GROSS DOMESTIC CAPITAL FORMATION AND ECONOMIC GROETH IN INDIA SINCE 1991 TO 2017

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Abstract

This paper aims at determining the role and impact of gross domestic capital formation on economic Growth in India. The macro economic variables are introduced vide an extension of the econometric model. The empirical results have been estimated by using annual data for the period of 1990-91 to 2017-18 at current prices. The study revealed the strong role and impact of capital formation on economic growth of India. Results of the unit root test indicate that all variables are stationary at first difference in ADF test and then apply Johansen co-integration test. There is no co integration among the variables. The Vector Auto Regression (VAR) model helped to establish a long run relationship between Gross Domestic Capital Formation (GDCF) and economic growth in India.There is unidirectional relationship between GDP to GDCF, GDCF to Imports and Exports to Imports. But there is one bidirectional relationship between GDCF to Exports in India.

Keywords: GDP,GDCF,VAR,Exports,Imports,Economic Growth.

INTRODUCTION

Capital formation is a concept used in macroeconomics. It is vital factor for economic growth and economic development. The goal of rapid economic growth and high productivity of factors of production can be achieved through capital formation. There is a direct reciprocal relationship among economic development and capital accumulation or capital formation. Without capital formation, it is not possible to attain the objectives of economic development such as reducing unemployment, recognizing economic stability, and improving the standard of living for all citizens, and so on. On the other hand, economic growth accelerates the process of capital formation. The core objective of economic growth is the formation of economic and social overhead capital in the economies. These capital causes to expand the production process, which increases the total national product through the facility of more employment opportunities, improve the living situation and reduce poverty. Thus, all nations irrespective of their geographical and economic status, to meet their main objective of economic growth, they need to be rapid capital formation.

The notion of capital formation refers the process of building up or stocking the assets of value, to expand the amount of existing source of wealth or generate new sources of further wealth. The essence of capital formation is equivalent to the accumulation of physical capital stock in an economy through investment on social and economic infrastructures. Any increase in the stock of physical capital can be generated by both gross private capital formation and gross public capital formation. The gross public capital formation accomplishes through two different sources, the government bodies, and the public enterprises. Governments by their autonomous investment in the infrastructural projects such as education services, public health services, power supply, transportation, construction of airports, highways, roads, water supply and sewerage, etc. enhance the productivity of private investment that will helpful for increasing

Gross Domestic Product (GDP) in the country. In under developed countries the rate of capital formation and levels of physical capital stock are very low. They need rapid rate of capital formation to break the vicious circle of poverty and raise their economic growth rate. Thus economic growth is mainly a function of capital formation .so that, Economists believe that Gross physical capital formation is an engine of economic growth.

Capital formation is analogous to an increase in physical capital stock of a nation with investment in social and economic infrastructures. Gross capital formation can be classified into gross private domestic investment and gross public domestic investment. The gross public investment includes investment by government and/or public enterprises. Gross domestic investment is equivalent to gross fixed capital formation plus net changes in the level of inventories. Capital formation perhaps leads to production of tangible goods (i.e., plants, tools & machinery, etc) and/or intangible goods (i.e., qualitative& high standard of education, health, scientific tradition and research) in a country.

Nurkse (1953), believe that, the vicious circle of poverty in underdeveloped countries can be broken through capital formation. Nurkse explains that, due to low levels of income in such countries demand, production and investment are deficient. This results in the deficiency of capital goods which can be removed by capital formation. Thus, capital formation leads to increase in the size of national output, income and development thereby solving the problems of inflation and balance of payments, and making the economy free from the burden of foreign debts.

Capital and money markets are other sources of capital formation for the economic development of any nation. These markets are avenue for surplus investors to save their excesses and/or the deficit investors to borrow the excesses for investments, which in turn, will lead to creation of employment opportunities, reduce poverty level, etc, (Shuaib& Peter, 2010).

Capital information is thus *sine qua non* as an important determinant of economic growth. This would be however, an oversimplification to regard economic development as a matter of capital formation alone ignoring political, social, cultural, technological, and entrepreneurial factors (Jhingan, 2006).

