

Gross Domestic Capital Formation, Exports and Economic Growth

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Abstract

The paper analyzed the relationship between gross domestic capital formation, export and economic growth in Pakistan. Johnson's co-integration methodology is used in the study to analyzed the presence of a long term relationship between gross domestic capital formation, exports and the economic growth of Pakistan. The results showed that there is one co-integrated vector among exports, gross domestic capital formation and economic growth. Granger causality tests based on Error Correction Models have indicated that gross domestic capital formation and export influences the steady state level of GDP.

Keywords: Gross domestic capital formation, export, co-integration, Pakistan

1. INTRODUCTION:

According to the report of Pakistan Bureau of Statistics, in the fiscal year 2012-2013 Pakistan has achieved 3.59 percent expansion in the Gross domestic Product (GDP). It is evident from the past history that Pakistan had an average growth rate of 4.94 percent for the period 1952 till 2013. Among the developing countries, Pakistan is placed as the poorest and least developed country among Asia. Having a low down economic condition, our economy heavily relies on the agriculture sector, being the largest contributor of the economic growth, besides that we definitely are a semi-industrialized economy that is dependent upon manufacturing and remittances. Since 2005, our GDP has been on the increase at an average rate of 5 percent annually, it is not adequate to continue with the increasing growth of the population. Other determinant which adversely affects, are the political instability, persistent corruption and deficiency in the law enforcement deeply effects the private investment and foreign aid.

In South Asian region, Pakistan is a lower income country. It is facing bad economic conditions and underdevelopment for the last ten years due to internal political instability, less foreign direct investment (FDI) and waning exports. Actually, we are placed as an agricultural economy which accounts for a large amount of country's labor force. Besides this, industry is also playing its key role in the economy of Pakistan.

Pakistan's economy is placed at 27th position based on its purchasing power in world's ranking. However, Government is putting a lot of efforts for reducing poverty and it is evident that since 2001 till 2007, the poverty level has declined by 10%. In the fiscal year 2004 to 2007, Gross domestic Product rose from 5 percent to 8 percent due to the development in the services and industrial sector in spite of the severe economic problems like shortage of electricity. Due to these problems, it caused depreciation in Pakistani rupee. It was again affected by the slump in global economy in 2008. As suggested by (Edwards, 1992) that the economics theory is of the point of view that a rise in the exports of the country results in an improvement in allocation of the production resources, thus it give rise to the volume of the production by the accumulation of the capital. As described by the Edwards, (1997) a rise in the exports give boost to the trade in the economy which definitely empowers the level of exports. It will strengthen the total factor productivity which will enhance the economic growth of the economy both in the short and long run. In the neo-classical theory of the international commerce, process of the commercial integration as in the case of the Central and European countries where there is less capital stock and more of the labor, a reduction in the relative prices of the labor and increase in the capital intensive goods will give rise to the exports. This technique will enhance the economic growth.

Apparently, there are many studies which tested the correlation among the economic growth and the

exports dynamics and also found the various methods of transmitting the effects of the both the variables. To test the causal relationship among them, Pereira and Xu (2000) employed the technique of the Granger to check the causality concept among exports and the economic growth. They were of their view that economic growth upholds the economic growth.

Similar study was conducted by Subasat (2002) and he suggested that exports are a cause of convergence of the economic growth. He was of the view that those countries where there is medium level of development and there is an increasing trend towards exports, those countries grow faster as compare to those who are less leaning towards the export culture. He suggested that the countries with very low or high pace of development there is no significant relationship between exports and the economic growth. Dritsakis (2006) did research on the relationship between exports, investments and the economic growth. He tested this relationship on two countries namely Bulgaria and Romania. According to his research, there exists a relationship among these variables and found that there is positive impact of exports and investments on the real GDP.

According to (Alimi & Muse, 2012; Mehmood, 2013) there is uni-directional relationship between exports and economics growth but Rahmaddi & Ichihashi (2011) concluded the bi-directional relationship between exports and economic growth.

