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Original Research Article

Macroeconomic Variables and Nigeria Stock Market Returns

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Abstract

This study empirically examines the influence of key macroeconomic variables on stock market returns in Nigeria. In-depth knowledge of the relationship between macroeconomic variables and stock market returns is essential in designing an effective policy framework for managing volatile macroeconomic variable indices like capital flows, inflation, money supply, interest rate, exchange rate fluctuations and their disruptive potential. We utilized cointegration Tests, the error correction model mechanism and Granger causality tests to show the nature of relationship amongst the variables of interest, with stock market returns serving as our dependent variable. Our empirical findings show that sound macroeconomic environment reflective of coherent exchange rate, sufficient money supply (liquidity), exchange rate, increased output and financial openness stimulates stock market returns in Nigeria. On the basis of our findings, the government and indeed statutory capital market regulators are advised to further open up the Nigerian financial market and economy to more capital inflows needed for further economic and industrial development. Investors are also advised to hedge against stock price volatility by constructing very highly diversified portfolio's which reflects the overall market portfolio.

***Keywords*:** Financial Openness, Inflation, Exchange Rate, Interest Rate, GDP, Money Supply, Stock Market Returns, Nigeria.

JEL Classification Codes: F21, C22, C32, C51, C52

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1. INTRODUCTION

Over the years, there has been fluctuating trend in capital market index volatility in numerous stock markets worldwide; and the trend from a cursory glance appears similar even in the Nigerian capital market. There are also contradictory views as to whether or not some set of macroeconomic variables positively or negatively impact on the stock market index of numerous bourses

worldwide (Chen, Roll & Ross, 1986).Macroeconomic variables that influence stock market returns have been documented in recent finance literature without a consensus on their appropriateness as regressors. This is confirmed by Lanne (2002), Campbell and Yogo (2003), Jansen and Moreira (2004), Donaldson and Maddaloni (2002), Goyal (2004), and Ang and Maddaloni (2005). Macroeconomic variables that are frequently cited in such studies conducted in developed financial markets are GDP, price level, industrial production rate, interest rate, exchange rate, current account balance, and unemployment rate. Such studies have relatively excluded numerous frontier and emerging markets like Nigeria as to date, relatively few studies have been conducted examining the direct impact of interest rate, Real Gross Domestic Product (RGDP), inflation rate, and exchange rate, on Nigerian capital market.

The study is necessitated because a lot of studies have been conducted concerning macroeconomic variables and stock returns movement; with little attention on the relationship between macroeconomic variables and aggregate stock market index vis-a-vis time and changing macroeconomic processes. Given that, macroeconomic variables have taken different values over the years, alongside the stock market index, it therefore becomes pertinent to determine the nature of relationship that exists between some set of key macroeconomic variables and stock market index in Nigeria; and the economic implication of these key macroeconomic variables on the Nigerian stock market index.

Many attempts have been made to determine and measure stock market return and its determinants in the past. Analysts have used mean-variance, Markovian and Monte Carlo approaches and more tools are being evolved in the literature to deal with this aspect of the stock market. All the attempts are to see if an investor can determine the risk inherent in the market and hence reap a windfall through efficient portfolio creation and diversification. The success of such analytical tool would naturally lead to an upward trend in the stock market and further lead to market vibrancy and economic development by facilitating informed investment and divestment decisions. It is against this background that the study tests the level of macroeconomic influences on Nigerian of security returns.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

There are numerous empirical studies dealing with macroeconomic influences on stock market returns in developed and emerging financial markets. Many of such studies have tended to examine the various internal and external macroeconomic factors that cause stock market returns to surge or drop in developed and emerging economies (including developing Asian and African economies). For instance, studies like Mukherjee and Naka (1995), Kwon, Shin, and Bacon (1997), Nasseh and Strauss (2000) and Anyaduba and Idolor (2015) examine the impact of several macroeconomic variables on stock markets in both developed and emerging economies. Majority of these studies posit that macroeconomic variables have significant influence on stock market returns and suggest also the existence of a long-run relationship between these macroeconomic variables and stock prices or returns. Ying (2000) assesses the impact of macro-economic variables on the Straits Times Industrial Index (STII) by categorizing the macro-economic indicators into two groups: money supply and interest rates. He documents that money supply does not register any pattern of influences on the STII but interest rate does play a significant role in determining the STII on the monthly investment horizon. However, the study failed to consider other variables and determine the STII on daily or weekly investment horizon to see if money supply does influence the STII.