INDIA'S SCENARIO

In 2019, India became fifth largest economy in terms of GDP after United States, China, Japan and Germany, the state third largest economy in terms of purchasing power parity after china and United States. After the 1991 economic liberalization India achieved 6-7%average GDP growth annually. The rate of capital formation in India is low compared to developed economy like USA Japan, Germany, and China etc. The rate of capital formation in India is low because of low savings. The rate of Capital formation in India has been steadily rising since first plan. In India, capital formation measure in terms of savings and investment as parentage of GDP. The new economic policy has 3 main dimensions i.e. Liberalization, Globalization and Privatization which is very crucial for capital formation and raising economic growth. Liberalization gives freedom to private enterprises and capital to enter any industry, business or trade. On the other hand globalization was very helpful for removal of restriction on the movement of goods and services, capital and technology, between the nations. At the same time the rate of gross capital formation increases slowly. It was 23.97% in 1990-91, 26.8% in 1997-98, 37.0% in 2006-07 and 39% in 2010-11. After 2011 it was slightly decline and 31.31% in 2017-18. The success of new economic policy reform is to be acceleration and sustainability of economic growth. It is

worthwhile to examine the growth rate of Indian economy from the prospective of long term trend. So in this paper we examine the relationship among Gross Domestic Capital Formation (GDCF), Exports, Imports and GDP of Indian economy and analysis how GDCF relates to GDP and economic growth.

RESEARCH OBJECTIVES

The main objective of this study is to investigate the dynamic relationship among GDP, Gross Domestic Capital Formation (GDCF), Exports (EXP) and Imports (IMP) in India.

This study is presented in five different sections. The first section contends with the introduction. This takes a look at general description of the study. Section two dwelt on the literature reviewed. Section three is on the data and methodology of the study while section four is analysis on result and discussion. Section five discusses the findings and suggestions.

LITERATURE REVIEWE

Theoretical and empirical research works carried out by various researchers on capital formation and economic growth. Some of the studies are briefly reviewed below:

Donwa and Odia(2010) examined the impact of globalization on the gross fixed capital formation in Nigeria from 1980 to 2006. Using the ordinary least square, it was found that globalization proxy by openness was negatively and insignificantly related to gross fixed capital formation. In other words, globalization has not helped in assisting fixed capital formation. Foreign Direct Investment and Gross Domestic Product were positive and significant while exchange rate had a negative impact on GFCF. Interest rate had positive and insignificant relationship with GFCF.

Adhikary(2011) examined the linkage between FDI, trade openness, capital formation, and economic growth rates in Bangladesh over a period 1986 to 2008 using time series analysis. All variables are found stationary at first differencing both at constant and constant plus trend level under the ADF and PP stationary tests. The Johansen-Juselius procedure is applied to test the co integrating relation between variables followed by a vector error correction model. The empirical results trace a strong long-run equilibrium relationship between GDP growth rates and the explanatory variables with unidirectional casual flows. The volume of FDI and level of capital formation are found to have significant positive effect on changes in real GDP. The degree of trade openness unleashes negative but diminishing influence on GDP growth rate.

Bakare(2011) examined the relationship between capital formation and growth in Nigeria. The study applied Harrod - Domar model to Nigerian growth model. The ordinary least square multiple regression analytical method was used to examine the relationship between capital formation and economic growth. The study tested the stationary and co integration of Nigeria's time series data and used an error correction mechanism to determine the long-run relationship among the variables examined. The empirical study found that the data were stationary and co integrated and showed that there is a significant relationship between capital formation and economic growth in Nigeria. The results supported the Harrod Domar model which proved that the growth rate of national income will directly or positively be related to saving ratio and capital formation (i.e. the more an economy is able to save-and invest-out of given GNP, the greater will be the growth of that GDP). The econometric results suggested the need for the government to continue to encourage savings, create conducive investment climate and improve the base of the economy to boost capital formation and promote sustainable growth.

Tan and Tang (2011) investigated the dynamic relationship between private domestic

investment (PDI), the user cost of capital and economic growth in Malaysia over the period of 1970 to 2009. His result shows that PDI, the user cost of capital, and economic growth are cointegrated in Malaysia. The Granger causality test shows that there is a unidirectional causality running from PDI to economic growth and from PDI to the user cost of capital in the long run.

Bakare, (2011) using co-integration to ascertain the relationship between capital formation and economic growth, his result showed that capital formation has a direct relationship with economic growth of Nigeria.

