-1.60068]	-0.574206 (0.20009) [-2.86979]	3.04E-07 (9.4E-07) [0.32308]	2.42E-09 (4.8E-10) [4.99274]
D(BGDP(-1))	-0.566870 (0.55786) [-1.01615]	-0.289656 (0.33482) [-0.86512]	-0.009364 (0.00269) [-3.47977]	3.68E-08 (1.3E-08) [2.90837]	3.59E-12 (6.5E-12) [0.55105]
D(BGCF(-1))	0.439893 (0.92809) [0.47398]	0.434066 (0.55702) [0.77927]	0.014573 (0.00448) [3.25511]	-6.75E-08 (2.1E-08) [-3.21037]	-1.61E-11 (1.1E-11) [-1.48596]
D(BCAPITAL INFLOWS(-1))	118.5068 (37.0585) [3.19783]	91.29194 (22.2417) [4.10453]	-0.345227 (0.17876) [-1.93121]	-7.03E-07 (8.4E-07) [-0.83675]	-2.13E-09 (4.3E-10) [-4.91143]
D(BINFLATION(-1))	-8529883. (9268899) [-0.92027]	-1401992. (5562998) [-0.25202]	69922.62 (44711.0) [1.56388]	0.237696 (0.21008) [1.13145]	2.13E-05 (0.00011) [0.19650]
D(BEXCHANGE RATE(-1))	1.15E+09 (2.3E+10) [0.04913]	1.67E+10 (1.4E+10) [1.18970]	2.29E+08 (1.1E+08) [2.02738]	-1172.597 (530.113) [-2.21198]	-0.480642 (0.27326) [-1.75893]
C	3.64E+10 (1.0E+10) [3.59052]	8.30E+09 (6.1E+09) [1.36233]	1.55E+08 (4.9E+07) [3.15728]	-488.7472 (230.088) [-2.12418]	0.197237 (0.11860) [1.66300]
R-squared	0.770469	0.831631	0.820790	0.764432	0.872417

Source: Computed by researchers.

FIGURE 3: IMPULSE RESPONSE FUNCTION- BRAZIL



Source: Computed by researchers.

Figure 3 shows the Impulse Response Function which gives response of capital inflows when standard deviation shock is applied to the system for a period of 10 years. The response of capital inflows to GDP, GCF, inflation and exchange rate when one standard deviation shock is given to the system is depicted in the Figure 1. It can be observed that with one standard deviation shock the response of capital inflows is negative when one standard deviation shock is applied to inflation and to GCF. While shock is applied to exchange rate and GDP the response is found to be slightly fluctuating. Further with application of shock to capital inflows to itself the response is found to be positive initially and negative later for future period of 10 years.

3.1b Russia

Russia attracted most of capital inflows due to prices and interest rate hikes by the central bank in response to rising inflation during 2012. Capital inflows in Russia reached its peak in 2007-08. GDP is found to be increasing in the pace with capital inflows. Russia has managed to control inflation in spite of high capital inflows due to appropriate policy response by the central bank. Reduced political uncertainty of Russia in 2012 also was a contributing factor for surge in capital inflows in Russia. (Suttle et al, 2012). Russia's average per capita GDP grew by 1.83 times from 1999-2009 and Russia's top performing regions have per capita GDPs comparable to western European nations and the US. Tyumen and the fast gaining Sakhalin are among this group whereas Ingushetia and Chechnya have per-capita levels on par with Ghana and Iraq, respectively. (Samir et al, 2013).

Augmented Dickey Fuller (ADF) test for Russia economy shows GCF (0.001), Inflation (0.001), capital inflows (0.009) and exchange rate (0.000) to be stationary at first difference. Results of Johansen cointegration test suggested 3 cointegrating equations in Russia as well. All other diagnostic testing were also performed on Russian data and all the variables were found to be normally distributed using Jarque-Bera statistics and none of the variables showed heteroscedasticity.