Sun and Brannman (1994) find a single long-run relationship among the SES All-S Equities Industrial & Commercial Index, Finance Index, Hotel Index, and Property Index from 1975 to 1992. Their study builds upon and extends the literature through the employment of Johansen's (1988) vector error correction model (VECM); to examine the long-run equilibrium relationship between selected macroeconomic variables, and stock market sectorial indices represented on the Stock Exchange of Singapore. Their study reveal that there exist a long run equilibrium relationship between the selected variables and stock market sectorial indices. Islam (2003) replicates the study to examine the short-run dynamic adjustment and the long-run equilibrium relationships between four macroeconomic variables (interest rate, inflation rate, exchange rate, and the industrial productivity) and the Kuala Lumpur Stock Exchange (KLSE) Composite Index. The findings and conclusion are also similar; as the study posits that there exist statistically significant short-run (dynamic) and long-run (equilibrium) relationships among the macroeconomic variables and the KLSE stock returns.

However, Maysami, Lee and Mohamed(2005) examine the existence of long-run cointegrating relationship among stocks listed dually in the US and Singapore stock markets. In addition, they used Johansen's (1988) VECM to examine the comovement between sectoral stock indices of the U.S. and Singapore, through examining whether the S&P 500 Electronics (Semiconductor) Price Index leads Stock Exchange of Singapore's Electronics Price Index. While their results confirmed the long-term co integrating sectoral relationships, there was evidence pointing to short-term disequilibria in the prices of dually listed stocks, leading to the conclusion that short-run arbitrage opportunities may exist. However, the study did not study individual country cases.

In addition, Ibrahim (1999) investigates the dynamic interactions between the KLSE Composite Index, and seven macroeconomic variables (industrial production index, money supply M1 and M2, consumer price index, foreign reserves, credit aggregates and exchange rate) in Malaysian stock market. While observing that macroeconomic variables led the Malaysian stock indices, Ibrahim (1999) posit that the Malaysian stock market was informationally inefficient. Chong and Koh (2003) results were similar, as their study reveal that stock prices, economic activities, real interest rates and real money balances in Malaysia was linked in the long run both in the pre- and post-capital control sub periods in Malaysia.Using Johansen (1988) VECM, Mukherjee and Naka (1995) analyze the relationship between the Japanese Stock Market and exchange rate, inflation, money supply, real economic activity, long-term government bond rate, and call money rate. They conclude that a cointegrating relation indeed existed and that stock prices contributed to this relation. However, upon applying this method they failed to find the strong evidence on the impact of these variables on the stock market index.

Wing, Khan and Du(2005) examine the long- run equilibrium relationships between the major stock indices of Singapore and the United States using selected macroeconomic variables with time series data from January 1982 through December 2002. The results of co integration test suggest that Singapore's stock prices generally display a long- run equilibrium relationship with interest rate and money supply (M1) but similar relationship does not exist in the United States. Their study is however not country specific. Chen, Roll and Ross (1986) assessed the relationships between macroeconomic variables and stock prices with US economic data and documents that

there is strong relationship between them. Fama (1981) also documents a strong positive correlation between common stock returns and real economic-variables like capital expenditures, industrial production, real GNP, money supply, lagged inflation and interest rates. In Nigeria, Soyode (1993) tests the association between stock prices and macroeconomic variables such as exchange rate, inflation and interest rate and finds that macroeconomic variables are co-integrated with stock prices and consequently related to stock returns. In addition, Amadi, Oneyema and Odubo (2000) employ multiple regressions to estimate the functional relationship between money supply, inflation, interest rate, exchange rate and stock prices, and, reveal that the relationship between stock prices and macroeconomic variables are consistent with theoretical postulation and empirical findings in other countries.