Ugwuegbe and Uruakpa, (2013) investigated the impact of capital formation on economic growth in Nigeria. To analyze the impact of capital formation, stock market capitalization, inflation rate and interest rate on economic growth, the study employed Ordinary least square (OLS) technique. To test for the properties of time series, phillip-perron test was used to determine the stationarity of the variables and it was discovered that gross fixed capital formation and economic growth are integrated of order zero I(0), Johansen co integration test was employed to determine the order of integration while error correction model was employed to determine the speed of adjustment to equilibrium. The empirical findings suggested that capital formation has positive and significant impact on economic growth in Nigeria for the period under review.

AnisOmri and Bassemkahouli (2014) analyze the nexus among foreign investment, domestic capital and economic growth in 13 MENA countries by using a 'growth model' framework and simultaneous-equations models estimated by the Generalized Method of Moments (GMM) during the period 1990–2010. Empirical results show that there is bidirectional causal relationship between foreign investment and economic growth, between domestic capital and economic growth, and there is uni-directional causal relationship from foreign direct investment to domestic capital.

Kanu&Ozurumba, (2014) examined the impact of capital formation on the economic growth of Nigeria using multiple regressions technique. It was ascertained that in the short run, gross fixed capital formation had no significant impact on economic growth; while in the long run; the VAR model estimate indicates that gross fixed capital formation, total exports and the lagged values of GDP had positive long run relationships with economic growth in Nigeria. It was equally ascertained that there exists an inverse relationship between imports (IMP), Total National Savings (TNSV) and economic growth; while GDP was seen to have a unidirectional causal relationship with export (EXP), Gross fixed capital formation (GFCF), Import (IMP) and Total national saving (TNSV).

Debi Prasad Bal, Devi Prasad Dash and BibhuduttaSubhasish (2016) scrutinize the impact of capital formation on economic growth in India covering the period from 1970 to 2012.The error correction (ECM) model shows that the capital formation positively affects the economic growth in the short run. It is recommended that government increases the level of capital formation in order to achieve a higher level of economic growth.

The empirical literature has paid a considerable attention to analyzing the relationship between growth rate and gross capital formation. The findings, in general, revealed strong positive association between rate of gross capital formation and economic growth. This may also be indicative of the fact that a certain stage has to be reached before the investment rates play an important role in the growth of output. However, it is found that there is a significant positive relationship between GDP and gross capital formation.

DATA AND METHODOLOGY

The Data

The analysis used in this study cover annual time series of 1991 to 2017 or 27 observations. This should be sufficient to capture the relation between Gross Domestic Capital Formation (GDCF) and economic growth in India. The data set consists of observation for GDP, Gross Domestic Capital Formation (GDCF), Exports and imports at current market price in rupee. All data set are taken from Statistical hand Book of Indian Economy of Reserve Bank of India and Economic survey report 2018

Methodology

We will use the most appropriate method stationary test of time series data which is Augmented Dickey Fuller (ADF) test .Consists firstly of determining the degree of Stationary. If the variables are all integrated in level, we apply an estimate based on a linear regression. On the other hand, if the variables are all integrated into the first difference, our estimates are based on an estimate of the VAR model. When the variables are integrated in the first difference we will examine and determine the co-integration between the variables, if the co-integration test indicates the absence of co-integration relation, we will use the model VAR. If the co-integration test indicates the presence of a co-integration relation between the different variables studied, the model VECM will be used with the application of Eviews9 software.

Model Specification

Gross Domestic Product for the period 1991-2018, herein represented by the symbol GDP, are regressed against other independent variables such as Gross Domestic Capital Formation (GDCF), Exports (EXP), Imports (IMP), which are deemed to impact on gross domestic product. In this context we set the model presented below:

GDP = F (GDCF, EXP, IMP) .... (1)

The function can be represented as follows:

$GDP_t = \beta_1 + \beta_2 GDCF_t + \beta_3 EXP_t + \beta_4 IMP_t + U_t$- .... (2)

The function can also be represented in a log-linear econometric format thus

$Log(GDP) = \beta_1 + \beta_2 Log(GDCF)_t + \beta_3 Log(EXP)_t + \beta_4 Log(IMP)_t + U_t$............(3)

Where: GDP_t= Gross Domestic Product of India in Year t

$GDCF_t$ = Gross Domestic Capital Formation in India in year t

EXP t = Total exports out of the country in year, t;

IMP t = Total imports into the country in year, t,

The relationship is structurally expressed as follows:

Where; β_1 = Constant term, β_2... β_4= Regression coefficient

t = Time and

Ut = The error term assumed to be normally and independently distributed with zero mean and constant variance, which captures all other explanatory variables which influences gross domestic product in a country

