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TIE AMONG DOMESTIC INVESTMENT, EXPORTS AND ECONOMIC GROWTH: EMPIRICAL ANALYSIS FROM INDIA

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Abstract:
The contribution of this paper is investigating the relationship between domestic investment, exports and economic growth in India. To attempt this purpose annual data was collected for the period 1960 – 2017 and was tested by using cointegration analysis and vector error correction model. Empirical analyses show that there is no relationship between exports domestic investment and economic in the long run. However, only exports cause economic growth in the short run. These results provide on evidence that domestic investment and exports are not seen as source of economic growth in India during this considerable period and bear a lot of issues and inappropriate economic strategy.

Keywords: Domestic Investment, Exports, Economic Growth, VECM, India
JEL Classification: C13, E22, F14, O47, O53

I. Introduction

Economic Growth is a fundamental process of contemporary economies, based on the development of factors of production, linked in particular to the industrial revolution, access to new mineral and energy resources and technical progress. It transforms people's lives to the extent that it creates more goods and services.

In the long run, economic growth has a significant impact on the demographics and the standard of living of the companies that serve as its backbone. In the same way, the enrichment resulting from economic growth can help to reduce poverty and unemployment in this same society.

According to IMF data, India was the world's ninth largest economy in current dollars in 2015, with a gross domestic product (GDP) of $ 2,183 billion, but a purchasing power parity of $ 8728 billion (PPP) ranking third in the world after the United States and China (19,150 billion), representing 7.1% of global GDP compared to 3% at the beginning of economic reforms in 1980. But it is still a country where poverty remains very important since its GDP per capita in purchasing power was $ 6,640 in 2015 against $ 15,180 for China and $ 57,765 for the United States.

It is clear to us that domestic investment and exports are among the most necessary solutions for advancing the country and reducing most of these disasters.

This is a motif that guides us to look into the relationship among domestic investment, exports and economic growth in India. To do this we will employ Sims Model and annual data for the period 1960 - 2016. The second section introduces a succinct overview of the literature. The empirical methodology and its results will be treated within sections three and four respectively.

II. Literature Survey

In this section, we will discuss the empirical work that focuses only on the relationship between domestic investment, exports and economic growth in developing countries, and deals with the case of time series analysis and not with panel data analysis.

Iftikhar and al (2016) analyzed the relationship among domestic investment, exports and economic growth in Pakistan during the period 1985 - 2016 by using cointegration analysis and error correction model to detect the nexus in the long run. Empirical results showed that domestic investment has a positive effect on economic growth; however, exports have a negative effect on economic growth. According to Saleem and Zaheer (2018), which examined the relationship among domestic investment, exports and economic growth in Pakistan using the same empirical analysis of Iftikhar and al (2016) but for the period 1980 – 2016, exports have a positive impact on economic in the long run; however domestic investment has a negative effect on economic growth in the long run.

Masoud and Suleiman (2016) investigated the nexus between exports, domestic investment and economic growth in Malaysia, using annual data for the period 1967- 2010. Cointegration analysis, VAR and Granger causality tests were employed in the empirical analysis. The results show economic growth and exports cause domestic investment.

Bakari (2017a) examined the impact of domestic investment and exports on economic growth in the short run and the long run for the case Gabon for the period 1980 – 2015. He used cointegration analysis and error correction model. Empirical analysis showed that domestic investment and exports have a negative effect on economic growth in the long run. However, in the short run, he found that exports and economic growth have a positive effect on economic growth. In another study, Bakari (2017b) investigated the impact of domestic investment and exports on economic growth in Sudan. In order to achieve this goal, he applied cointegration analysis and error correction model. Empirical analysis showed that there is no relationship between domestic investment, exports and economic growth in the long run. Only economic growth causes domestic investment in the short run. Also Bakari (2017c) investigated the relationship between exports, domestic investment and economic growth in Egypt. In order to achieve this purpose, annual data for the periods between 1965 and 2015 was tested by using Johansen co-integration analysis of Vector Error Correction Model to explore the long run and the short run relationships between these variables. The empirical results indicated that in the long run domestic investment and exports have negative impact on economic growth.