Nwokoma (2002) also attempts to establish a long-run relationship between stock market returns and some macroeconomic indicators. The study findings reveal that only industrial production and level of interest rates, as represented by the 3-month commercial bank deposit rate have a long-run relationship with the stock market returns. Further findings also revealed that the Nigerian stock market respond more to its past prices than changes in the extant macroeconomic variables in the short run. Ologunde, Elumilade and Asaolu (2006), upon examining the relationships between stock market capitalization rate and interest rate; find that prevailing interest rate exerts a positive influence on stock market capitalization rate. Their study also reveal that government development stock rate exerts a negative influence on stock market capitalization rate and that prevailing interest rate exerts negative influence on government development stock rate.

Without further testing the robustness of these research findings in the extant literature, it is hard to determine whether these empirical regularities are merely spurious correlations, let alone whether they support one theory or another (Rajan & Zingales, 1995). This study attempts to start filling this gap in our knowledge. The motive for this current effort therefore is to upgrade the current corpus of knowledge regarding macroeconomic influences on stock market returns, with the Nigerian capital market as a special focal point of interest.

As a frame of reference, the following hypotheses stated in the null form are posed:

Ho_1: Changes in inflation rate does not have significant impact on Nigerian Stock Market Returns

Ho_2: Fluctuating Interest rate does not have significant impact on Nigerian Stock Market Returns.

Ho_3: Changes in Real Gross Domestic Product does not have significant impact on Nigerian Stock Market Returns

Ho_4: Fluctuating Exchange rates does not have significant impact on Nigerian Stock Market Return.

H_{05}: Money Supply changes does not have significant impact on the Nigerian stock market Returns

3. METHODOLOGY

This research was designed to examine the effects of macroeconomic variables influences on stock market returns in Nigeria. The dependent variable in the model that is specified is stock market returns (RASI) while money supply and other factors are used as the independent variables. Financial openness (FOPN) is measured as the ratio of the sum of foreign assets and liabilities to Nigerian gross domestic product (GDP). The nature of the study requires that exchange rate, interest rate, inflation rate and real GDP are included as independent variables in the model. Secondary data source was adopted for the study. The data was obtained from the CBN Statistical Bulletin, the Nigerian Stock exchange all share index and capital

account liberation report by IMF. The functional form of the relationship is thus specified as:

RASI = f (MS, EXR, INTR, INF, RGDP, FOPN) (1)

RASI = Nigerian Stock exchange All-Share Index (ASI) which will be used to proxy stock market return,

MS = Money supply in Nigeria (M2),

EXRT= Exchange rate of the naira to the dollar,

INTR = Prime interest rate,

INF = Inflation rate,

RGDP = Real GDP,

FOPN = Financial Openness, and

Δ = Change in the variable of interest

The econometric form of the model is then specified as:

$$\Delta RASI_t = \alpha_0 + \beta_1 \Delta MS + \beta_2 \Delta EXRT + \beta_3 \Delta INTR + \beta_4 \Delta INF + \beta_5 \Delta RGDP + \beta_6 \Delta FOPN + ECM(-1) + \varepsilon_t \quad (2)$$

The apriori expectations assumes $\beta_1, \beta_2, \beta_4, \beta_5, and, \beta_6 > 0$ while β_3 is assumed to be < 0

4. ESTIMATION RESULTS AND DISCUSSION OF FINDINGS

Unit Root Analysis

Table 1: Unit Root Test for Variables in levels and First Difference

Variable	ADF Statistic (in Levels)	ADF Test Statistic (in First Difference)	Order of Integration	Remark
ΔRASI	-0.984	-3.422*	I(1)	Stationary
ΔMS	-1.104	-4.370*	I(1)	"
ΔEXR	-0.936	-4.519**	I(1)	"
ΔINT	-1.240	-4.965**	I(1)	"
ΔINF	-1.0891	-4.905**	I(I)	''
ΔRGDP	-2.275	-5.522**	I(1)	''
ΔFOPN	1.021	-4.179*	I(1)	''