The prior expectations are as follows:

$\beta_1, \beta_2,..., \beta_4 <> 0$

JUSTIFICATION OF THE CHOSEN VARIABLES

Gross Domestic Capital Formation ($GDCF_t$) is expenditure on fixed assets such as building and machinery; either for replacing or adding to the stock of existing fixed assets. It is a component

of the expenditure on gross domestic product (GDP), and thus shows something about how much of the new value added in the economy is invested rather than consumed. Thus, its coefficient β1, is expected to be positive i.e., β1 >0

Exports (EXPt): This represents proceeds from the sale of products or raw materials from India to other countries. It is a veritable source of foreign exchange to our country. Thus, its coefficient β2, is expected to be positive i.e., β2 >0

Imports (IMPt): This represents the total cost of products or raw materials bought from another country for use in our own country. Directly or indirectly, the cost is borne or defrayed through the nation's foreign exchange reserve. Though the imported products or raw materials are expected to improve the lives of our citizenry; it's been observed that, their inputs usually impact negatively on the economic growth of our nation. Therefore, its coefficient β3, is expected to be negative i.e., β3 < 0

Gross Domestic Product (GDPt): This study will use GDP to measure economic growth. This is due to the fact that gross domestic product determines whether or not an increased aggregate expenditure is matched by an increase in real output overtime. Gross capital formation is expected to enhance the economic growth of any nation.

ESTIMATION PROCEDURE
- To determine the suitability of the time series data employed we ran the unit root test.
- The data was discovered to be all stationary at first difference.
- The researcher investigated for the presence of co-integration equation.
- With the presence of co-integrating equation established, we developed vector error correction model.
- With the developed VEC model, we employed system equation estimation method to evaluate the model to establish the effect of the independent variables on the dependent variables.
- And finally investigating the direction of causal relationship between the dependent and independent variables using the VEC causality estimation procedure.

RESULTS AND DISCUSSION
Unit Root Test and Results
For the time series, in order to guard against spurious regression, the first step is to see whether the series is stationary or non-stationary; to ensure that unit root tests are used. The Augmented Dickey-Fuller (ADF) statistic was employed to test for the existence of unit roots in the data using trend and intercept. The test results are presented in Table 1 and table-2.It reveals thatin table -2, the model consists of I (I), that is, integrated of order 1.

Table—1: Augmented Dickey-Fuller Unit Root Tests
Trend and intercepts @ level I(0)

SERIES	ADF TEST STATISTIC	5% CRITICAL VALUE	10% CRITICAL VALUE	PROBABILITY	ORDER	REMARKS
L GDP	-1.644498	-3.595026	-3.233456	0.7465	I(0)	Not Stationary
LGDCF	-1.410161	-3.595026	-3.233456	0.8336	I(0)	Not Stationary
L EXP	-0.742954	-3.595026	-3.233456	0.9585	I(0)	Not Stationary
L IMP	0.142987	-3.595026	-3.595026	0.9960	I(0)	Not Stationary

H0: Variable has a unit root at this level H1: Variable is stationary at this level
MacKinnon (1996) one-sided p-values

The result of the stationary tests ADF shows that all variable are not stationary at level order zero I(0), 5 % and 10% level of critical value.so that we accept null hypothesis (H₀) and reject alternative hypothesis(H₁) of all variables.

Table –2: Augmented Dickey-Fuller Unit Root Tests

Trend and intercepts @ 1st difference

H0: Variable has a unit root at this level H1: Variable is stationary at this level.

SERIES	ADF TEST STATISTIC	5% CRITICAL VALUE	10% CRITICAL VALUE	PROBABILITY	ORDER	REMARKS
L GDP	-4.395513	-3.603202	-3.238054	0.0095	I(1)	stationary
LGDCF	-5.189370	-3.603202	-3.238054	0.0016	I(1)	stationary
L EXP	-5.083984	-3.603202	-3.238054	0.0021	I(1)	stationary
L IMP	-3.827757	-3.603202	-3.238054	0.0318	I(1)	stationary

MacKinnon (1996) one-sided p-values

The result of the stationary tests ADF shows that all variable are integrated in order one i.e I(1),namely in first difference in level 5 % and 10% level of critical value.so that we reject null hypothesis (H₀) and accept alternative hypothesis(H₁) of all variables.