Mbulawa (2017) explored the impact of economic infrastructure on long term economic growth in Botswana by using Vector Error Correction Model and Ordinary Least Squares during the period of 1985 – 2015. Empirical results show that domestic investment influence positively economic growth.

Again, Bakari (2018) studied the impact of domestic investment and exports on economic growth in Algeria for the period 1969 – 2015. By using cointegration analysis and error correction model, he found in the long run that domestic investment has a negative effect on economic growth; however exports have a positive effect on economic growth. In the short run, he found that domestic investment has a positive effect on economic growth.

Bakari, Mabrouki and Elmakki (2018) examined the relationship between industrial domestic investment and economic growth in Tunisia. In order to achieve this purpose, annual data for

the periods between 1969 and 2015 were tested using the Johansen co-integration analysis of VECM and the Granger-Causality tests. According to the result of the analysis, it was determined that there is a negative relationship between industrial domestic investment and economic growth in the long run term. Otherwise, and on the basis of the results of the Granger causality test, we noted a unidirectional causal relationship from economic growth to industrial domestic investment in the short term.

In other research Bakari, Mabrouki and Othmani (2018) examined the nexus between domestic investment, exports and economic growth in Nigeria using cointegration analysis and vector error correction model over the period 1981 – 2015. The results show that there is no relationship between domestic investment, exports and economic growth in the long run and in the short run.

The aim of the next section is to identify our methodology and our model specification to inspect the nexus between domestic investment, exports and economic growth in India which are inspired from the works that explained in our literature survey.

III. Empirical Strategy

We operate the model of Sims (1980) because it has various advantages. It is more apt for testing the existence of relationship in the long run and in the short run among macroeconomics variables.

That is why our empirical strategy would be found first of all on the fixation of the stationary of variables (attachment of the order of integration of each variable) utilizing the ADF stationary test. All variables must be stationary (at least two variables are stationary in first difference) to maintain to the upcoming step of clenching cointegration analysis by using the Johansen Test. In the case of the absence of cointegration relationship between variables, we will use VAR Model; however in the case of the presence of cointegration relationship we will use VECM Model.

1) Model Specification

In this context, we will use as a starting point the modeling of the neoclassical model in order to determine the causality between exports, domestic investment and economic growth. This model includes exports and domestic investment it is written as follows:

$$\mathbf{Y = F\,[K, X]} \quad \mathbf{(1)}$$

The augmented production function containing all these variables is uttered as:

$$\mathbf{Y = A\,K^{\alpha_1}X^{\alpha_2}} \quad \mathbf{(2)}$$

In equation (2) Y is GDP, K is Domestic Investment, X is Export and A evince the level of technology involved in the country which is presumed to be constant. The returns to scale are linked with domestic investment and exports which are shown by α_1 and α_2 respectively.

All the variables are changed into logarithms in order to concoct linear the non linear form of Cobb-Douglas production. The Cobb-Douglas production function is occurred in linear functional form as follows:

$$\mathbf{Log\,(Y_t) = Log(A) + \alpha_1 Log(K_t) + \alpha_2 Log(X_t) + \varepsilon_t} \quad \mathbf{(3)}$$

The overhead empirical will scout about the potency of domestic investment and exports on economic growth by remaining technology constant.

The linear model restoring the effect of domestic investment and exports on economic growth after detaining technology constant can be written as follows:

$$\mathbf{Log\,(Y_t) = \alpha_0 + \alpha_1 Log(K_t) + \alpha_2 Log(X_t) + \varepsilon_t} \quad \mathbf{(4)}$$

2) Estimation period and source of data

To perambulate the tie among domestic investment, exports and economic growth in India, we will involve a time series database that will wrap the period 1960 - 2017, and taken from annual statistical reports of the World Bank. The short illustration of variables is stated as below in Table 1.

Table 1: Description of variables

No	Variable	Description	Source
1	Y	Gross domestic product (Constant US$)	The World Bank
2	K	Domestic Investment (Constant US$)	The World Bank
3	X	Exports (Constant US$)	The World Bank

After having the identification of our estimation model, the next section puts an empirical validation that looks into the acquaintance among domestic investment, exports and economic growth in India.