Source: Author's computation extracted from Eviews 7.0 output. ***(**) denotes significance at 5% (1%) level***

Unit root test involves the test of stationarity of time series variables used in regression analysis. The importance of stationarity of time series used in regression borders on the fact that; for a non-stationary time series, it is not possible to generalize to other time periods apart from the present. This makes forecasting based on such time series to be of little practical value. Moreover, regression of a non-stationary time series on another non-stationary time series may produce spurious and inconsistent parameter estimates (Engle & Granger, 1987).The Augmented Dickey Fuller (ADF) test was employed in order to analyze the unit roots. The results are presented in levels and first difference in Table 1. In Table 1, the respective variables possess ADF values that are less than the 95 percent critical ADF value (in absolute values). The implication of this is that the time series are non-stationary in their levels. In order words, the variables are time-dependent and would not guarantee a long run relationship unless differenced.

In line with the argument of Box and Jenkins (1978) that non-stationary time series in levels may be made stationary by taking their first differences, we took the first differences of the respective variables and performed the unit root test on each of

the resultant time series. The results of the unit root tests on the variables in first differences are reported in the second column of Table 1. It is seen that the ADF test statistic for each of the variables is greater than the 95 percent critical ADF values (in absolute values). Therefore, the variables are adjudged to be stationary in first difference form and hence possess unit roots. Indeed, the variables are integrated of order one (i.e. I [1]).

Cointegration Test

Having established that the series in the analysis are all I(1) variables, possessing unit roots, we determined their co-integration status. The results from the Johansen multivariate co-integration test are presented in Table 2.

Table 2: Johansen Multivariate Cointegration Tests Results.
Maximum Eigen Values

Null Hypothesis	Test Statistic	Critical Value at 5%	Hypothesized No of CE(s)
r = 0*	145.28	90.15	None**
r ≤ 1*	120.31	57.25	At most 1**
r ≤ 2*	97.40	42.04	At most 2**
r ≤ 3*	69.50	21.45	At most 3**
r ≤4*	22.25	12.26	At most 4*
r ≤5*	3.19	3.22	At most 5
r≤6	0.38	0.44	

(**) denotes rejection of the hypothesis at 5% (1%) significance level.
L.R. test indicates 5 cointegrating equation(s) at 5% significance level.
Source: Author's computation extracted from Eviews 7.0 output

As can be seen from Table 2, both the λ-max and the trace test statistics indicate that there is at least five significant co-integrating vectors among the variables since the hypothesis of no co-integrating vector (r=0) is to be rejected. The number of co-integrating relations or vectors (indicated by r) is at least five, implying that a long-run equilibrium relationship exists among the variables.

Test for Causality

Table 3: Granger Causality Test results

Null Hypothesis:	**F-Statistic**	**Decision**	**Causality**
MS does not Granger Cause RASI	4.4225	Reject	Unidirectional
RASI does not Granger Cause MS	1.234	Accept	
EXR does not Granger Cause RASI	5.2712	Reject	Unidirectional
RASI does not Granger Cause EXR	2.6052	Accept	
INT does not Granger Cause RASI	3.992	Reject	Unidirectional
RASI does not Granger Cause INT	0.9764	Accept	
INF does not Granger Cause RASI	5.3061	Reject	Feedback
RASI does not Granger Cause INF	4.8822	Reject	

RGDP does not Granger Cause RASI	3.742	Feedback
RASI does not Granger Cause RGDP	4.644	
FOPN does not Granger Cause RASI	5.721	Unidirectional
RASI does not Granger Cause FOPN	2.324	

Source: Author's computation extracted from Eviews 7.0 output

The Granger-causality test was also be used to investigate direction of causation between stock price volatility and the independent variables. The outcome from the Granger-causality test was used to determine whether the variables under study can be used to predict each other or not. Granger causality test simply means that if causal relationship exists between variables, then these variables can be used to predict each other. In causality tests, a variable say Y, is caused by X if Y can be predicted better from past values of Y and X than from past values of Y alone. The causality test helps to ascertain whether a uni-directional or bi-directional (feedback) relationship exists between many variables.