VAR Lag Order Selection Criteria

As soon as the order of integration of the studied variables is in first differentials, we will determine the co-integration between them. But before this step, one must determine the number of delay existing in this estimate. To accomplish this, we will apply the VAR Lag order selection criteria method and select lag order which is best fit to our model.

VAR Lag Order Selection Criteria
Endogenous variables: L_GDP_F L_GDCF L_EXP L_IMP
Exogenous variables: C
Sample: 1991 2017
Included observations: 24
TABLE-3

Lag	LogL	LR	FPE	AIC	SC	HQ
0	134.6296	NA	2.20e-10	-10.88580	-10.68946	-10.83371
1	242.4866	170.7735*	1.07e-13*	-18.54055*	-17.55884*	-18.28010*
2	253.3267	13.55014	1.87e-13	-18.11056	-16.34348	-17.64175
3	266.3573	11.94475	3.45e-13	-17.86311	-15.31066	-17.18595

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

The result of above table-3 indicates, we have to use lag 1 in our model because most of the criteria satisfy to lag 1.

JOHANSEN CO-INTEGRATION TEST

To test the co-integration among the variables of the same order, there are two main techniques available, that is, Engle and Granger (1987) and Johansen (1988) approach. As the number of variables in the study is more than two, we apply co-integration procedure developed by Johansen (1988)to find number of co-integration existing in our model. We use the most effective and suitable test, which is Johansen co-integration test. The result is given in table -4 and table -5.

Unrestricted Co-integration Rank Test (Trace)
Table-4

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.545120	40.97743	47.85613	0.1894
At most 1	0.356364	21.28436	29.79707	0.3401
At most 2	0.264605	10.26880	15.49471	0.2606
At most 3	0.098238	2.585116	3.841466	0.1079

Trace test indicates no co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
Table -5
Unrestricted Co-integration Rank Test (Maximum Eigenvalue) hypothesis

		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.545120	19.69307	27.58434	0.3627
At most 1	0.356364	11.01556	21.13162	0.6458
At most 2	0.264605	7.683682	14.26460	0.4118
At most 3	0.098238	2.585116	3.841466	0.1079

Max-eigenvalue test indicates no co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

The Johansen co-integration test both table-4 and table -5 indicates that there is noco-integration or long run association ship at the 0.5 % level in both Trace and Max statistics. Therefore, we will use an estimate based on Vector Autoregressive Model (VAR) Estimation.

VECTOR AUTOREGRESSIVE MODEL (VAR)

The purpose of the model estimation is to identify and see whether the dependent variable directly or indirectly related to that of independent variables.

Table-6- Vector Auto-regression Estimates

Standard errors in ( ) & t-statistics in [ ]

	L_GDP_F	L_GDCF	L_EXP	L_IMP
L_GDP_F(-1)	0.676615	-0.409422	-0.349689	-0.674493
	(0.09294)	(0.17472)	(0.18594)	(0.20330)
	[7.27979]	[-2.34330]	[-1.88066]	[-3.31773]
L_GDCF(-1)	0.176759	0.677195	0.748127	0.755970
	(0.12562)	(0.23614)	(0.25130)	(0.27476)
	[1.40713]	[2.86778]	[2.97700]	[2.75133]
L_EXP(-1)	0.127419	0.947092	0.881761	0.777707
	(0.16164)	(0.30385)	(0.32336)	(0.35355)
	[0.78831]	[3.11697]	[2.72686]	[2.19970]
L_IMP(-1)	-0.043244	-0.381419	-0.271070	0.081879
	(0.18772)	(0.35289)	(0.37555)	(0.41061)
	[-0.23036]	[-1.08085]	[-0.72180]	[0.19941]
C	0.491676	1.103120	0.115043	0.652325
	(0.16618)	(0.31239)	(0.33244)	(0.36348)
	[2.95875]	[3.53128]	[0.34605]	[1.79465]
R-squared	0.998704	0.996475	0.997146	0.996801
Adj. R-squared	0.998457	0.995804	0.996602	0.996192
Sum sq. resids	0.005704	0.020158	0.022830	0.027292

S.E. equation	0.016481	0.030982	0.032972	0.036050
F-statistic	4044.878	1484.117	1834.154	1635.983
Log likelihood	72.62760	56.21677	54.59866	52.27792
Akaike AIC	-5.202123	-3.939751	-3.815281	-3.636763
Schwarz SC	-4.960182	-3.697810	-3.573340	-3.394821
Mean dependent	4.489403	3.980296	3.704794	3.755266
S.D. dependent	0.419555	0.478274	0.565643	0.584190