On the basis of the literature, three variables have been decided for the purpose of estimation which is of core importance. Annual data of all these variables have been taken from the Economic Survey of Pakistan and through website of World Bank. The objective of this study is to find out the relationship between economic growth, exchange rate and exports in the context of Pakistan. Secondly, to analyse how exchange rate and exports effect the economic growth in Pakistan. Thirdly, to provide policy implications on the basis of estimated results.

1.1. RESEARCH QUESTIONS:

Following are the research questions that are intended to be tested in this paper.

- Does Gross Domestic Capital Formation affecting Economic Growth?
- Does Exports affecting Economic Growth?

2. METHODOLOGY:

For the estimation of the growth model in the long run context we want the estimate the following:

$$GDP_t = f(GDCF_t, X_t)$$

Where GDP_t is the value of the real GDP and GDP is the proxy for the variable economic growth. $GDCF_t$ is termed as gross capital domestic formation which is calculated by deflating nominal GDCF by the whole sale price index in the time period t. This is taken as a proxy for the domestic investment. X_t is exports and can be measured if we divide nominal export by the whole sale price index in the time frame t.

The next step which is very important to decide is the choice of the appropriate model whether we decide among the linear or the log model. For this purpose, there are various tools and techniques are used. Various researchers which include Khan & Ross (1977), Boylan, et al. (1980), & Doroodian (1994) are of the view that log linear model should be incorporated according to the data. The reason why

Khan and Ross (1977), Boylan, et al. (1980), & Doroodian (1994) suggested that log linear model should be used inspite of the linear model, the reason being that there are certain merits which are related with this. In this data set we have constant value of elasticity for the entire data. (Goldstein & Khan, 1976) are of the view that this technique is useful for overcoming the problem of heteroskedasticity.

As we used time series data in this study so according to the nature of data first we check the stationary of the data, as all the variables are stationary at first difference and indicating the presence of long run relationship among the variables (Granger & Newbold, 1974). In the study, to test the order of integration, the Augmented Dicky-Fuller (ADF) test and Philips-Perron (PP) test is applied and to test the presence of co-integration, the Johansen (1988) approach has been applied. If there is co-integration, we estimate an ECM which includes both long run and short run estimation.

2.1. Econometric Analysis:

The long run growth model of this study is:

$$GDP_t = \alpha + \beta_1 GDCF_t + \beta_2 X_t + e_t$$

3. RESULTS AND DISCUSSION:

3.1. Long run dynamics:

3.1.1. Unit Roots and Co-integration:

In this paper the author has applied the ADF and PP tests for testing the required variables because Johanson co integration test necessitate that all the variables used should be of the same order. The results of the ADF and PP tests are shown in the table 1 below. It provides the evidence that all the variables at level have values less than

the critical values. It concludes that at level null hypothesis is accepted because all the variables are non stationary. However, if we look at the first difference it clearly indicates that values of the variables are greater than the critical values, which concludes that at order one all the variables are integrated. In the above table majority of the stars are at lag = 2 so we will use lag = 2 as optimal lag order.

Table-1: ADF Test.

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

Variable	Level Variable			First difference			Order of Integration
	Const.	Const. & Trend	None	Const.	Const. & Trend	None	
LGDP	-2.97	-2.20	13.88	-3.66*	-3.92*	-1.47	I(1)
LGDCF	-0.63	-2.60	2.92	-4.44*	-4.36*	-3.88*	I(1)
LEXPORT	-0.17	-2.11	4.41	-5.31*	-5.26*	-3.79*	I(1)

As most of the statistics (const., const. & trend, none) in ADF test are significant (using ADF critical values) suggesting that the variable in the first difference form is stationary but not stationary at level form so they are suggested to be I(1).

Table-2: Philips Peron Test.

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

Variable	Level Variable			First difference			Order of Integration
	Const.	Const. & Trend	None	Const.	Const. & Trend	None	
LGDP	-2.52	-2.39	9.97	-3.63*	-3.92*	-0.16	I(1)
LGDCF	-0.68	-2.09	2.92	-4.43*	-4.35*	-3.89*	I(1)
LEXPORT	-0.17	-2.23	4.41	-5.32*	-5.27*	-3.88*	I(1)

As most of the statistics (const., const. & trend, none) in Phillips Peron test are significant (using PP critical values) suggesting that the variable in the first difference form is stationary but not stationary at level form so they are suggested to be I(1).

