Determinants of Domestic Private Investment: Test of Alternative Hypotheses for Pakistan

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Abstract

This paper analyzes the determinants of domestic private investment in Pakistan using long time series data for the period 1982 to 2012. The conventional variable such as output is not significant in explaining the domestic private investment but the interest rate has significant negative effect on private investment in the long run. The results of the study confirm the validity of crowding in hypothesis and debt overhang hypothesis for Pakistan. This study did not find any support for Mackinnon-Shaw hypothesis. The improvement in law and order condition and existence of democratic political regime in the country has significant positive effect on domestic private investment in the long run. The focus on non-conventional variables could restore investors' confidence and may result in the recovery of domestic private investment in the country.

Key words: crowding in, debt overhang, political regime, law and order, investors' confidence

JEL code: E22, F34, P16

Introduction

Domestic private investment plays an important role in the economy. It increases the productive capacity, creates employment opportunities, promote technical advancement, and reduces poverty in the country. The private investment is usually more volatile than consumption spending and is responsible for much fluctuation in economic growth. Therefore, it is important to highlight the long run and short run determinants of domestic private investment.

Investment climate in Pakistan remained challenging due to several economic and non-economic factors. Domestic private investment which averaged 5.6 percent of GDP during 1970s increased to 7.8 percent during 1980s and 9.1 percent during 1990s. It reached to 11.8 percent of GDP during 2000s with its highest level of 13.5 percent in 2005-06. Since then domestic private

investment has a declining trend and it reached to its lowest level of 8.7 percent of GDP in 2012-13 (Government of Pakistan, 2012-13). This is a key concern for the government and policy makers in Pakistan.

The literature on the determinants of private investment has been dominated by cross sectional country wise and time series country specific regression analyses. The previous empirical studies show that conventionally used economic variables could not explain the variation in domestic private investment. This study aims to examine the long run and short run determinants of domestic private investment using Pakistan as a case study. The long run and short run models for domestic private investment have been estimated to understand the behavior of domestic private investment in Pakistan.

The analysis of the long run and short run determinants of domestic private investment would not only be beneficial for Pakistan but also be helpful for similar developing countries in designing investment recovery strategy.

This paper is organized in five sections. After introduction, section 2 presents review of theoretical literature. Section 3 discusses the review of selected empirical studies. Section 4 describes the model and present its estimation results. Section 5 provides conclusion, policy implications and sets directions for further research.

Literature Review

Investment behavior has been a controversial issue in theoretical and empirical literature. While there have been many different approaches to understand investment spending, a brief review of the main approaches is presented in this section.¹

Keynes (1936) first formulated marginal efficiency of capital (MEC) approach which he took from the classical economists before him. In simple terms it involves calculating whether it is profitable for a firm to make a certain investment, by comparing the costs of the investment with its prospective benefits in the future. However, it is important to emphasize that MEC approach gives information about the amount of investment that would be profitable. It does not indicate how fast firms will actually undertake the investment projects concerned and therefore do not provide a theory of the demand for investment in the current period.

One attempt to get a theory of investment is the marginal efficiency of investment (MEI) analysis, by incorporating the variation in capital goods prices. Since the MEC/MEI analysis constitutes a large part of received Keynesian approach on investment, it is important to highlight the variables identified in the analysis as possible determinants of investment. One such variable is the rate of interest, which is basically the opportunity cost of capital. A second determinant of investment in MEI analysis is firms' expectation of future sales revenues. And a third variable which comes into the analysis but is not usually emphasized in Keynesian exposition is firms' expectation of future running costs: these depend not only on the quantity of sales or output expected but also on the prices of labor

and raw material inputs with higher inputs prices making investment less profitable and therefore lower.

Keynes himself put great emphasis on firms' expectation of future demand, which he regarded as a matter partly of what he called 'animal spirit', that is non-rational confidence factors. Changes in business confidence or animal spirits cause changes in expected future sales revenues and hence changes in the likely profitability of investments. Some of Keynes's followers continued to stress animal spirits, but others tried to develop the emphasis on expectations in a more systematic way through the 'accelerator hypothesis'.

The simplest view of the accelerator starts from the assumption of a fixed ratio relating output to the amount of capital normally required to produce it. It is also assumed that firms always adjust their capital to their output, so that the capital stock of the previous period must be in the same ratio to the output of the previous period. Net investment is the growth in the capital stock between periods. Thus, net investment is proportional to the growth of output, rather than its level (it is for this reason that term 'accelerator' is used): rising output brings about positive net investment; constant output brings about zero net investment; and falling output brings about negative net investment, i.e. not all worn-out capital is replaced (but aggregate gross investment cannot be negative). Moreover, an increase in investment requires an increase in the rate of growth of output.

