

Joint Impact of Investment (Public and Private) On the Economic Growth of Pakistan: (Co-Integration Approach)

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Abstract

The purpose of this study is to find out the joint impact of public and private investment on economic growth of Pakistan in short run and long run time period. For this purpose co integration and error correction model is applied covering 1975-2010 time period. Results shows that in the long run private investment has positive and significant impact on economic growth where as in the short run it has positive but insignificant impact on economic growth and public investment has positive and significant impact on economic growth both in short run and long run. Private investment has a stronger, more favorable effect on growth rather than public investment, probably because private investment is more efficient and less closely associated with corruption. Along with public and private investment the other important variables like Real interest rate government revenue and aid also effects economic growth. Government development expenditures must be improved, to minimize the cost of production of private sectors which increase the profitability of the investors.

Key Words: Public Investment, Private investment, Real Interest Rate, government revenue

1. Introduction

Investment in any form results in a productive outcomes (either it is at individual level or at national level). At national level there are two kinds of investments, which are useful for the economic efficiency of a country. These include public investment and private investment.

According to the reports published by Lloyd (1999) mostly the private investment is carried out in the privately owned businesses, by their owners. The main objectives of the owners are to improve the profitability of their businesses. They achieve their objectives by augmenting to the current and existing capital stock of the business. The investments provided to the businesses are in the form of inclusion of new technologies to the current business; the new doesn't mean the updated and latest technology, but merely provision of new technologies serve the purpose. At individual level they only benefit only their businesses but when their impact is evaluated at national level, then positive results have been explored by various researchers.

He also defined the public investment, on the other hand, is a result of the government policies; hence representing priorities of the political party in power. However, in general there are four different kinds of the public investment, such as investment on human capital (in the form of provision of education, and other basic needs); infrastructure (e.g. buildings, roads and other means of communications); research and development (e.g. in the form of technology adoption, investment in provision of technological equipments etc.) and general investment on the industries. The last of the all investments, mentioned above referred to investment in public sector enterprises, which is also affected by the privatization policies; hence reducing gradually, with the government's intentions to privatize more and more enterprises.

Having defined these two broader terms we will consider the bi-variate association between these two variables with the economy of Pakistan. According to Aschauer (1988) and Lynde and Richmand (1992), there is a positive relationship between the public and private investment. Private investment is affected by the public investment, due to the fact that public investment encourages businessmen to invest in different industries. These both investments create job opportunities and hence overcoming the problem of unemployment in the country.

There is still a gap of literature in the body of knowledge which needs to be filled by conducting researches on the impact of public and private investment on the economic growth of a developing economy, Pakistan. Considering these facts the problem statement for the current study was; what is the impact of investment (both public and private) on the economic growth of Pakistan?

Objectives of the study are to explore:

- i. The impact of private investment on the economic growth of Pakistan
- ii. The impact of public investment on the economic growth of Pakistan.
- iii. The relationship between the public and private investment.
- iv. The combined impact of public and private investment on economic growth of Pakistan.

The next section highlights some previous researches conducted in this area. Data is estimated and results are interpreted in the third section. However the paper is concluded with necessary policy implications in the last section.

2. Literature Review

These two kinds of investment (public and private) serve as complement to each other (Lynde & Richmand, 1992). They further argued that public sector investment in the form of spending on research and development, education and other infrastructure attracts the private capitalists to invest, though for their own interest, in these sectors. Rashid (2005) conducted a study for Pakistan to explore either these two kind of investments serves as complements to each other or substitute each other. He proved private and public investments to be complements to each other for their contribution in the economic growth.

Rossiter (2002) also conducted a study in USA to explore the relationship between the public and private investment and empirically demonstrated that a crowding out effect. Buiter (1977) and Munnell (1992) proved that public investment complements private investment when the former is provided to improve the infrastructure. A very recent study conducted by Kollamparambil and Nicolaou (2001) in South Africa (one of the developing countries), considering quarterly data from 1960 to 2005 to explore the relationship between the two kinds of investment (i.e. private and public investment).