The relationship between the dependent variable stock market returns and independent variables as well as the direction of causality is very important in this study; and this informed our choice to employ the Grange causality test to determine the direction of causality between the dependent and independent variables. The results of the Granger causality tests are reported in Table 3. As it is generally the case, the F-test is conducted on the null hypotheses in order to determine the direction of causality between each pair of variables. The rejection of each of the null hypothesis is based on the significance of the F-value for the particular relationship. We focus on the relationship that is of importance to the study. From the results, a unidirectional relationship exists between money supply and stock market return, with the causation running from money supply rate to stock market return. Thus, an increase in money supply will for instance stimulate stock market returns. The same unidirectional relationship is observed between exchange rate and stock market returns and interest rate and stock market returns with the causation running from exchange rate to stock market returns. The same scenario is observed with interest rate and exchange rate. Thus, changes in them will have effects on stock market returns. A bi-directional (feed-back) relationship is shown to exist between inflation and stock market returns. The same feedback relationship is also observed to exist between stock market returns and GDP. Thus, while increase in GDP output enhances stock market activities, the eventual increase in stock market activities in turn stimulates economic growth, resulting in a simultaneous relationship between both variables. Finally, a uni-directional relationship is found to exist between financial openness and stock market returns, with the causation running from FOPN to stock market returns, implying that foreign portfolio investment (FPI) stimulates stock market returns.

Error Correction Model

The results of the short-run dynamic error correction model showing the response of stock market returns with respect to macroeconomic influences is shown in Table 4.

Table 4: Error Correction Model Results
Dependent Variable RASI

Dependent Variable RASI		
Variable	**Coefficient**	**t-ratio**
C	0.203	1.845
MS	0.527	2.296
ΔEXR	0.025	3.353
ΔINT	-0.0139	-1.499
ΔINF	-0.0137	-1.552
ΔRGDP	0.643	4.862

FOPN	0.242	2.067
ECM(-1)	-0.702	-2.747
$R^{2=}$0.94; Adjusted R^2=0.90	F-Value=93.14	DW Statistic=1.72

Source: Author's computation extracted from Eviews 7.0 output

The adjusted R^2 value of 0.90 indicates that 90 percent of the systematic variations in real stock market returns is explained by macroeconomic influences, suggesting a good fit of the model. The F-value of 93.14 is highly significant at the 1 percent level, validating the hypothesis of the existence of a significant linear relationship between stock returns and its explanatory variables. The Durbin Watson statistic of 1.72 is approximately 2; and shows that there is no serial correlation in the model, implying that the model can be used for structural and policy analysis. In examining the contribution as well as the relative impact of the individual variables, we consider their respective signs as well as their statistical significance. A cursory observation reveals that the coefficient of money supply is appropriately positive and passes the significance test at the 5 percent level. This is a clear indication that rising money supply- a measure of financial liquidity will enhance stock prices in Nigeria. In fact, a cursory look at economic theory posits that sufficient liquidity is critical for the enhancement of stock market performance and consequently stock prices or returns. The coefficient of exchange rate is positive and passes the significance test at the 1 percent level. This implies that rising exchange rate has a highly significant positive effect on stock market returns. The reason for this stems from the international trade perspective in that depreciation of the exchange rate would induce domestic exports which invariably increases economic capacity reflected in rising output and economic activities. Increase in economic output and the resultant increase in economic activities will stimulate stock market performance reflected in rising stock market returns.