Table 3 provides the estimates for the coefficients in Vector Error Correction Model (VECM). The R^2 of the model is more than 60 percent which indicates that the model is fitted properly. For Russian economy capital inflows were found to be cointegrated with GDP and Inflation in the long run. Exchange rate was found to be dependent on GCF whereas GCF is found to be influenced by lagged and current values of capital inflows (0.000) and GDP is dependent on capital inflows (0.000). GDP is found to be associated in the long run by

capital inflows, and inflation. Moreover exchange rate was found to be associated in the long run with capital inflows, inflation, GDP and GCF.

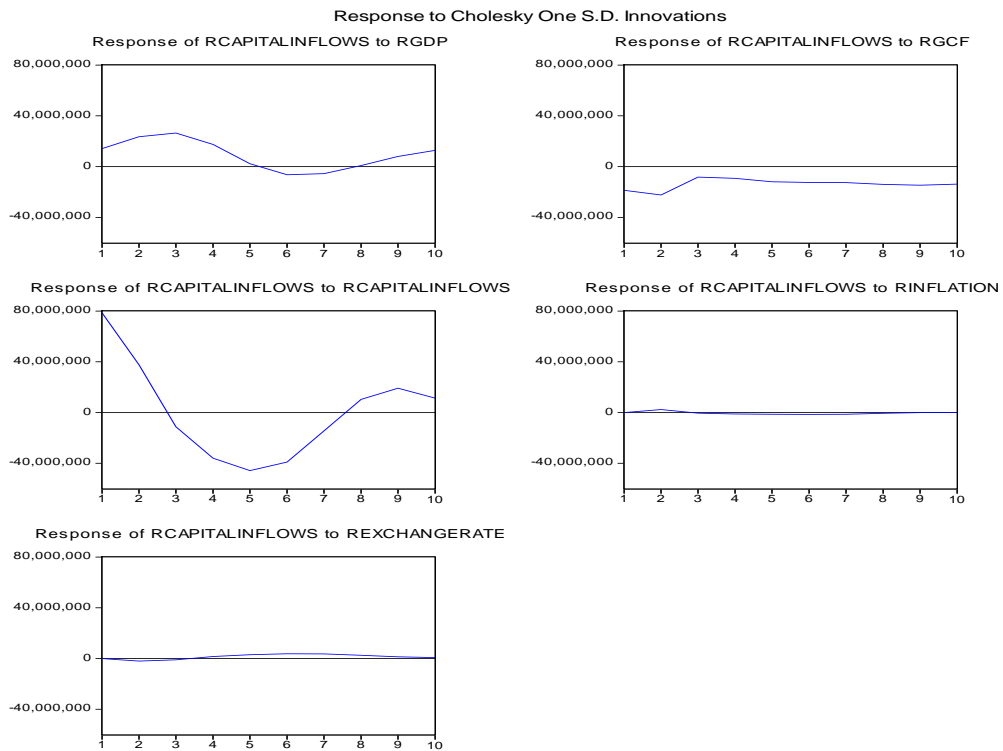
TABLE 3: VECM OLS ESTIMATES

Error Correction:	D(RCAPITAL INFLOWS)	D(REXCHANGE RATE)	D(RGCF)	D(RGDP)	D(RINFLATION)
CointEq1	-0.968647 (0.37723) [-2.56777]	1.94E-08 (2.1E-08) [0.93186]	-84.80743 (78.7484) [-1.07694]	-158.8782 (78.2026) [-2.03162]	1.16E-07 (1.2E-07) [0.98321]
CointEq2	2151257. (1799057) [1.19577]	-0.004998 (0.09929) [-0.05034]	-1.03E+09 (3.8E+08) [-2.75196]	-5.46E+08 (3.7E+08) [-1.46387]	-0.058523 (0.56495) [-0.10359]
CointEq3	0.000806 (0.00183) [0.44051]	4.69E-11 (1.0E-10) [0.46470]	-1.776517 (0.38193) [-4.65137]	-1.305251 (0.37929) [-3.44133]	-4.61E-10 (5.7E-10) [-0.80205]
D(RCAPITAL INFLOWS(-1))	0.458298 (0.32305) [1.41868]	-2.43E-08 (1.8E-08) [-1.36524]	291.4610 (67.4365) [4.32201]	325.5474 (66.9691) [4.86116]	-8.45E-08 (1.0E-07) [-0.83250]
D(REXCHANGE RATE(-1))	-4640441. (7739434) [-0.59958]	0.217364 (0.42715) [0.50887]	-1.00E+08 (1.6E+09) [-0.06204]	-6.93E+08 (1.6E+09) [-0.43175]	-1.455253 (2.43039) [-0.59877]
D(RGCF(-1))	-0.002560 (0.00205) [-1.24909]	1.56E-11 (1.1E-10) [0.13756]	0.610609 (0.42789) [1.42702]	-0.155949 (0.42493) [-0.36700]	-1.46E-10 (6.4E-10) [-0.22667]
D(RGDP(-1))	0.002169 (0.00190) [1.14042]	-4.07E-11 (1.0E-10) [-0.38723]	-0.266997 (0.39710) [-0.67238]	0.406197 (0.39434) [1.03006]	9.11E-11 (6.0E-10) [0.15248]
D(RINFLATION(-1))	132261.3 (358839.) [0.36858]	0.008371 (0.01980) [0.42267]	-76319991 (7.5E+07) [-1.01884]	-51271369 (7.4E+07) [-0.68923]	-0.194803 (0.11268) [-1.72874]
C	-15092054 (4.6E+07) [-0.32655]	2.651798 (2.55075) [1.03961]	2.55E+09 (9.6E+09) [0.26453]	1.18E+10 (9.6E+09) [1.23380]	-24.42734 (14.5133) [-1.68310]