According to Blejer and Khan (1984) there is a positive relationship between investment and economic growth of a country. They urged that developing countries can achieve economic growth with high levels of investment (a well-established theory for investment and economic growth). Various researchers (in their studies conducted in different countries) have demonstrated that the private investment is crowded out by the public investment spending (i.e. reducing the amount of private investment in the economy). As for example Bairam and Ward (1993), Voss (2002) Bende-Nabende and Slater (2003) and Mitra (2006) have empirically demonstrated that increase in public investment reduces the private investment, which shows a negative relationship between the public and private investment.

There are opposite relationship being explored by Easterly and Rebelo (1993) and Argimón et al. (1997), who demonstrated that private investment may be crowded in by the public investment in various other sectors of the development, which includes the infrastructure erection. These infrastructure facilities may include the communication ways and energy generation, which attracts the private investors.

3. Methodology & Data Collection

Annual dataset for period of 1975 to 2010 is used in this study. The data was collected from International Financial Statistics-2010 and State Bank of Pakistan, Hand Book of Stat (2010) and Economic Surveys of Pakistan (2010). Following is the mathematical representation of the model.

$$GDP = \alpha_0 + \alpha_1 PVI_t + \alpha_2 RIR_t + \alpha_3 PUI_t + \alpha_4 GR_t + \alpha_5 AID_t + \mu_t$$

Where GDP, PVI, RIR, PI, GR and AID μ represent Growth Rate of Real GDP, private investment, real interest Rate, Public Investment, Government revenue, aid from developed countries and Error term.

To estimate the above model Johansen's (1988) co-integration technique is used which help us not only to find short-run relationship between Y and Independent variables but also useful to find Long-run relationship between them. This technique is better than Engel Granger (1987), because it is based on Maximum likelihood procedure that provides test statistics to determine number of co-integrating vectors as well as their estimates.

4. Estimation and Results

To check the stationarity of the data, as required before estimating the model, ADF (Augmented Dickey-Fuller) test is applied. As ADF test is based on AR (1) process, while ADF test considers extra lagged terms of the dependent variable in order to eliminate autocorrelation. Null hypotheses of unit root against alternative of no unit root at level and 1st difference are tested.

Results of Unit Root Test

Table 1-Result of unit root test

Variables	Level	Intercept	Trend & intercept
	Lags		
GDP	1	-2.774 (-3.258)	-3.4191 (-5.871)
PVI	0	-2.458 (-3.784)	-3.458 (-5.128)
RIR	1	-2.125 (-4.257)	-3.472 (-6.498)
PUI	0	-2.478 (-4.284)	-3.236 (-7.256)
GR	1	-2.794 (-3.987)	-3.479 (-7.179)
AID	1	-2.5692 (-3.297)	-3.512(-8.592)

Results show that at level all variables are stationary as all the variables are significant at 5% critical value.

Result of Model

After applying ADF test the next step is to find that the series have any long run relationship or not. As all the series are integrated of order one; so we check co-integration between these series. The first step of this test is to estimate the VAR to choose the lag length of the model. The maximum lag length of our model is 1. Minimum AIC is used to identify significant lag length. We have used Johansen's test to find co-integration and solve the model. The co-integration test results are reported in Table 1 which show that long run relationship exist between the variables. Minimum AIC in VAR is at lag [1], so we use this lag for co-integration test.

Table 2 Johansen Co-integration Test

Eigen value	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.785240	247.9428	156.00	168.36	None **
0.658947	178.3025	124.24	133.57	At most 1 **
0.587421	127.1436	94.15	103.18	At most 2 **
0.625897	80.88381	68.52	76.07	At most 3 **
0.412589	50.72220	47.21	54.46	At most 4 *
0.345827	25.74937	29.68	35.65	At most 5
0.201457	12.29454	15.41	20.04	At most 6
0.211478	4.922240	3.76	6.65	At most 7 *

** L.R. test indicates 4 co integrating equation(s) at 5% significance level

** denotes rejection of the hypothesis at 5% significance level.

$$Y = 0.258 + 0.784PVI - 0.258RIR + 0.651PUI + 0.489GR + 0.257AID$$

(2.025) (3.236) (-2.852) (2.872) (3.698) (3.147)

These results show that PVI has positive and significant impact on economic growth in long run. Ghali and Al-shamsi (1997) have observed that when investment in an economy increases it affects growth in the same direction. The impact is due to the fact that increase in investment raises aggregate demand via national income identity and it also generates employment in the country which in its turn also boosts the economy.