The coefficient of interest rate is appropriately negative though it is not significant at the 5 percent level. This is an indication that although rising interest rate has a negative impact on stock market performance, and by implication stock market returns, the impact is however weak. Inflation rate on the other hand, contrary to our prior expectations is seen to be negative, and also not significant. This implies that rising inflation rate has a destabilizing impact on the value of stock returns since inflation erodes the value of financial assets. The impact is however weak. This implies that rising inflation do not really deter investors from investing in the stock market, particularly when the returns on stocks are encouraging. Thus, inflation is not a critical determinant of stock market returns performance in Nigeria. Finally, the coefficient of real GDP is rightly positive and highly significant at the 1 percent level. The overwhelming significance of economic growth rate is an indication that the stock market does not function in a vacuum and that its performance is a reflection of the general economic performance. This further buttresses the fact that rising real level of output reflected in increased economic activities stimulates stock market performance and the consequent rise in stock returns. The coefficient of financial openness is positive in line with theoretical expectation and is significant at the 5 percent level. Thus, financial openness reflected in increased openness to foreign capital flows, particularly foreign portfolio investment which is more akin to the stock market enhances stock market returns.

Apart from the diagnostic statistics, the coefficient of the error term is appropriately negative and significant at the 5 percent level. Its coefficient indicates that the contemporaneous speed of adjustment to equilibrium long-run real stock market returns (RASI); after a temporary

disequilibrium, and, perturbation is about 70 percent.

Summary of Findings

This study sought to examine the impact of macroeconomic influences on stock market returns in Nigeria. To facilitate the study, various hypotheses were proposed on the relationship that seems to exist between macroeconomic variables and stock market returns in Nigeria. Using data covering the period 1986 to 2014 and cointegration, error correction techniques and Granger causality test, the following findings were made from the empirical analysis:

(i) Money supply has a positive and significant impact on stock market returns in Nigeria. Thus, sufficient money supply oils the wheel of the economy and this stimulates stock market returns

(ii) Exchange rate has a significant positive effect on stock market returns in Nigeria, particularly through the virtuous effect of depreciation on domestic export and the eventual stimulation of economic activities which generates positive ripple effect on stock market performance.

(iii) Interest rate has a weak negative effect on stock market returns in Nigeria. Thus, rising interest rate could dampen stock market prospect but such impact could be underplayed or whittled down particularly by other complementary gingering factors

(iv) Inflation has a negative but weak impact on stock market returns in Nigeria.

(v) Real GDP has a highly significant positive impact on stock market returns in Nigeria. Thus, rising real economic output reflects in increased economic activities and will also induce greater trading activities in stock market, which inevitably enhances stock market returns.

(vi) Financial openness has a positive and significant influence on stock market returns in Nigeria. Thus, increased openness of the domestic economy to international capital inflows, particularly foreign portfolio investment has the ability to stimulate stock market returns in Nigeria.

5. CONCLUSION AND RECOMMENDATIONS

Macroeconomic policy has an important role to play in the enhancement of stock market activities in Nigeria. Evidence show that sound macroeconomic environment is reflective of a coherent exchange rate, sufficient money supply (liquidity), exchange rate, increased output and financial openness; which all stimulate stock market returns in Nigeria. It is on this basis that sound monetary policy is believed to have an impinging role in the determination of stock returns. To this end, we have attempted to show that a sound monetary policy framework is critical to the performance of stock market returns. We therefore posit that sound macroeconomic policies must be made at all times to integrate the objective of enhancing financial markets, particularly stock market returns, in order to drive economic growth to sustainable levels in Nigeria.

Based on the empirical findings of the study, the following recommendations are suggested for policy action.

(i) Sufficient level of money supply through appropriate monetary policy must be put in place in order to encourage stock market activities and consequently stock prices in Nigeria.

(ii) The exchange rate as a pass-through variable for the domestic financial markets must be well managed in order to improve stock market stability. Since this study has shown the critical role of the naira exchange rate in ensuring market stability, it is clear that a stable naira regime can contribute extensively to the stability of the stock market and eventual rise in stock prices in Nigeria.

(iii) Inflation control should be brought to a level where it becomes stock market-enhancing.