R-squared	0.459612	0.336064	0.877159	0.889529	0.844724

Source: Computed by researchers.

The impulse response function in Russian context suggests that with one standard deviation shock, the response of capital inflows to GDP and to itself was positive initially. However it shows a negative trend after 5 years. The response of capital inflows to exchange rate and to inflation was found to be steady which implies one standard deviation shock did not have much impact on capital inflows. Further the response of capital inflows to GCF was found to be negative for forthcoming 10 years.

FIGURE 4: IMPULSE RESPONSE FUNCTION- RUSSIA



Source: Computed by researchers.

3.1c India

Indian economy witnessed an increase in capital inflows in 2007-08. In 2008 it experienced a fall due to economic crisis of 2008. Net capital inflows, which increased from 2.2 percent of GDP in 1990-91 to around 9 percent in 2007-08. According to Mohan (2008), much of this increase has been offset by corresponding capital outflows, largely on account of foreign institutional investors' (FIIs) portfolio investment transactions, Indian investment abroad and repayment of external borrowings.

For Indian economy the unit root test suggested stationarity of GCF (0.008), inflation (0.00) and exchange rate (0.00) were found to be stationary at 1st difference. Johansen cointegration test showed cointegration of 3 equations. All variables were also found to be normally distributed and there was no presence of heteroskedasticity.

All the diagnostic testing made it relevant to estimate the equations using OLS estimate for Indian economy. The results are shown in Table 4. It suggests that capital inflows in Indian economy is determined by inflation (0.01) and exchange rate (0.03). It was also found that capital inflows, inflation and exchange rate were associated in the long run. GCF, was found to be cointegrated with inflation, exchange rate and GCF in the long run. In Indian economy the results also suggested that GCF and GDP were also determined by inflation and exchange rate. GDP is found to be associated in the long run with capital inflows and inflation. As in Russia and Brazil R^2 for India was also above 60 percent which suggested the model was properly fitted.

