

Investigating Public Investment-Growth Nexus for Pakistan

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Abstract: This empirical study has been conducted to analyze the relationship between public investment spending and economic growth for Pakistan. The study used annual time series data set over the period 1975 to 2009 and applied Autoregressive distributed Lag Approach (ARDL) to estimate short run as well as long run elasticities of the model. A disaggregated analysis of public sector spending has been carried out and showed that, there is a positive impact of public sector spending on economic growth of Pakistan in short run as well as long run.

Keywords: Public Investment, Economic Growth, ARDL Application

1. Introduction

It is the need of people to achieve high and sustainable standard of living. The issue of public spendings, private investment and public consumption has been a long debated issue among macroeconomists and development economists. Developing nations have tried to explore the reasons and causes due to which western world have achieved higher rates of growth. Economists and policy makers are making efforts to find the linkage between public spending and economic growth. Public investment in the infrastructure enhances private investment which in turn increases the marginal productivity of private capital and improves the growth of GDP (Looney, 1997).

A positive change in government spendings affects aggregate demand and boosts up the productive capacity of an economy. Furthermore, it brings innovations and improvements through technological changes and causes high growth in real GDP through multiplier effect.

A vast majority of literature have discussed the determinants of public investment and its relevance for economic growth. For Pakistan a number of studies have been conducted for exploring this nexus which include. Khan (1988), Looney and Frederiken (1995), Loony et al. (1997), Khan and Sasaki (2001), Naqvi (2003), Ghani and Din (2006), Khan and Khan (2007), Ahmad and Qayyum (2007) and Majeed and Khan (2008). In some studies the relationship between growth and investment is investigated, while others have attempted to examine the determinants of public and private investment.

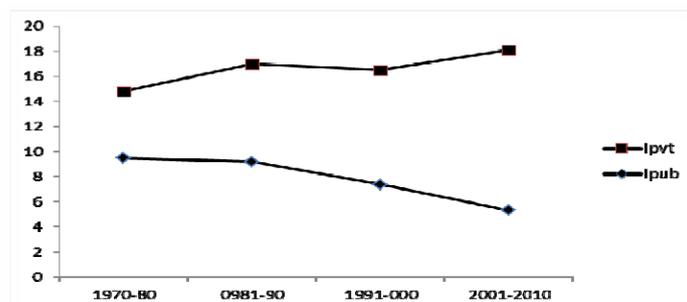
The Specific objectives of the study include to find the short run as well as long run effects of public investment and economic growth, and to find the direction of causality between public investment and economic growth. Rest if this study is organized as Section 2 discusses the review of related literature for theoretical as well as empirical studies. Section 3 reviews trends of investment in Pakistan. Model, methodology, data and variables are discussed in section 4. Results are analyzed in section 5. Final section is reserved for conclusion.

1.1. Public Investment in Pakistan

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During the Bhutto period nationalization programme was implemented in 1970, due to which government participation in economic activity increased greatly. As a result share of public investment rose and squeezed the share of private investment. However during the decades of 80s private sector activity was revived in the country. Furthermore, during the early 1990 a sharp decline in rate of growth has been observed from 6 percent to approximately 4 percent (Khan et al, 2009). Khan and Sasaki (2001) argued that slowing down and fall of growth rate during the early 1990s is dedicated to instable political situation prevailing in the country. During this decade leadership didn't emphasized the need of savings for long term economic development. The low saving rate caused less financial sector development, which was due to low investment spendings and deterioration of infrastructure.

With this background, it was needed to develop a strong base of economy. Therefore the Pakistan economy adopted the structural adjustment programme, introduced by international funding agencies, to integrate their economy with the rest of world (Ellahi and Khan, 2011). This programme and its policies were characterized with dominance of private sector because the main feature was privatization of state owned industries. Hence the share of public investment showed a continuous declining trend from 2000 to 2005, further it remained approximately at the same level till the end of 2010. However due to policies of privatization, share of private investment showed a rising trend over the time. The figure below shows the trends of public and private investment shares in GDP. It is shown that private investment has been more than public investment. Due to restructuring programme, private investment has improved while the share of public investment has shown a declining trend.



Source: The Data for this figure has been collected by Economic Survey of Pakistan (Various Issues)

Figure 1: Ratio of Public and Private Investment over the Time

2. Literature Review

A number of empirical studies including time series as well as cross sectional have attempted to explain the determinants and explored channels of growth. Paola et al (2002) studied the relationship for Euro and Anglo Saxon countries. The study used annual time series data set over the decades of nineties. Study highlighted the structural instability for both the groups of countries. This cross sectional study concluded firstly, in the Euro area, the economies grew at the rates only slightly below that recorded in the period from first oil price shock, to the end of nineties and that the growth in investment was very weak, at time even negative. Secondly, Anglo Saxon countries, especially in U.S.A the growth in investment was very strong and economy was in the boom.

