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**IMPACT OF EXCHANGE RATE AND TRADE OPENNESS ON STOCKS OF BSE
SENSEX IN LONG RUN AND SHORT RUN : AN ARDL BOUNDS TESTING
APPROACH**

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Abstract

The main objective of this study to find out the long and short run relationship between the two major macroeconomic variables i.e. Exchange rate and Trade openness and BSE SENSEX . The impact of macroeconomic variables plays a very important role in the development of stock market. For finding out the relationship the study supplies the Autoregressive Distributed Lag model for short run and Bounds test for long run relationship. Monthly time series data of eleven years from Jan 2009 to Dec 2019 has been taken for the study. For cross checking the short run relation the study applied the Wald test also. According to the results Exchange rate is affected the stock market in short run and both of the variables affected combinedly in long run.

Keywords: Macroeconomic variable, Stock market, ARDL Model, BSE SENSEX, Wald Test, Exchange rate, Trade openness.

Introduction

Technological improvements and capital formations are considered as a vehicle of economic growth of the country. As a result, FDI plays a very important role in economic growth. It is a transferring source relating to improvements in productivity or the spill over effect of foreign direct investment. However, the evidence concerning FDI and the mixed economic growth. Many articles have been explored growth in economy which argued that FDI promotes the economy under certain circumstances or directly. The issue of FDI inflows and the economic growth have been sparkling since last some decades especially in India. In developed countries, inward FDI believed as a major in the economic growth. Indispensable external power promote their own growth in economy under the current backdrop of globalization. Several factors like economic and political stabilities, capital resource as well as market openness are the necessities for the host countries to make benefits from FDI inflows. According to several research FDI can exert high level of producing efficiency only in that condition in which the host developing countries reached at the lowest level of human capital accumulation. From the view of developed countries long term decisive factors of activities for FDI such as comparative national factor endowment, trading and investing cost and market scale/distance in the objective of the host country. In order to benefits from FDI inflows in long term, economies requires economic stability, human capital and liberalized market. After examining a causal relationship between economic growth and FDI in three developing countries, Thailand, Malaysia and Chile, it was found that, in Malaysia there were a strong evidence of bi-directional causality between the two variables. Bi-directional causality and the long run relationship between economic growth and inward FDI.

The traditional Heckscher - Ohlin Samuelson frame work suggests that FDI and international trade work as a substitute for each other and it is assuming that labour and capital can move freely between different countries and no transportation cost apply. An indirect exchange of production factors between the countries, which is an implication in the

international trade. The association between the economic growth and technology which had been highlighted by an OECD study of both developing countries and OECD countries, which had found a significant effect by diffusion and innovation and economic growth. FDI considered as best source of development of the internal economic growth in comparison to other investment sources. Ricardian Theory is also useful for the empirical evidence for FDI and production theory, added some relative factors.

Country Profile:

United Nations conference of trade and development defined the general profile of India. According to it, till 2017 GDP estimated 2575667 million US \$ in which growth has been estimated around 6.68 % and the CPI growth is 2.49%. International merchandise trade, export estimated 299275 million US \$ and imports around 448423 million of US \$ till 2017. The trade balance has been shown negative due to more imports. Export structure has been shows, 12% on all food items, 4% ores and metals, 12% on fuels, 61% manufactured goods and 11% other items. International trade in services shows 183980 million US \$ for services export, 154014 million for services imports and trade balance in services is around 29967 million US \$ till 2017. Economic indicators shows GDP 2575667 million US \$ and real growth in GDP is 6.68%. In the category of FDI and external financial resources, the FDI inflows are 39916.09 and FDI outflow are 11304.35 million of US \$. Personal remittances, percentage of US \$. The growth in GDP has been estimated by 2.70% till 2017. FDI outflow as percentage of GDP has been grown by 0.4%.

Literature Review:

Jayachandran, G., & Seilan, A. (2010), the time series data around of thirty years have been used for checking the relationship between foreign direct investment, economic growth and trade. Generally positive points have been found for the relationship between trade and FDI growth. The growth in FDI is very pronounced in India now a days. So the causal relation has been found among the variables. Granger causality test has been shown a

causal relationship is existing among the tested variables and cointegration test shows a long term relationship among the variables. Kalai, M., & Zghidi, N. (2017), the autoregressive distributed lag model has been employed for checking the interrelationship among international trade, FDI and the economic growth in the fifteen Middle Eastern and North African countries from the period 1999 to 2012 for examining the co integration. A long run unidirectional relationship found from the variables which were taken for the study. These MENA countries could be compare with the developed countries, which have been considered in experienced for attracting the trade liberalization and the foreign direct investment. Datta, K., & Lahiri, A. (2018), FDI raises the growth in economy of the host country whether it brings some sophisticated technology efficiently, it has been supported by some researchers. It has filled the gap between investments and the domestic savings. It is not a unique issue that FDI impacts the economy of the country. ARDL bound co integration test approach employed to find the interrelation among the variables. Shahbaz, M., & Mafizur Rahman, M. (2014), a long run and a short run relationship has been measured among exports, economic growth and financial development in case of Asian countries. After checking the direction of causality and among the variables has been investigated by VECM model. Co-integration has been found among the exports, financial developments and economic growth. Muhammad, S., Saleheen, K., & Mohammad, I. T. (2012), structural break test has been applied to find out the long run relationship among energy consumption, financial development, imports, export, financial trade and capital in China over a period of time from 1971 to 2011. Unidirectional causality has been found after applying the Granger causality test. Bidirectional causality has been found between trade and energy consumption. Feedback relation exist between energy consumption and international trade and energy consumption, economic growth and international trade. Policy makers used the outcomes for searching the sources of energy for fulfilling the demand of the energy due to sustained rate of economic growth.