IV. Empirical Analysis

This section is an empirical exploration on the tie among domestic investment, exports and economic growth in India. To get on our lens we split this section into five steps. In the first step, we will determine the order of integration of each variable. Then, in the second step, we

will determine the number of optimal lag that is appropriate to our estimate. Next, in the third step, we will check the presence of cointegration between the three variables. The fourth stage presents the Sims model estimate. And lastly, the last step involves diagnostic tests to check the quality and stability of our estimate.

1) Analysis of stationarity

To determine the order of integration of each variable (the stationarity of each variable), we will apply the most appropriate test that the ADF test (Test Dickey Fuller Augmented).

Table 2: Test for Unit Test ADF

Variables	ADF Test		
	Constant	Constant and Trend	None
Y	(3.767782)	(0.621336)	(13.56845)
	[6.574230]***	[8.344343]***	[0.764358]
K	(1.574293)	(0.907395)	(9.469957)
	[6.684342]***	[7.048916]***	[1.614959]*
X	(1.248296)	(2.231911)	(6.807146)
	[6.956265]***	[7.159414]***	[2.603544]**

*****; ** and * denote significances at 1%; 5% and 10% levels respectively**

( ) denotes stationarity in level

[ ] denotes stationarity in first difference

The table above indicates that all variables are stationary. They are all integrated in order (1).

2) Determination of the number of the lag

To determine the number of lags applied in our model, we use a set of information criteria such as AIC and SC to achieve this goal.

Table n °3: Lag Order Selection

VAR Lag Order Selection Criteria						
Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	232.5942	NA	1.15e-08	-9.769967	-9.651872*	-9.725527*
1	242.4516	18.03683	1.11e-08*	-9.806449*	-9.334071	-9.628690
2	248.4829	10.26614	1.26e-08	-9.680124	-8.853462	-9.369046
3	250.5274	3.218927	1.72e-08	-9.384143	-8.203198	-8.939746
4	256.3523	8.427507	2.02e-08	-9.249032	-7.713803	-8.671315

5	261.0408	6.184946	2.53e-08	-9.065568	-7.176056	-8.354532
6	271.5946	12.57471	2.51e-08	-9.131686	-6.887890	-8.287331
7	290.2369	19.83217*	1.83e-08	-9.541994	-6.943914	-8.564319
8	302.7060	11.67321	1.79e-08	-9.689616	-6.737252	-8.578621
9	308.5542	4.728362	2.45e-08	-9.555498	-6.248851	-8.311185
10	315.1468	4.488574	3.49e-08	-9.453055	-5.792125	-8.075422

*** 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

Table 3 indicates that the number of the optimal lag is equal to 1.

3) Cointegration analysis

In this step, we will use the Johanson test to check the cointegration between the variables included in our model.

Table n°4: Johanson Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0,05 Critical Value	Prob.**
None *	0.466529	75.08052	29.79707	0.0000
At most 1 *	0.351346	40.52125	15.49471	0.0000
At most 2 *	0.262061	16.71416	3.841466	0.0000

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

*** denotes rejection of the hypothesis at the 0.05 level**

****MacKinnon-Haug-Michelis (1999) p-values**

The Trace test points the existence of 3 cointegration relationships. So the Vector Error Correction Model (VECM) will be held.

4) Estimation of the VECM model

a- Determination of the equation of long-term equilibrium

The equation of long-run equilibrium is presented as follows:

$$\mathbf{Log(Y) = 0.021872 - 0.177440\ log(X) + 0.690027\ log\ (K)} \qquad \mathbf{(5)}$$

According to this equation, we note that there is a negative relationship between exports and economic growth (a 1% increase in exports leads to a decrease of 0.177440% of GDP) and a positive relationship between domestic investment and economic growth (a 1% increase in domestic investment leads to an increase of 0.690027% of GDP).