A case study for OECD countries has been conducted by Rosik (2006). It explored public capital as a determinant of regional economic growth. Analyzing the role of infrastructure it concluded that low investment and trade deficit were the leading causes of the slow growth in developing countries. There was positive relationship between public capital and returns to infrastructure investment when the aggregate data of all economies was used for the purpose. Major implications of the study suggested that an improvement in public sector infrastructure will be effective to increase the economic growth.

Otto (1997) conducted a case study for Australia. The estimated results found no evidence of underutilization of resources for investment. It highlighted the average return to both public and private investment along with conclusion that prices of public investment goods had increased relative to aggregate production. The study presented an implication that rising cost has been a cause of expensive public goods.

Khan (1996) investigated the relationship between public and private investment and economic growth for 95 developing countries using data over the period of 1970-90. The results suggested that public investment is more effective to affect economic growth than private investment, during the decade of 80s the study suggested that government should remove the unproductive investment, which had adverse effect on the growth of the neighboring countries.

Impact of public spending on economic growth has been discussed by Onder et al (2007) for Turkey. This study used panel data of 12 sub regions for the period of 1980-2001 and applied conditional convergence model along with GMM system. The estimated output of the two models showed that a positive relation exists between public investment and GDP per capita. However, when spatial effect was included to the model, the results lost significance. No strong impact on convergence can be explained by disparities in regional distribution. When population distribution was taken into account, the relatively more developed areas were found to obtain more public investment than the less developed regions. The study suggested that in order to reduce regional disparities, more public investment is required in the relatively less developed regions and it should be directed towards social infrastructure, education, healthcare and public administration.

Bukhari et al (2006) investigated the causal relationship between public investment and economic growth, private investment, as well as public consumption for Korea, Singapore and Taiwan over the period of 1971 to 2001. The analysis suggested that both public and private investment and public consumption had a long-term dynamic impact on economic growth in all the countries. The panel causality analysis showed no evidence of relationship between the variables. The non-causality hypothesis suggested that the results were completely homogeneous in a small sample of East Asian countries.

Naqvi (2002) investigated the relationship between economic growth, public investment, and private investment for Pakistan. The study used data set over the period 1964-2000 and applied VAR methodology. The results showed that public investment had a positive impact on private investment, and that economic growth pushes forward both private and public investment, as predicted by the accelerator-based models. The impulse response functions showed that it takes about five years for the effects of policy change or a shock disappears from the system. Further, uncertainty had a much larger impact on private investment than on public investment.

Ghani and Din (2006) explored the relationship between public investment and economic growth for Pakistan economy by using the vector autoregressive approach (VAR). Both the public and private investments were included in the study. The study concluded that public investment had a negative, though insignificant, impact on output. In contrast, there was a positive relationship between private investment and economic growth. Public investment had no favorable impact on private investment. In other words it 'crowded out' private investment and this result raises some concern about the efficiency of public investment. Sola (2008) studied the impact of public investment for economic growth in case of Nigeria. This study used VAR methodology and used annual time series data set over the period 1975 to 2004. It concluded that a positive link exists between public investment and economic growth, while no causal link was found between gross fixed capital formation and economic growth.

3. Theoretical Model, Methodology, and Data

Investment is an important component of GDP. Likewise, investment in public sector is mainly determined by the level of GDP, government revenues, foreign aid, inflation rate and exchange rate. For estimation purposes, this study specified a model consisting of four variables including public investment as a share of GDP, government consumption as a share of GDP, private investment as a share of GDP, and GDP growth rate as explanatory variables. The dependent variable is real GDP, which measures economic growth. Here the variables are expressed and estimated along with natural logarithms, and our major focus is to find the impact of public investment of growth index. For some theoretical reasons, we included private investment into our analysis. Firstly, it may compliment public investment and enhances economic growth activity. Secondly, crowding out of private investment may reduce growth process (Bukhari et al, 2007).

This study has applied Auto regressive Distributed Lag (ARDL) methodology for estimation purposes. This is the most recent methodology introduced by Pesaran et al (1996), Pesaran (1996), Pesaran and Shin (1999). Contrary to conventional methods to find long run relationship this methodology does not estimates system of equations, rather it estimates a single equation of reduced form (Pesaran and Shin, 1999). Major advantage of this methodology is that, it exempts pre testing procedures followed by other methodologies i.e. it does not require variables to be of same order. It is applicable with variables possessing different order of integration. Naryan (2004) formulated critical values set using GAUSS, further this is also suitable methodology for limited number of observations ranging from 30 to 80 (Duassa, 2007).

Here the model to estimate can be written in following form

$$RGDP = F(AID, PBIY, PRIVY, GCY) \dots \dots \dots (1)$$

Where RGDP is real GDP, RGC is share of government consumption in GDP, RAID is share of foreign aid into GDP, RPUBI is share of public investment in GDP and RPRVI is share of private investment in GDP. Data on all these variables has been taken from Pakistan Economic Survey (various issues), International Financial Statistics (IFS) various issues and from the official website of State Bank of Pakistan (SBP). All variables are expressed with natural logarithm and multiplied by 100.