Sahu, P. K. (2014) several trade agreements has been established in different countries with Malaysia. Where its FTA partners are specially emphasising on MICECA (Malaysia – India Comprehensive Economic Cooperation Agreement). With rest of the world, in large context the FTA policies of Malaysia first assessed. Research focuses at the potential sectors where Malaysia can engaged with a strong trade in India. As a result of Granger causality, it was found that total import and export does not have any Granger cause FDI from the partners of FTA. A causal relationship could not be established between FTA partners. Bitzenis, A., Marangos, J., & Andronikidis, A. (2007) due to major changes in political and economic issues in Bulgaria the relationship between FDI and international trade has been tested on the basis of successful institutional and structural reforms. Liberalisation policies were effective in the transition to the market economy when the country has managed successfully the institutional reforms. Due to entrance in EU, in Bulgaria FDI inflow has been increased and also increased the re-orientation of trade activities towards the EU member countries. FDI and the international trade both are complements with each other and play a role as a substitute in the context of Bulgarian economic system. Shahbaz, M., & Rahman, M. (2011) economic growth and financial development simulated the rate of exports in the Asian countries. A causality test reveals a bidirectional causal relationship between the economic growth, financial developments and import & export activities. Kim, S. H., & Yang, J. H. (2014), by using a panel quantile regression model, different levels of FDI have been identified to the host country. FDI inflows in South Korea was gathered for secondary database. Results from conditional-mean based models for specifically FDI inflows in South Korea are not very informative. May be the determinants are different, it is depending on the different levels of FDI inflows, it implied that the determinants of FDI inflows can be heterogeneous. Results shown by using the panel quantile regression model. Muhammad, S., Mohammad, M. R., & Abdul, F. (2012), a long run relationship examined by applying the ARDL bound testing approach to co integration found in case of time series analysis in Australian stock market from the period 1965 to 2010. Capital,

international trade and financial development are the real drivers of the economic growth both in short and long run. The validation is by Granger cause economic growth of the hypothesis in case of Australia.

Objective of the Study

1. To analyse the long run and short run relationship between the dependent and independent variables.

Research Methodology

The research is focused to find out the long run and short run relationship among some macroeconomic variables and stock market. In this study BSE SENSEX (BSE) used as a proxy of Indian stock market. Exchange rate (EXR) and Trade Openness (TO) have been taken for macroeconomic indicators. For the analysis eleven years monthly time series data, taken i.e. from 2009 January to 2019 December. For analysing the long run and short run study applied the ARDL bound testing approach. For converting time series data stationary ADF unit root test applied. The procedure starts with estimation of lag length criteria by using VAR (Vector Autoregressive Model) and for checking the cointegration among the variables Johanson Cointegration test applied. The Autoregressive Distributed Lag (ARDL) model has been used for checking the short run relationship and Bound testing approach has been used for checking the long run relationship among the variables.

Table:1 Data Description & Symbols

Variables	Symbols	Proxy used
Exchange Rate	EXR	Real Exchange Rate
Trade Openness	TO	(Import + Export)/GDP Ratio
Stock Market	BS	Closing price of BSE SENSEX

Source: EViews 11

Table no. 1 is showing the symbols, variables and proxies used in to the study. Equation defined below, indicates the effect of exchange rate and trade openness.

$$BS=f(EXR, TO)$$

Table 2: Descriptive Analysis

	BS	EXR	TO
Skewness	.102	-1.346	-.632
Kurtosis	1.72	16.6	1.56
Jerque-Bera(JB)	3.543	787.165	5.828

Source: E-views 11

The descriptive analysis of all variables is showing in Table No. 2. BSE SENSEX is positively skewed while EXR and TO are skewed negatively. The values of Kurtosis of EXR is leptokurtic and the trade openness is in Platykurtic distributed where BSE SENSEX is in the position of normal distribution.

Result and Discussion:

Table No. 3 is giving the results of unit root test. For which the study applied the ADF unit root testing approach. The hypothesis are as follows:-

H0 :The Variables haveno unit root.

H1: The Variables have a unit root.

All the time series data are not stationary at level but stationary at first differencing.