To verify the credibility of the long-run equilibrium equation, we will extract the equations of the vector error correction model and we estimate them using the Gauss-Newton method to determine the long-term relationships and using the WALD test to determine short-term relationships.

b- Representation of the equations of the vector error correction model

The equations of the vector error correction model are presented as follows:

$$\mathbf{D(DLOG(Y))} = \mathbf{C(1)} * (\mathbf{DLOG(Y(-1))} + \mathbf{0.177439695622} * \mathbf{DLOG(X(-1))} - \mathbf{0.690027064212} * \mathbf{DLOG(DI(-1))} - \mathbf{0.0218719572978}) + \mathbf{C(2)} * \mathbf{D(DLOG(Y(-1)))} + \mathbf{C(3)} * \mathbf{D(DLOG(X(-1)))} + \mathbf{C(4)} * \mathbf{D(DLOG(DI(-1)))} + \mathbf{C(5)} \quad \textbf{(6)}$$

$$\mathbf{D(DLOG(X))} = \mathbf{C(6)} * (\mathbf{DLOG(Y(-1))} + \mathbf{0.177439695622} * \mathbf{DLOG(X(-1))} - \mathbf{0.690027064212} * \mathbf{DLOG(DI(-1))} - \mathbf{0.0218719572978}) + \mathbf{C(7)} * \mathbf{D(DLOG(Y(-1)))} + \mathbf{C(8)} * \mathbf{D(DLOG(X(-1)))} + \mathbf{C(9)} * \mathbf{D(DLOG(DI(-1)))} + \mathbf{C(10)} \quad \textbf{(7)}$$

$$\mathbf{D(DLOG(DI))} = \mathbf{C(11)} * (\mathbf{DLOG(Y(-1))} + \mathbf{0.177439695622} * \mathbf{DLOG(X(-1))} - \mathbf{0.690027064212} * \mathbf{DLOG(DI(-1))} - \mathbf{0.0218719572978}) + \mathbf{C(12)} * \mathbf{D(DLOG(Y(-1)))} + \mathbf{C(13)} * \mathbf{D(DLOG(X(-1)))} + \mathbf{C(14)} * \mathbf{D(DLOG(DI(-1)))} + \mathbf{C(15)} \quad \textbf{(8)}$$

c- Long-term and short-term results

The table above presents the final results of the estimation of the equations of the vector error correction model.

Table n°5: Estimation of VECM

	Y (6)	X (7)	K (8)
Y	-	(0.2092)	(0.0099)***
X	(0.0197)**	-	(0.5667)
K	(0.6003)	(0.8390)	-
ECT	[-0.312593*]	[-1.002600*]	[1.192264***]

*****; ** and * indicate significance at 1%, 5% and 10%, respectively**

( ) denotes the value of the probability of the variables in the short term

[ ] denotes the significance of long-term co-integration equations

- **Short term relationships:**

To determine the short-term relationship in the vector error correction model, the WALD test is used. The econometric rule states:

- ✓ If there is a probability less than 5% then there is a causal relationship between the two variables.
- ✓ If there is a probability greater than 5% then there is not a causal relationship between the two variables.

In our case, we notice that:

- ✓ Exports (X) cause economic growth (Y) since both variables have a probability of less than 5% (P = 0.0197)
- ✓ Domestic investments (K) do not cause economic growth (Y) since variables have a probability greater than 5% (P = 0.6003)
- ✓ Economic growth (Y) does not cause exports (X) since both variables have a probability greater than 5% (P = 0.2092)
- ✓ Domestic investments (DI) do not cause exports (X) since both variables have a probability greater than 5% (P = 0.8390)
- ✓ Economic growth (Y) causes domestic investment (K) because both variables have a probability of less than 1% (P = 0.0099)
- ✓ Exports (X) do not cause domestic investment (K) since both variables have a probability greater than 5% (P = 0.5667)

In the short run, the estimation of the vector error correction model shows that exports cause economic growth and economic growth cause domestic investment.