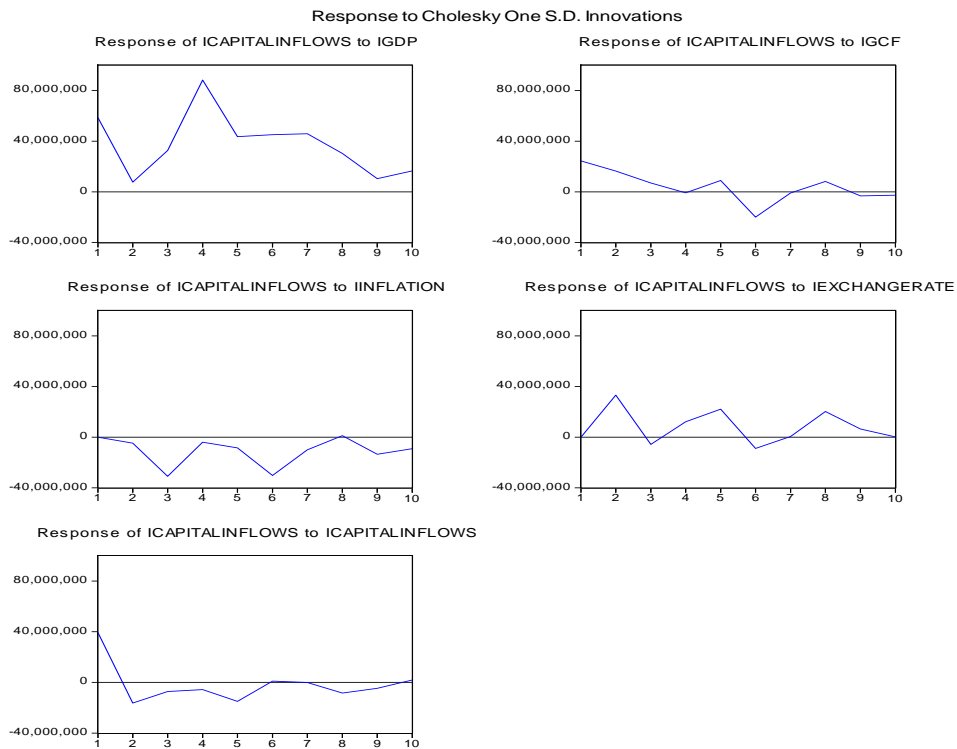
TABLE 4: VECM OLS ESTIMATES

	D(IGDP)	D(IGCF)	D(ICAPITAL INFLOWS)	D(IINFLATIO N)	D(IEEXCHAN GERATE)
Error Correction:					
CointEq1	0.400768 (0.50105) [0.79985]	1.087473 (0.43606) [2.49386]	-0.000610 (0.00187) [-0.32696]	6.50E-11 (3.6E-11) [1.81565]	-3.42E-11 (5.5E-11) [-0.62158]
CointEq2	-0.658494 (1.02412) [-0.64298]	-2.030822 (0.89128) [-2.27854]	0.002402 (0.00381) [0.62978]	-9.53E-11 (7.3E-11) [-1.30152]	6.95E-11 (1.1E-10) [0.61802]
CointEq3	-8.289104 (99.7492)	-46.03755 (86.8107)	-1.099742 (0.37147)	1.16E-08 (7.1E-09)	1.10E-08 (1.1E-08)
D(IGDP(-1))	0.331884 (0.51473) [0.64478]	0.885121 (0.44796) [1.97589]	0.002283 (0.00192) [1.19121]	-1.64E-10 (3.7E-11) [-4.44502]	-8.19E-11 (5.7E-11) [-1.44753]
D(IGCF(-1))	0.907618 (0.65483) [1.38603]	0.838797 (0.56990) [1.47184]	-0.001079 (0.00244) [-0.44260]	1.11E-10 (4.7E-11) [2.37753]	-5.13E-11 (7.2E-11) [-0.71246]
D(ICAPITALINFLOWS(- 1))	-37.56186 (70.1975) [-0.53509]	-13.19960 (61.0921) [-0.21606]	-0.105161 (0.26142) [-0.40227]	3.10E-09 (5.0E-09) [0.61858]	-1.22E-08 (7.7E-09) [-1.58160]
D(IINFLATION(-1))	5.33E+09 (2.3E+09) [2.36709]	7.58E+09 (2.0E+09) [3.86644]	21726709 (8385663) [2.59094]	-0.130191 (0.16091) [-0.80907]	-0.401812 (0.24741) [-1.62408]
D(IEEXCHANGERATE(- 1))	8.56E+09 (4.0E+09) [2.14003]	1.16E+10 (3.5E+09) [3.31772]	31606394 (1.5E+07) [2.12125]	0.322297 (0.28592) [1.12724]	-0.545070 (0.43960) [-1.23991]
C	6.83E+09 (2.8E+10) [0.24316]	-5.05E+10 (2.4E+10) [-2.06530]	-1.04E+08 (1.0E+08) [-0.99483]	5.503790 (2.00587) [2.74385]	7.111614 (3.08407) [2.30592]
R-squared	0.718602	0.698463	0.754560	0.868451	0.624197

Source: Computed by researchers.