It is also observed from the results that in the long run except of real interest rate all other variables have positive and significant impact on economic growth. If we compare the coefficients of PVI and PI it is clear that the contribution of private investment is higher i.e. 78% as compare to public investment i.e 65%. This difference indicates that in Pakistan the share of private investment is higher in the economic growth as compare to public investment. Negative sign of real interest rate shows that in the long run as interest rate increases, this cause a reduction in private investment and as a result it has negative impact on economic growth. Government revenue and aid has positive and significant impact on GDP in the long run. The major source of government revenues is through taxes. The tax structure of a country play very important role in revenue generation. In case of Pakistan though the tax structure is not very efficient but the coefficient of GR shows that it affects GDP by 48%. Pakistan's economy suffers much type of disasters in recent past like earth Quik 2005and flood in 2010. Due to these un happy events and bad economic position Pakistan was not in the position to sustain its economic position and to cover the loses therefore the aid from other developed countries always plays very important role in the recovery of Pakistan's economy. Results also show that aid has a positive and significant impact on economic growth.

Short Run Relationship:

$$\Delta \ln Y_t = \alpha_0 + \alpha_1 PVI_{t-1} + \sum_{i=1}^n \beta_1 \Delta RIR_{t-i} + \sum_{i=1}^n \beta_2 \Delta PUI_{t-i} + \sum_{i=1}^n \beta_3 \Delta \ln GR_{t-i} + \sum_{i=1}^n \beta_4 \Delta \ln AID_{t-i} + e_t$$

Table 3 Error Correction

Variables	Co-efficient	t-statistics
ΔY_{t-1}	0.23164	(3.258971)*
ΔPVI_{t-1}	0.12418	(1.32956)
ΔRIR_{t-1}	0.15897	(3.25698)**
ΔPUI_{t-1}	0.14789	(2.14587)**
ΔGR_{t-1}	0.24782	(0.12589)
ΔAID_{t-1}	0.23698	(3.2568) **
EC_{t-1}	0.34125	(4.23659)**

** Significant at 5%. * Significant at 10%. ** Significant at 1%.

We estimate a dynamic error correction model (ECM) and all variables are in first difference. The error correction term that is EC_{t-1} in the estimated equation is significant and bears a theoretically correct signs. The estimated co-efficient of EC_{t-1} indicates that approximately 34% of the disequilibrium in economic growth is corrected immediately i.e. in the next year. In the estimated error correction model, the coefficient of lagged change in GDP is positive and significant at 5 per cent significance level which shows that GDP in the previous period led to a positive change in the GDP in short run. It is observed from short run analysis that except of private investment and government revenues all other variables have significant impact on GDP. This insignificant impact shows that in short run the private investors have not sufficient opportunities for investment. The coefficient of real interest rate is also positive and significant in the short run which shows that in the short run interest rate is high and due to higher interest rate investors are reluctant to invest therefore the private investment has positive but insignificant impact on GDP. Similarly the insignificant impact of GR on GDP indicates that the process of revenue generation is slow in short run and it has not as much contribution in economy in short run as much in the long run. Public investment and AID has a positive and significant impact on economic growth in the short run.