- **Long run relationship**

To verify the existence of a long-term relationship between the variables included in our model. The econometric rule requires that the coefficient of the error correction term must be negative and have a probability of less than 5%

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In our case, we note that:

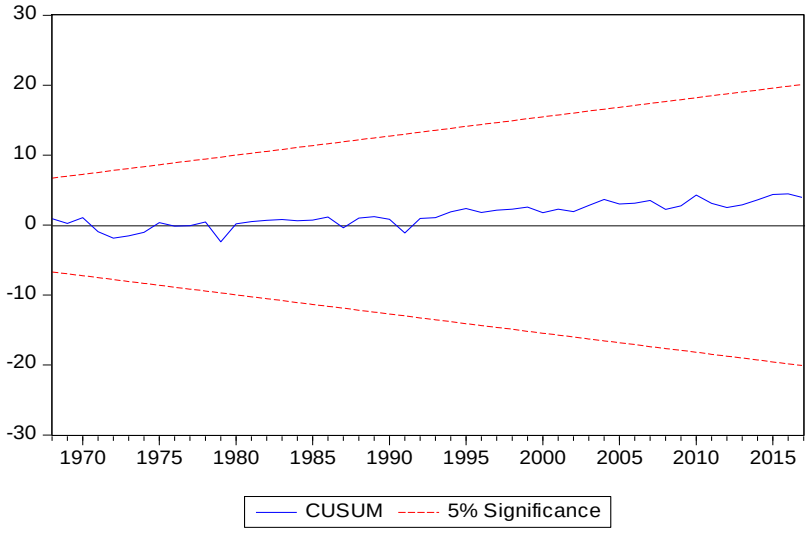
- ✓ For the equation (6), the coefficient of the error correction term is negative and has a non-significant probability (C1 = -0.312593). So, we can confirm that exports and domestic investment have not any effect on economic growth in the long run.
- ✓ For the equation (7), the coefficient of the error correction term is negative and has a non-significant probability (C6 = - 1.002600). In that case, we can confirm that economic growth and domestic investment have not any effect on economic growth in the long run.
- ✓ For the equation (8), the coefficient of the error correction term is positive and has a significant probability (C11 = 1.192264). So we can confirm that economic growth and domestic investment have not any effect on economic in the long run.

In the long run, the estimation of vector error correction model shows that there is no relationship between domestic investment, exports and economic growth in India.

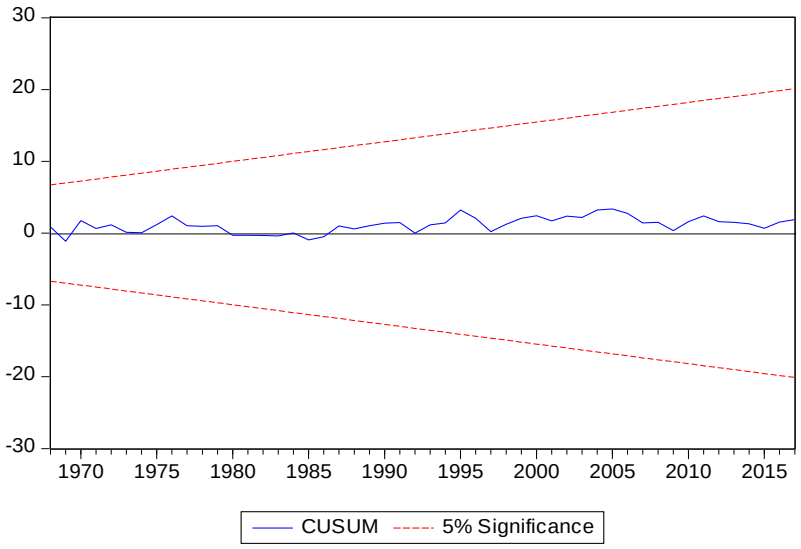
5) Diagnostics tests

To verify the stability of our estimation of the three equations (6), (7) and (8) we will use the CUSUM Test