The estimation comprise of three steps, first step explored the time series properties of data i.e. finding the order of integration applying Augmented Dicky Fuller (ADF) and Phillip Perron (PP) unit root tests. Following the time series properties next step is to find the existence or non-existence of long run relationship between the variables of interest. Once the cointegration between variables has been confirmed, we find short run and long run estimates and the causal relation between public investment and economic growth.

4. Interpretation of Estimation Output

Below is the outcome of unit root test. The results indicate that real Gross Domestic Product (LRGDP), public investment as a share of GDP (LPBIY), government consumption (LRGCY) and foreign aid as a share of GDP are non-stationary at level while become stationary after taking first difference. While the only one variable private investment as a share of GDP (PRIY) is stationary at level. The application of Augmented Dicky Fuller (ADF) and Phillip Perron (PP) test yielded the same results regarding the stationarity and non stationarity.

Table 1: ADF and Phillip Perron Unit Test Results

| <i>Variables</i> | <i>ADF Test Results</i> | | <i>Phillip Perron Test Results</i> | | <i>Decision</i> |
|------------------|-------------------------|-----------------------|------------------------------------|------------------------|-----------------|
| | | | | | |
| Ln(RGDP) | 0.081035 (-2.9499) | -3.2218* (-2.9527) | -0.54832 (-2.9472) | -5.49625* (-2.9499) | I(1) |
| Ln(PIY) | -0.85318 (-2.9499) | -4.1580* (-2.9527) | -0.34679 (-2.9472) | -6.98128* (-2.9499) | I(0) |
| Ln(PBIY) | -2.12173* (-2.9499) | -4.3663* (-2.9527) | -2.72488* (-2.9472) | -4.85418* (-2.9499) | I(1) |
| Ln(RGCY) | -2.103407 (-2.9499) | -6.68396 (-2.9527) | -1.73019 (-2.9472) | -8.59486* (-2.9499) | I(1) |
| Ln(AIDY) | -1.882929 (-2.9499) | -8.3072* (-2.9527) | -2.362914 (-2.9472) | -7.99069* (-2.9499) | I(1) |

Note: *shows significance at 5% level, figures in parenthesis are values of both tests at first difference, null hypothesis states that series is non-stationary.

The Short run and long run estimates using the ARDL techniques of estimation are found and quoted below in Table 2. A negative link between public investment and economic growth indicator, this effect of public investment on real GDP is significant at 5% level of significance, the negative sign of public investment is indicative of “crowding out” effect on growth. The negative impact of government sector investment on GDP growth is due to the fact that these spending are more oriented towards the defence

sector and due consideration is not given to the more productive sectors. Private investment indicator exerts positive and significant impact on GDP growth indicator. This is because of the fact that private sector investment is more productive due to competition enhanced at this level and encouragement of private sector after the implementation of structural adjustment programmes during the late 1980s and initial period of 1990s (Ellahi and Khan, 2010). The short run impact of foreign aid is negative and insignificant because foreign aid is not properly utilized for meeting the development needs (Ellahi and Ahmad, 2010).

Table 2: Short Run and Long run Estimates

| Variables | Coefficients | Short run Diagnostic Statistics | |
|-----------|--------------|---|--|
| C | 0.443 | R^2_{adj} 0.68320 DW stat 1.826898 F- Stat 5.277025 S.E of Regression 0.003984 | |
| D(PBIY) | -0.0023** | | |
| D(PRVIY) | 0.0102*** | | |
| D(GCY) | -0.0018 | | |
| D(AIDY) | -0.001144 | | |
| RGDP(-1) | -0.1916** | | |
| PBIY(-1) | -0.0087 | | |
| PRIVY(-1) | 0.0062 | | |
| GCY(-1) | 0.0053 | | |
| AIDY(-1) | -0.0005 | | |

Note: *shoes significance at 1%, **at 5% and *** at 10% level of significance

$$LRGDP = -2.31 + 0.045 PBIY - 0.032PRVY + 0.027 AIDY - 0.00026 GCY \dots \dots \dots (2)$$

Normalizing the coefficients of RGDP (-1) we found the longrun equation estimates. The long run equation is given above in (2). This equation explains the positive impact of public investment on real GDP growth in long run. The impact of private investment in long run is negative stating that investment by private sector is not effective in long run because of govt policies.

5. Conclusion

The study is an attempt to find the empirical link between public investment and economic growth for Pakistan using time series data set. The empirical findings suggested that public investment, private investment and consumption by government sector has strong short run and long run impacts on economic growth of Pakistan. Here we observed that growth is driven by the performance of private investment, while the role of public investment is negligible due to its inefficiency, the findings are in line with the findings of Ghani (2006) for Pakistan.

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