Table 3 : Augmented Dicky Fuller Unit Root Test

Variable	Level	1st Difference (P- Value)	Null Hypothesis	Results
BSE SENSEX (BS)	NS	0.0001	Rejected at 1 st difference	Stationary at first difference
Exchange Rate (EXR)	NS	0.0000	Rejected at first difference	Stationary at first difference
Trade	NS	0.0000	Rejected at first	Stationary at

Openness			difference	first difference
*NS = Non-significance				

Source: E-Views 11

Results of ARDL Model – Short Run

Table no. 4 is showing the results of ARDL model in short run, according to the data only exchange rate (EXR) is influencing the stock market in short run because its P value is less than 5% level of significance. Where trade openness (TO) is not affecting the stock market in short run and according to the results its P values is more than 5% level of significance. For confirming the short run affects we have conducted the Wald test also, in Table No. 5,6 and 7 ,according to the Wald test also only exchange rate is showing the value of F statistics and Chi square test which are less than 5% level of significance. Finally the conclusion is, only exchange rate is influencing the stock exchange(BSE) in short run.

Table No. 4 Results of ARDL Model

Dependent Variable: DBSE
 Method: ARDL
 Date: 01/11/21 Time: 11:25
 Sample (adjusted): 2009M04 2019M12
 Included observations: 129 after adjustments
 Maximum dependent lags: 4 (Automatic selection)
 Model selection method: Akaike info criterion (AIC)
 Dynamic regressors (4 lags, automatic): DEXR DTO
 Fixed regressors: C
 Number of models evaluated: 100
 Selected Model: ARDL(2, 0, 0)
 Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
DBSE(-1)	-0.122573	0.086246	-1.421201	0.1578
DBSE(-2)	-0.154995	0.082537	-1.877895	0.0627
DEXR	287.5218	65.06776	4.418805	0.0000
DTO	15.42892	18.34597	0.840998	0.4020
C	266.5347	93.02507	2.865193	0.0049

R-squared	0.169258	Mean dependent var	244.5367
Adjusted R-squared	0.142460	S.D. dependent var	1080.589
S.E. of regression	1000.663	Akaike info criterion	16.69270
Sum squared resid	1.24E+08	Schwarz criterion	16.80355

Log likelihood	-1071.679	Hannan-Quinn criter.	16.73774
F-statistic	6.316048	Durbin-Watson stat	1.902066
Prob(F-statistic)	0.000117		

*Note: p-values and any subsequent tests do not account for model

selection.

Table No. 5 : Wald Test Results-1

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
t-statistic	-1.421201	124	0.1578
F-statistic	2.019813	(1, 124)	0.1578
Chi-square	2.019813	1	0.1553

Null Hypothesis: C(1)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	-0.122573	0.086246

Restrictions are linear in coefficients.

Table No. 6: Wald Test Results- 2

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
t-statistic	4.418805	124	0.0000
F-statistic	19.52584	(1, 124)	0.0000
Chi-square	19.52584	1	0.0000

Null Hypothesis: C(3)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.

C(3) 287.5218 65.06776

Restrictions are linear in coefficients.

Table No. 7: Wald Test Results- 3

Wald Test:

Equation: Untitled

Test Statistic	Value	df	Probability
t-statistic	0.840998	124	0.4020
F-statistic	0.707277	(1, 124)	0.4020
Chi-square	0.707277	1	0.4003

Null Hypothesis: C(4)=0

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(4)	15.42892	18.34597

Restrictions are linear in coefficients.

Bound Test Results – Long Run

In Table No. According to the bound testing report the value of F Statistics is 32.318% which is above upper and lower bounds, I(0) and I (1) which indicates that variables are having a long run relationship in the given period of time. In long run all the variables are influencing each other.

Table No. 8 : Bounds Test Results

ARDL Long Run Form and Bounds Test
Dependent Variable: D(DBSE)
Selected Model: ARDL(2, 0, 0)
Case 2: Restricted Constant and No Trend
Date: 01/13/21 Time: 12:50
Sample: 2009M01 2019M12
Included observations: 129

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	266.5347	93.02507	2.865193	0.0049
DBSE(-1)*	-1.277568	0.119338	-10.70542	0.0000
DEXR**	287.5218	65.06776	4.418805	0.0000
DTO**	15.42892	18.34597	0.840998	0.4020
D(DBSE(-1))	0.154995	0.082537	1.877895	0.0627

* p-value incompatible with t-Bounds distribution.

** Variable interpreted as $Z = Z(-1) + D(Z)$.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEXR	225.0539	53.40645	4.213985	0.0000
DTO	12.07679	14.50846	0.832396	0.4068
C	208.6266	69.45791	3.003641	0.0032

$$EC = DBSE - (225.0539*DEXR + 12.0768*DTO + 208.6266)$$

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	32.31829	10%	2.63	3.35
k	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5
Finite Sample: n=80				
Actual Sample Size	129	10%	2.713	3.453
		5%	3.235	4.053
		1%	4.358	5.393

Conclusion:

The research paper has analysed the impact of exchange rate and the trade openness on Bombay Stock Exchange in past eleven years. The study was focused on the relationship in short run and long run. The macroeconomic variables had been taken as important influencers for the stock market

developments. According to the results, we can say that the exchange rate is more effective for the stock market development in short run and long run both. Trade openness is less effective for the stock market volatility. The policy makers must pay attention on the effect of exchange rate fluctuations. The fiscal policy and the monetary policy must be formulated according to the fast effect of exchange rate on stock market.

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