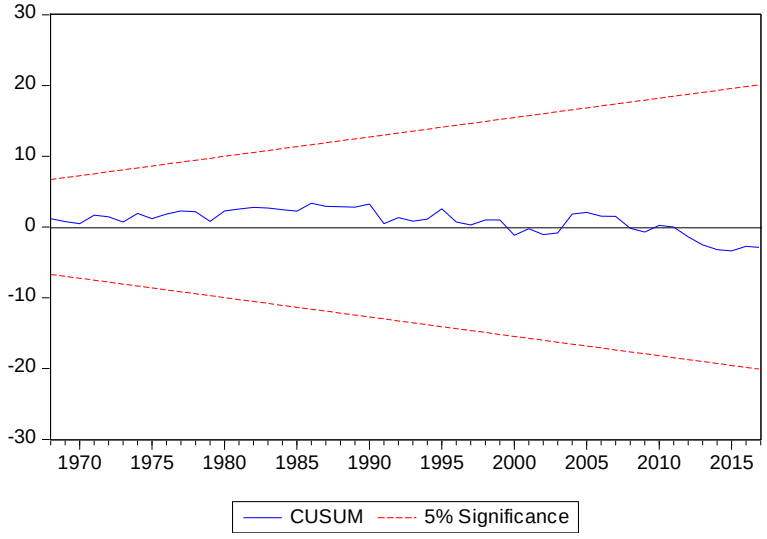
Graph n°1: Test CUSUM of the estimation of the equation (6)



Graph n°2: Test CUSUM of the estimation of the equation (7)



Graph n°3: Test CUSUM of the estimation of the equation (8)



Graph 1, 2 and 3 show that the estimation of our vector error correction model is significant and stable in the three models.

V. Conclusion

In this paper, we investigate the tie among domestic investment, exports and economic growth in India for the period 1960 – 2017. We use vector error correction model to look into the relationship among this variable in the long run and in the short run. Empirical analyses show that there is no relationship between domestic investment, exports and economic growth in

the long run. In the short run, the results show that exports cause economic growth and economic growth cause domestic investment.

These results explain that exports and domestic investment are not seen as a source for economic growth in India. The economic cycle between investment, export and economic growth is inefficient due to its many economic and political obstacles.

India is a multi-ethnic country, and its diverse democracy is imposing a huge tax on its economy. The Indian government should consider many interest groups before making the decision, which would slow the solution of economic problems and establish timely development reforms.[1]

Since its independence, India has witnessed many rebel movements that exploit the poor by forced recruitment and misuse property and wealth of the country[2], which has caused many economic crises and hinder investment growth.

Another reason that presents political and economic obstacles is the absence of an international representation of India, as it is not a permanent member of the Security Council, it lacks the capacity to expand its influence or ideas on international events in the way that the superpowers operate, which negatively affects the expansion of their exports[3].

Another problem like the infrastructure in India (roads, power, water, communications, housing and education infrastructure), which is often beneath standards, continued weak infrastructure may serve as a bottleneck to increase economic development.[4]

Furthermore, the plurality of India lies in the tropical climatic zone, which may have an unfavorable effect on agricultural economic development. Because rainfall is usually adequate, but timing is often erratic and uncertain. Also, because this climate, India is more apt to waterborne and parasitic diseases such as cholera and malaria (Of the 3 million premature deaths in the world each year due to air pollution, India ranks first).[5]

Similarly, the overpopulation and lack of resources are holding back exports because the majority of agricultural production is derailed directly to consumption to provide some food security and stop people's hunger.

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[1] Democracy's drawbacks". The Economist. https://www.economist.com/special-report/2005/10/27/democracys-drawbacks

[2] See Azam and Bhatia (2012), Mahadevan (2012), Mukherjee (2017)

[3] See Gurtoo and Williams (2009).

[4] See Gupta and al (2009)

[5] See Kumar and al (2004), Burney and Ramanathan (2014)

All these reasons add to poverty, employment, structural violence and bureaucracy make the pillars of Indian economy very fragile and a barrier to progress and growth.

India has to undertake many political and economic reforms, such as seeking to improve its commercial and political relations with neighboring countries, and to ensure the rapid development of its investments, taking into account its large population density, abundant natural wealth and geographical location, with a focus on diversification policy, especially in the agricultural sector, to reduce poverty.

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