The above table -6 shows the co efficient, standard error and 't' value of the dependent as well as independent variables. For the better understand of this model we use the model equations which are given below:-

VAR estimation Equations

L_GDP_F = C(1)*L_GDP_F(-1) + C(2)*L_GDCF(-1) + C(3)*L_EXP(-1) + C(4)*L_IMP(-1) + C(5) ………….(4)

L_GDCF = C(6)*L_GDP_F(-1) + C(7)*L_GDCF(-1) + C(8)*L_EXP(-1) + C(9)*L_IMP(-1) + C(10)…………..(5)

L_EXP = C(11)*L_GDP_F(-1) + C(12)*L_GDCF(-1) + C(13)*L_EXP(-1) + C(14)*L_IMP(-1) + C(15)……….(6)

L_IMP = C(16)*L_GDP_F(-1) + C(17)*L_GDCF(-1) + C(18)*L_EXP(-1) + C(19)*L_IMP(-1) + C(20) ……………(7)

To know the significant of the co efficient we need probability value of each coefficient that is given below in table-7

Table-7: Estimation Method: Least Squares

	COEFFICIENT	STD. ERROR	T-STATISTIC	PROB.
C(1)	0.676615	0.092944	7.279788	0.0000
C(2)	0.176759	0.125617	1.407131	0.1631
C(3)	0.127419	0.161636	0.788308	0.4327
C(4)	-0.043244	0.187723	-0.230362	0.8184
C(5)	0.491676	0.166177	2.958752	0.0040
C(6)	-0.409422	0.174720	-2.343300	0.0215
C(7)	0.677195	0.236139	2.867778	0.0052
C(8)	0.947092	0.303850	3.116971	0.0025
C(9)	-0.381419	0.352888	-1.080849	0.2829
C(10)	1.103120	0.312385	3.531280	0.0007
C(11)	-0.349689	0.185940	-1.880661	0.0635
C(12)	0.748127	0.251302	2.976999	0.0038
C(13)	0.881761	0.323361	2.726860	0.0078
C(14)	-0.271070	0.375548	-0.721799	0.4724
C(15)	0.115043	0.332444	0.346052	0.7302
C(16)	-0.674493	0.203300	-3.317729	0.0013
C(17)	0.755970	0.274765	2.751335	0.0073
C(18)	0.777707	0.353551	2.199700	0.0306
C(19)	0.081879	0.410611	0.199407	0.8424
C(20)	0.652325	0.363483	1.794652	0.0763
DETERMINANT RESIDUAL COVARIANCE	2.20E-14			

OUR TARGET MODEL GIVEN BELOW
Equation :--(4)
L_GDP = C(1)*L_GDP_F(-1) + C(2)*L_GDCF(-1) + C(3) *L_EXP(-1) + C(4)*L_IMP(-1) + C(5)

SUBSTITUTED COEFFICIENT MODEL
L_GDP = 0.676615*L_GDP_F(-1) +0.176759 *L_GDCF(-1) + 0.127419 *L_EXP(-1) -- 0.043244   *L_IMP(-1)+0.491676

Equation-4 is our target model. Here C(1),C(2),C(3),C(4), are the coefficient of our target

model. The result of the VAR model shows that the variable Gross Domestic Capital Formation (GDCF) and Exports have   positive effects on GDP but it does not have significant probability value. On the other hand the variable imports have negative effects on GDP also not significant. But if we look to our model we found that a single unit changes in GDCF that would positive impact on GDP which is increase 0.176759 unit. Similarly a unit change in Exports causes 0.124719 unit increase in GDP. On the other hand a unit raises in imports cause 0.043244 unit decreases in GDP.