For Indian economy when one standard deviation shock was imposed the response of capital inflows to GDP when one standard deviation shock was imposed showed a positive trend for ten years from now whereas it showed a negative trend with regard to inflation. In case of response of capital inflows to exchange rate, it was positive for first 3 years then negative for next three year and again positive.

FIGURE 5: IMPULSE RESPONSE FUNCTION- INDIA



Source: Computed by researchers.

3.1d China

In the first half of 2012 though, China became the world's largest recipient of foreign direct investment, though by the end of 2012, the U.S. regained its position. One reason might be the fact that the China is growing faster. Another reason may be that China no longer seems to be a risky country for investment. An improvement in international financial markets coupled with China's relatively rapid economic growth will make it easier for the country to attract long-term and stable capital inflows. On the macroeconomic side, firming demand from mature economies is expected to support a cyclical pickup in EM growth and business sentiment indicators have become more favorable, notably in China. (Suttle et al, 2013).

For China the Augmented Dickey Fuller suggested GDP and GCF was found to be stationary at 1st difference. Johansen Cointegration test suggested that for China three equations were found to be cointegrated which implied that these were associated with each other in the long run. Normality condition was also satisfied for all four variables and there was no presence of heteroscedasticity present in model which suggested that OLS estimates could be used for estimating the equations. The VECM estimates for China are given in Table 5. The results suggest that capital inflows is determined by GCF (0.01). It implies that higher GCF plays an important role in attracting capital inflows in Chinese economy. GDP is found to be dependent on capital inflows and GCF which implies that with an increase in capital inflows enhances the growth of Chinese economy. Moreover, GDP is found to be cointegrated in the long run with exchange rate, inflation and GCF. Inflation in Chinese economy was found to be associated in the long run with GDP, exchange rate and inflation.