Diagnostic Tests:

Table 4 Results Diagnostic Test

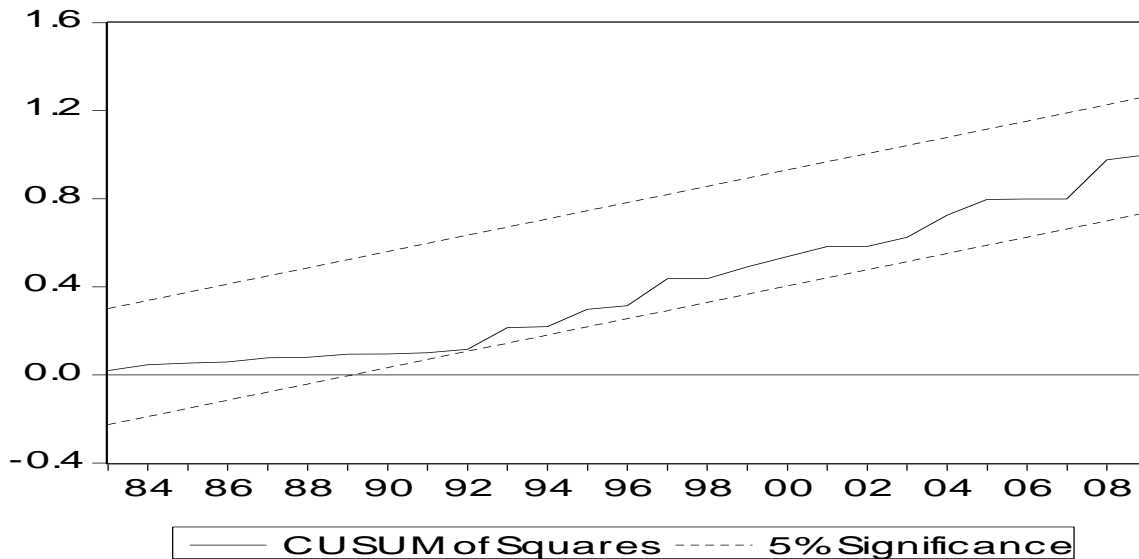
White Heterosadasticity Test ($N \cdot R^2$)	3.259 (Prob.0.00125)
Ramsay RESET Test (F- Statistics)	6.124 (Prob. 0.02589)
Jarque Bera Test	4.871 (Prob. 0.7854)

In the diagnostic test we check the hetrosecdasticity test which shows that there is no problem of hetrosecdasticity in the model. In order to check that whether the model is correctly specified or not we use the Ramsay RESET test under the null hypothesis of correctly specified model. The result shows that our calculated value of F is less than the tabulated value. So we accept our null hypothesis and conclude that our model is correctly specified. Jarque Bera normality test is used under the null hypothesis that errors are normally distributed. The results show that errors are normally distributed because the value of Jarque Bera is less than χ^2 value.

Stability Test

In order to test the stability of parameter we use the CUSUM test. The result shows that the specific model is stable because the estimated line lies between the two critical lines.

Figure 1 CUSUM Test



5. Conclusion and Recommendations

The purpose of this study is to find out the joint impact of public and private investment on economic growth of Pakistan in short run and long run time period. For this purpose co integration and error correction model is applied covering 1975-2010 time period. Results shows that in the long run private investment has positive and significant impact on economic growth where as in the short run it has positive but insignificant impact on economic growth and public investment has positive and significant impact on economic growth both in short run and long run. It is concluded from empirical findings that for the higher economic growth of a country both public and private investment plays very important role. If government provides sufficient opportunities for private investors for investment, it has positive effects on economy. Private investment has a stronger, more favorable effect on growth rather than public investment, probably because private investment is more efficient and less closely associated with corruption.

Along with public and private investment the other important variables like Real interest rate government revenue and aid also effects economic growth.

Government should take some remedy measures to increase the ratio of public and private investment. As lender interest rate in Pakistan is very high that’s why very few investors mostly invested and few employment opportunities are there, to increase the investment ratio in GDP government must decrease the interest rate that small investors can also invest, due to this government revenues increases.

Government policies and political stability are two very important determinants of private investment. Therefore it is necessary for government to formulate such policies which are favorable for private investors and also the political stability should be promoted by the government.

Government development expenditures must be improved, to minimize the cost of production of private sectors which increase the profitability of the investors.

Aid from foreign countries can also play very significant role to enhance public and private investment. Government should utilize aid for the development projects which helps to appreciate private investment.

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