(iv) Interest rates should be made to encourage investment in Nigeria, so as to enhance stock market returns. This is because an increase in investment will enhance stock market performance and the resultant rise in stock returns.

(v) Policies to stimulate the growth of the economy must be put in place in order to enhance stock market activities and stock prices in Nigeria.

(vi) Openness of the economy to foreign capital flows should be put in place in order to stimulate stock market returns in Nigeria. However, caution should be exercised in this respect because of the possibility of destabilizing short-term capital flows.

(vii) Regulatory financial authorities should adopt guided financial openness where aspects of foreign participation that are critical should be factored in and leveraged in other to improve the stock market.

(viii) More focus should be directed at attracting foreign financial inflows that are permanent in nature. This is because easily reversible inflows are bound to generate instability in the stock market.

(ix) The Nigerian bourse should be expanded in terms of depth and breadth; whereby foreign stockholdings in domestic companies is enhanced through a transparent and easily understood process.

(x) Efficient exchange rate management should be adopted by government; which take into account the relevance of the stock market as a possible significant strong economical indices; when addressing the issue of exchange rate management.

(xi) On the basis of our findings, the government and indeed statutory capital market regulators are advised to further open up the Nigerian financial market and economy to more capital inflows needed for further economic and industrial development.

(xii) Investors are also advised to hedge against stock price volatility by constructing very highly diversified portfolio's which reflects the overall market portfolio

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Appendix

Data for Regression

YEARS	RASI	MS	EXR	INT	RGDP	FINOPN	FPI (N'M)	INF
1986	163.8	23,806.40	2.02	16.19	-0.69	0.57	151.6	5.39
1987	190.9	27,573.58	4.02	15.55	7.58	2.2	4353.1	10.18
1988	233.6	38,356.80	4.54	16.62	7.15	0.29	2,611.8	56.04
1989	325.3	45,902.88	7.39	20.11	11.36	0.2	-1618.8	50.47
1990	513.8	52,857.03	8.04	25.78	0.01	0.23	-435.2	7.50
1991	783.0	75,401.18	9.91	20.04	2.63	0.50	-594.9	12.70
1992	1,107.6	111,112.31	17.3	24.76	1.56	3.79	36,851.8	44.81
1993	1,543.8	165,338.75	22.05	31.65	0.78	0.09	-377	57.17
1994	2,205.0	230,292.60	21.89	20.48	2.15	0.01	-203.5	57.03
1995	5,092.2	289,091.07	21.89	20.23	4.13	0.24	-5785	72.81
1996	6,992.1	345,853.96	21.89	19.84	2.89	0.09	-12055.2	29.29
1997	6,440.5	413,280.13	21.89	17.8	2.82	0.28	-4,785.8	10.67
1998	5,672.7	488,145.79	21.89	18.2	1.19	0.10	-637.5	7.86
1999	5,266.4	628,952.16	92.69	20.3	4.89	0.01	1,015.7	6.62
2000	8,111.0	878,457.27	102.11	21.3	4.72	0.00	51,079.1	6.94
2001	10,963.1	1,269,321.61	111.94	23.3	4.63	0.17	92,518.9	18.87
2002	12,137.7	1,505,963.50	120.97	24.8	9.57	0.07	24,789.2	12.89
2003	20,128.9	1,952,921.19	129.36	20.7	6.58	0.06	23,555.5	14.03
2004	23,844.5	2,131,818.98	133.5	19.2	6.51	2.00	23,541.0	15.01
2005	24,085.8	2,637,912.73	132.15	17.95	6.03	0.30	116,035.03	17.85
2006	33,189.3	3,797,908.98	128.65	16.89	6.45	0.00	360,291.55	8.24
2007	57,990.2	5,127,400.70	125.83	16.9	5.98	0.00	332,547.78	5.38
2008	31,450.8	8,008,203.95	118.57	15.14	6.96	0.00	157,157.16	11.68
2009	20,827.2	9,411,112.25	148.88	18.36	7.98	0.07	70,938.49	10.12
2010	24,770.5	11,034,940.93	153.45	20.17	7.43	0.16	556,585.07	9.72
2011	20,730.6	12,172,490.28	156.72	13.12	5.58	0.04	792,360.22	10.12
2012	21,652.42	15,190,465	158.95	14.6	6.77	0.02	2,687,232.51	9.86
2013	23,506.19	14, 352,150	160.5	15.17	7.44	0.04	2,450,250.14	9.50
2014	22,705.20	17, 250, 180	165.20	19.5	6.20	0.05	2,564,750.40	1215