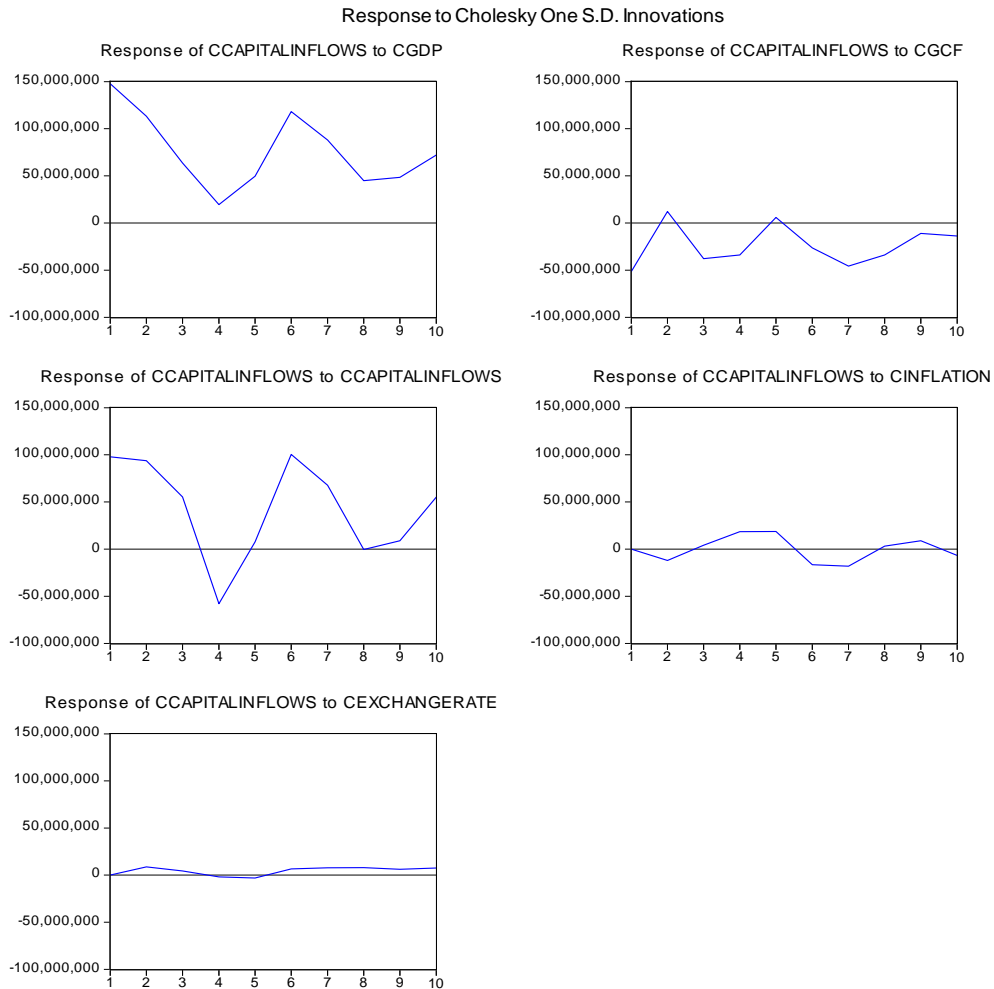
TABLE 5: VECM OLS ESTIMATES

Error Correction:	D(CGDP)	D(CGCF)	D(CCAPITAL INFLOWS)	D(CINFLATIO N)	D(CEXCHANG ERATE)
CointEq1	0.352444 (0.11015) [3.19970]	0.622434 (0.07445) [8.35995]	6.44E-05 (0.00087) [0.07413]	-3.63E-12 (1.2E-11) [-0.29602]	2.84E-13 (8.9E-13) [0.31863]
CointEq2	-0.594441 (0.19934) [-2.98199]	-1.079492 (0.13474) [-8.01139]	-0.000101 (0.00157) [-0.06443]	-2.29E-12 (2.2E-11) [-0.10306]	-1.26E-12 (1.6E-12) [-0.78278]
CointEq3	94.82320 (45.2728) [2.09448]	140.4915 (30.6018) [4.59096]	-0.098778 (0.35715) [-0.27657]	-1.99E-08 (5.0E-09) [-3.95242]	-8.07E-10 (3.7E-10) [-2.20484]
D(CGDP(-1))	-0.504132 (0.42272) [-1.19259]	-1.353885 (0.28573) [-4.73828]	-0.002558 (0.00333) [-0.76704]	1.17E-10 (4.7E-11) [2.48978]	-4.96E-13 (3.4E-12) [-0.14495]
D(CGCF(-1))	0.951912 (0.24722) [3.85046]	0.839149 (0.16711) [5.02165]	0.005116 (0.00195) [2.62309]	-2.24E-12 (2.8E-11) [-0.08118]	1.17E-12 (2.0E-12) [0.58267]
D(CCAPITAL INFLOWS(-1))	88.77782 (28.7966) [3.08293]	13.97262 (19.4648) [0.71784]	0.155082 (0.22717) [0.68266]	1.11E-08 (3.2E-09) [3.45793]	7.72E-10 (2.3E-10) [3.31514]
D(CINFLATION(-1))	-2.00E+09 (2.5E+09) [-0.80783]	-2.23E+09 (1.7E+09) [-1.33462]	-4899800. (2.0E+07) [-0.25100]	0.012918 (0.27578) [0.04684]	0.016595 (0.02002) [0.82910]
D(CEXCHANGE RATE(-1))	-1.23E+09 (1.9E+10) [-0.06513]	8.32E+09 (1.3E+10) [0.65332]	10592157 (1.5E+08) [0.07125]	1.564510 (2.10012) [0.74496]	-0.147749 (0.15242) [-0.96933]
C	1.96E+11 (6.3E+10) [3.13106]	2.71E+11 (4.2E+10) [6.40067]	38735774 (4.9E+08) [0.07846]	-23.19887 (6.97445) [-3.32627]	-0.039833 (0.50620) [-0.07869]
R-squared	0.974965	0.973912	0.628916	0.824207	0.962819

Source: Computed by researchers.

The impulse response function of Chinese economy suggests that if one standard deviation shock is imposed on the system response of capital inflows to GDP is positive for forthcoming 10 years. It is negative in case of GCF whereas much variation was not observed in the response of capital to exchange rate for forthcoming 10 years.