Table-3: Lag order criterion.

To calculate the lag order, VAR model is used.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	32.12918	NA	2.88e-05	-1.941946	-1.801826	-1.897120
1	149.0627	202.6848	2.17e-08	-9.137515	-8.577036*	-8.958213
2	164.1796	23.17927*	1.47e-08*	-9.545309*	-8.564471	-9.231531*
3	170.3925	8.283793	1.87e-08	-9.359499	-7.958302	-8.911244

* indicates lag order selected by the criterion

LR is sequential modified LR statistics,

FPE denotes Final prediction error,

AIC refers to Akaike Information criterion

SC is Schwarz information criterion,

HQ denotes Hannan-Quinn information criterion

As results show that mostly criteria's are significant at lag 2 so we use lag 2 in the model.

3.1.2. Co-integration Test:

While running the co-integration test we will input lag 2 in the model which is suggest by previous test.

Table-4a: Trace test.

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.659828	42.19348	29.79707	0.0012
At most 1	0.208970	9.844375	15.49471	0.2929
At most 2	0.089469	2.811807	3.841466	0.0936
Trace test indicates 1 co-integrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table-4b: Eigen value test.

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.659828	32.34911	21.13162	0.0009
At most 1	0.208970	7.032569	14.26460	0.4853
At most 2	0.089469	2.811807	3.841466	0.0936
Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

In both Trace test and Eigen value test shows that there is one co-integrating equation exist at 0.05. In table 5 shows that long run co-integrating vector and it shows that GDCF has positive while EXP has negative relationship with the GDP in the long run. If 1% increases in GDCF it will increase GDP 1.33% and 1% decrease in EXP it will increase 0.85% increase in GDP. The reason might be behind that with the increase in exports, the domestic consumption of that particular item decreases.

Table-5: Long run co-integrating vector.

LGDP	LGDCF	LEXPOR	C
1.00	1.33 (5.95)	-0.85 (-3.77)	-17.54

Hence the long run relation is (t values in brackets)

3.2. Short Run Dynamics:

The results of the error correction model are represented in the table below. After employing the diagnostic test it seems that model is fit. The results of the diagnostic test indicate that there does not exist a serious problem of heteroskedasticity and serial correlation. The value of the error term is also normally distributed. The values of the error correction terms with a period of one lag has negative and significant which states that the above explained long run relationship is steady and distinctive. If there is any disequilibrium exists in the short run, it will be temporary and will be erected over a period of time.

Table-6: Result of Vector Error Correction Model.

Variables	Coefficient (t- Value)
ECT-1	-0.02 (-1.15)
(LGDP)t-1	0.21 (0.88)
(LGDCF)	0.06 (-0.18)
(LEXPOR)	-0.02 (-0.48)
C	0.03 (2.03)

Short run results are;

$$D(LGDP) = 0.03 + 0.21 * D(LGDP)t-1 - 0.06 * D(LGDCF)t-1 - 0.02 * D(LEXPOR)t-1 - 0.02 * ECT-1$$

(2.03) (0.88) (0.18) (-0.48) (-1.15)

Since the coefficient of D (LGDP) is significant according to the t value hence there is short run granger causality (also called weak causality) since the coefficient of ECT-1 is significant hence there is short run relationship. It shows that there is disequilibrium in model. It will come to equilibrium 2% in one period of time.

4. CONCLUSION:

The study attempts to assess the relationship between gross domestic capital formation, exports and economic growth in Pakistan from 1985 to 2012. PP test, unit root test shows that all the variables are non-stationary at level and stationary at first difference level which shows that all the variables are integrated at first order, that is, I(1). Johansen co-integration test reveals that long run relationship prevails among the variables. Gross domestic capital formation found positively related to economic growth and exports found negatively related with economic growth in this study. The reason behind the negative relationship of economic growth and exports is might be that exports decrease the domestic consumption. Results of this study are contradictory to the (Khan, et al. 2014; Jarra, 2013; Alam, 2012; Chimobi & Uche, 2010). With the recent downturn in the world economy, Pakistan also needs to concentrate on its already large and growing domestic demand.

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