VAR GRANGER CAUSALITY TEST
The objective of applying Granger causality test is to find out the Causal relationship between variables in our model. The results are given below table-8
Table-8

NULL HYPOTHESIS	PROB.	REMARKS
L GDCF does not Granger Cause LGDP	0.1594	Accept
LEXP does not Granger Cause L G	0.4305	Accept
L IMP does not Granger Cause L GDP	0.8178	Accept
L GDP does not Granger Cause L GDCF	0.0191	Reject
L EXP does not Granger Cause L GDCF	0.0018	Reject
L IMP does not Granger Cause L GDCF	0.2798	Accept
L GDP does not Granger Cause L EXP	0.0600	Accept
L GDCF does not Granger Cause L EXP	0.0029	Reject
L IMP does not Granger Cause L EXP	0.4704	Accept
L GDP does not Granger Cause L IMP	0.0009	Reject
LGDCF does not Granger Cause L IMP	0.0059	Reject
L EXP does not Granger Cause L IMP	0.0278	Reject

VAR Granger Causality Test result shows in Table-8, that GDP, Exports influence GDCF and Exports causes Imports. On the other side GDCF influences Exports and Imports in India. There is unidirectional relationship between GDP to GDCF, GDCF to Imports and Exports to Imports. But there is one bidirectional relationship between GDCF to Exports.

RESIDUAL DIAGNOSTIC TEST
To verify that our model estimation work is reliable and acceptable or not in Table -9.This is highly reliable that is because of residual diagnostic test result. The R-square and adjusted R-square value are very high that is 0.98704 and 0.998457 respectively. On the other hand there are no serial correlation and heteroskedasticity in our model estimation. Finally our model is a stable model.
Table-9

R-squared	0.98704	
Adjusted R-squared	0.998457	
F-statistic 4044.878		
Breusch-Godfrey Serial correlation LM Test :	0.847911	Prob. Chi-square 0.3571
Brusch-Pagan-Godfrey Heteroskedasticity Test	8.252801	Prob. Chi-square 0.0827

RECOMMENDATIONS AND CONCLUSION
RECOMMENDATIONS
Based on the findings of this research; we extend the following recommendations: It is hoped that the measures will help to improve the level of gross domestic capital formation in India and thus, provide a subsequent boost to our economic growth and development.
• The central government of India should reprioritize her needs. They should spend more on capital expenditures

• Efforts must be made to mobilize the desired level of gross national savings that could be big enough to attract foreign direct investments This is very vital as FDI will help to accompaniment our domestic savings.

• Government should work on her potentially exportable commodities. The proceeds should be utilized in the importation of needed technical tools and components.

• Basic infrastructures like good roads, electricity supply and security must be seen to be adequate. This will help to reduce the fluctuations currently being faced by manufacturers.

• Efforts should be geared towards a reduction in exchange rate alteration, volatility and general mismanagement

• Policy formulators in India need to consent some investor friendly policies that will encourage, promote and attract more capital inflows (Be it official or private inflows) and to provide a beneficial and enabling environment for gross domesticcapital formation to succeed.

• There is need to play down on speculative businesses and to invest into the real sectors of the economy

• There is also the need to reduce the level of capital flight out of country. Inflows should be tied to specific, relevant and purposeful projects. This will help to create employment opportunities in the long run and reduce poverty in India.

• Farsightedness and proper accountability should be the motto in the management of accruals from official capital inflows and transfers. Such assessments are expected to be channelled into productive ventures by the governments in power and not for extravagance.

• There is need to effect a change in the revenue structure of government. This must become significantly based on domestic production activities, which is in contrast to the ages long dependence on export of primary commodities

• Lastly, macroeconomic projections should guide the overall level of expenditure. As such, their projections need to be more realistic, internally and based on more accurate and timely information.

CONCLUSION

The level of economic growth in India bears a significant relationship with gross domestic capital formation so desires a closer watch for improved economic performance. Results of the unit root test indicate that all variables are stationary at first difference in ADF test and then apply Johansen co-integration test .there is no co integration among the variables. Vector Auto Regression (VAR) model helped to establish a long run relationship between gross domestic capital formation and economic growth in India. The model posted an R-Square of 99.87%, Adjusted R-Square 99.84%,F-statistic-4.44.878 Standard Error 0.016481 Log Likelihood-72.62760Akaike information criterion -5.2.2123 and Schwarz criterion of -4.960182 The VAR model estimate indicates that an inverse relationship exist between imports (IMP) to economic growth (GDP) in current periods. A unit increase in imports in a particular year leads to about 4.32%decrease in GDP within the same year.

On the other hand, our model we found that a single unit change in GDCF that would positive impact on GDP which is increase 17.6759% unit. Similarly a unit change in Exports cause 12.4719% unit increase in GDP. Lastly, GDP, Exports Granger causes GDCF and Exports causes Imports. On the other side GDCF influences Exports and Imports in India. There is unidirectional relationship between GDP to GDCF, GDCF to Imports and Exports to Imports. But there is one bidirectional relationship between GDCF to Exports.

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