FIGURE 6: IMPULSE RESPONSE FUNCTION- CHINA



Source: Computed by researchers.

3.1.e South Africa

In South African economy, economic disparity is linked to not only race but also regional disparities. Southeast and North coast tend to be poorer provinces of South African, whereas the regions of Johannesburg and Cape Town tend to have more wealth. (Samir et al, 2013).

The economic growth of South African economy has been tied with worsening inequality. According to Vandemoortele (2013), the legacy of colonial dispossession, the unsustainable spatial geography, the development of a vertically integrated and highly concentrated capital-intensive core economy and skewed distribution of human and the failure to transform the education system are the important factors shaping the distribution of the economic benefits of growth. (Vandemoortele et al, 2013).

Augmented Dickey Fuller (ADF) test for South African economy shows GDP (0.0361), GCF (0.0239) capital inflows (0.0003) and exchange rate (0.0198) to be stationary at first difference. Results of Johansen cointegration test suggested 1 cointegrating equation in South African economy. All other diagnostic testing were also performed on South African data and all the variables were found to be normally distributed using Jarque-Bera statistics and none of the variables showed heteroscedasticity.

The VECM estimates for South Africa are given in Table 6. The results suggest that capital inflows are determined by inflation (0.03). The coefficient for inflation was observed to be negative which shows an opposite association between capital inflows and inflation. When inflation increases, capital inflows is expected to decrease and vice versa.