Date: 05/10/18 Time:11:17
Sample: 1986 2014
Included observations: 29
Test assumption:
Linear deterministic trend in the data
Series: RASI MS EXR INT INF RGDP FOPN

Lags interval: 1 to 2

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value
0.91120	145.28	90.15	101.01
0.82177	120.31	57.28	72.23
0.73221	97.40	42.04	55.24
0.58740	69.50	21.45	33.16
0.29436	22.25	12.26	15.41
0.10250	3.19	3.22	4.15
0.07621	0.38	0.44	0.71

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 5 cointegrating equation(s) at 5% significance level

Error Correction Representation for the Selected ARDL Model

ARDL (2, 0, 0, 2,1) selected based on Schwarz Bayesian Criterion

****

Dependent variable is dLRASI

28 observations used for estimation from 1987 to 2014

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.20377	0.11042	1.84540	0.0003
DLms	0.52681	0.22947	2.29576	0.0360
dLEXR	0.02535	0.00756	3.35317	0.0028
dLINT	-0.01388	0.00926	-1.49892	0.1412
dLINF	-0.01369	0.00882	-1.55215	0.1312
dLRGDP	0.64278	0.13220	4.86218	0.0002
dLFOPN	0.24236	0.11721	2.06774	0.0510
ecm(-1)	-.70213	.25562	-2.74650	0.0523

****

List of additional temporary variables created:

dLRASI = LRASI-LRASI(-1)

DLMS = LMPS -LMPS (-1)

DLEXR= LEXR-LINT (-1)

dLINT =LINT-LINT(-1)

dLINF = LINF-LINF(-1)

dLRGDP = LRGDP-LRDP (-1)

dLFPI = LFPI-LFPI (-1)

dCONSTANT = CONSTANT-CONSTANT(-1)

ecm = LRASI + 1.2251*MS + 0.1937*EXR -0.77450*INT + 0.0924*INF +0.32616RGDP -.3282* + +0.4431FOPN CONSTANT

****

R-Squared .94326 R-Bar-Squared .90214
S.E. of Regression 9.177 F-stat. F (6, 23) 93.14[.00000]
Mean of Dependent Variable 81.005 S.D. of Dependent Variable 32.063
Residual Sum of Squares 9.8730 Equation Log-likelihood 9.4022
Akaike Info. Criterion 8.126 Schwarz Bayesian Criterion 8.255
DW-statistic 1.720

****

R-Squared and R-Bar-Squared measures refer to the dependent variable dLRASI and in cases where the error correction model is highly Restricted, these measures could become negative.

Granger Causality Test results

Null Hypothesis:	**F-Statistic**	**Decision**	**Causality**
MS does not Granger Cause RASI	4.4225	Reject	Unidirectional
RASI does not Granger Cause MS	1.234	Accept	
EXR does not Granger Cause RASI	5.2712	Reject	Unidirectional
RASI does not Granger Cause MS	2.6052	Accept	
INT does not Granger Cause RASI	3.992	Reject	Unidirectional
RASI does not Granger Cause INT	0.9764	Accept	
INF does not Granger Cause RASI	5.3061	Reject	Feedback
RASI does not Granger Cause INF	4.8822	Reject	
RGDP does not Granger Cause RASI	3.742	Feedback	
RASI does not Granger Cause RGDP	4.644		
FOPN does not Granger Cause RASI	5.721	Unidirectional	
RASI does not Granger Cause FOPN	2.324		