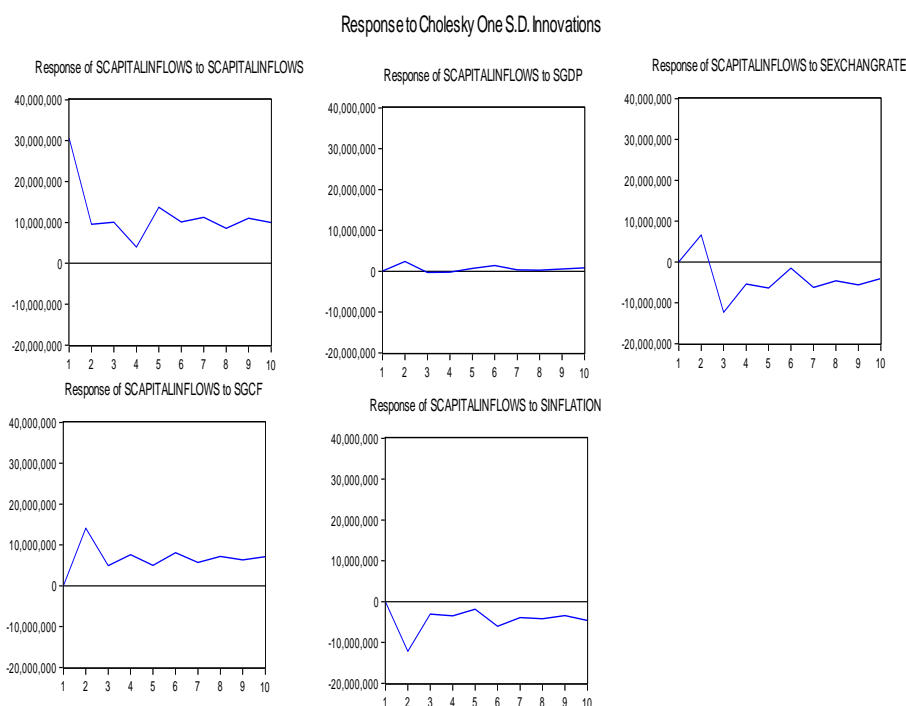
TABLE 6: VECM OLS ESTIMATES

Error Correction:	D(SCAPITALI N FLOWS)	D(SEXCHAN GRATE)	D(SGCF)	D(SGDP)	D(SINFLATION)
CointEq1	-0.205877 (0.26754) [-0.76951]	2.35E-10 (8.2E-09) [0.02858]	38.16558 (22.8322) [1.67157]	-26.51787 (34.4350) [-0.77009]	-3.47E-09 (1.3E-08) [-0.27542]
D(SCAPITALINFLOWS(- 1))	-0.347827 (0.23767) [-1.46347]	1.72E-08 (7.3E-09) [2.35988]	-26.35914 (20.2830) [-1.29957]	4.079006 (30.5903) [0.13334]	2.53E-08 (1.1E-08) [2.26016]
D(SEXCHANGRATE(- 1))	15972546 (1.0E+07) [1.59395]	0.467368 (0.30773) [1.51874]	-5.78E+08 (8.6E+08) [-0.67537]	-1.26E+08 (1.3E+09) [-0.09735]	1.931489 (0.47248) [4.08800]
D(SGCF(-1))	0.001684 (0.00498) [0.33809]	-1.41E-11 (1.5E-10) [-0.09203]	0.233108 (0.42496) [0.54854]	-0.398970 (0.64091) [-0.62250]	-2.48E-11 (2.3E-10) [-0.10563]
D(SGDP(-1))	0.005421 (0.00330) [1.64139]	1.12E-10 (1.0E-10) [1.10622]	0.349689 (0.28188) [1.24058]	0.684446 (0.42512) [1.61001]	6.32E-10 (1.6E-10) [4.05534]
D(SINFLATION(-1))	-11747787 (4955279) [-2.37076]	-0.221557 (0.15218) [-1.45594]	-5.16E+08 (4.2E+08) [-1.21976]	-1.02E+09 (6.4E+08) [-1.59879]	-1.087351 (0.23364) [-4.65394]
C	-49042345 (2.4E+07) [-2.06499]	-0.738332 (0.72934) [-1.01233]	-7.48E+08 (2.0E+09) [-0.36893]	2.93E+09 (3.1E+09) [0.95884]	-5.626458 (1.11978) [-5.02461]
R-squared	0.638617	0.514063	0.393651	0.465807	0.776645

Source: Computed by researchers.

The impulse response function of South African economy suggests that response of capital inflows to itself and to GCF is positive for upcoming 10 years when one standard deviation shock is imposed on the system whereas the response was found to be negative in case of inflation. whereas for exchange rate after two periods. Much variation was not observed in the response of capital to GDP, it was steady over a period of 10 years.

FIGURE 7: IMPULSE RESPONSE FUNCTION- SOUTH AFRICA



Source: Computed by researchers.

4.1 CONCLUSION

Surge in capital inflows can stimulate economic growth in developing countries and also lead to macroeconomic fluctuations. This makes the analysis of determinants of capital inflows in developing countries interesting. Such analysis could help to avoid undesirable consequences of surge in capital inflows. In Brazilian economy capital inflows is determined by GDP, GCF and Exchange rate. Moreover it is found that in Brazil capital inflows are associated in the long run with GCF, inflation and exchange rate. For Russian economy it is observed that capital inflows were found to be cointegrated with GDP and Inflation in the long run. In case of Indian economy capital inflows are determined by inflation and exchange rate. The results for South African economy suggests that capital inflows is determined by inflation. In general from the analysis we can conclude that growth of BRICS countries is an important factor in determining the capital inflows to these countries.

When one standard deviation shock is applied to GCF and inflation, in the case of Brazilian economy, the response of capital inflows is found to be negative. While shock is applied to exchange rate and GDP the response is found to be slightly fluctuating as far as capital inflows are concerned. With the application of shock to capital inflows itself, it is observed to be positive initially and negative for later period. The impulse response function in Russian economy suggests that with one standard deviation shock the response of capital inflows to GDP and to itself is positive during the initial period. However it shows a negative trend after five years. For Indian economy the response of capital inflows to GDP when one standard deviation shock was imposed showed a positive trend for forthcoming ten years whereas it showed a negative trend with regard to inflation. The impulse response function of Chinese economy suggests that the response of capital inflows to GDP is positive for a future period of ten years. With the persistence of the same shock on the system, the response was found to be negative in case of GCF. The impulse response function of South African economy suggests that response of capital inflows to itself and to GCF are positive whereas the response was found to be negative in case of inflation and exchange rate after two periods. Further the response of capital to GDP maintained a steady trend over a period of ten years in future. It may be inferred that the BRICS in general are characterized by an admixture of negative and positive effects related to various factors considered for the study.

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