A more sophisticated view of the accelerator hypothesis is that it attempts to formalize the role of expectations as the key determinant of investment together with the assumption that expectations of future demand are determined by current demand. On the simple view an increase in current sales leads firms to increase their capital stock as a result of the technical requirements for increasing output, but in more sophisticated view, firms interpret the current level sales increase as indicating the likely future level and increase their capital in order to maintain the most efficient mix of factors of production: if production functions are homogenous and there are constant return to scale, the most efficient mix and the consequent capital-output ratio remains constant so long as relative factor prices are unchanged.

On either view, however, the accelerator has been widely criticized. Firstly, it omits the interest rate. Secondly, the capital output ratios are not necessarily fixed, particularly in the short run. Thirdly, the more sophisticated view is open to the criticism that it views firms as forming their expectations in a mechanical way from current sales, and apparently taking no account of

¹ For a detailed review of the theories on private investment, see Serven (1993).

other factors which might affect future sales such as the government's macroeconomic policy or development in the world trade. Fourthly, the hypothesis takes no account of the existing level of capacity utilization or of firms' ability to meet demand changes by means of changes in their stocks and/or variation in their capital output ratios. Finally, the hypothesis takes no account of the possible supply constraints in the capital goods.

An alternative approach to investment, which takes its inspiration from a different aspect of Keynes's work, is that of the q -ratio proposed by Tobin (1969). The essential idea is that movements in the share prices relative to the cost of investment affect the level of investment. The crucial issue for investment is whether q is greater than or less than 1. If q is greater than 1, that suggests that if the firm makes an investment its value on the stock market will increase by more than the cost of the investment. On the other hand if q is less than 1, an investment will increase the firm's market value by less than its cost, in which case the investment is not sensible from the firm's point of view.

Much effort has been devoted to the development and testing of the q -theory, with an important distinction being made between average and marginal q and some emphasis on adjustment cost. While this effort has not been entirely successful, the model has continued to be influential as a theory which relates investment directly to the state of the stock market.

There are restrictive assumptions in accelerator theory which led Jorgenson (1963 and 1967) to formulate the neoclassical approach for investment. In the neoclassical approach, profit-maximizing firms are assumed to choose the optimal path of accumulation of capital on the basis of certain knowledge about current and future factor prices, output prices and technology; moreover the capital stock is continually adjusted to its optimal level and is always fully utilized. These assumptions enable the approach to focus on the cost of using capital relative to other prices as the key determinant of the optimal path of capital accumulation, and hence of investment. The optimal capital stock (relative to output) is regarded as a function of the price level, the nominal wage rate, and the 'rental price of capital services' or 'user cost of capital'.²

There is vast literature on the effects of bank credit to the private investment. The private investment is expected to be encouraged due to the availability of real

credit. The importance of foreign capital inflows in the domestic investment process, whether they are in the form of direct or portfolio investment, has also been documented (see Tun and Wong, 1982). In a similar vein, private investment can be influenced by interest rate and exchange rate policies that cause changes in private capital flows, which augment or reduce financial resources available to private sector.

Finally, there is much debate in literature that whether public investment crowded-out or crowded-in private investment. If public investment utilizes the scarce physical and financial resources of the country and produces the output that competes with private sector's output, it can crowd-out private investment. Yet public sector investment in infrastructure facilities the provision of public goods and can crowd-in private investment. Thus, this issue is not settled in theoretical literature and the focus is on empirical results.

The theories discussed above have mostly been developed in the context of advanced countries, and it is not possible to apply them in a straightforward manner to the developing countries like Pakistan.³

A large number of empirical testing of investment functions has been carried out but the results are less clear.

Empirical studies show that changes in the level of output is the significant determinant of domestic private investment. Blejer and Khan (1984) found that the private investment was positively affected by changes in the expected real GDP and availability of funds and negatively affected by excess productive capacity (the shortfall of actual GDP from its trend value). The study also found that government infrastructure investment can crowd-in private investment. Green and Villanueva (1991) estimated the effects of macroeconomic and policy related factors on private investment in twenty three developing countries (including Pakistan) for the period 1975-87. Their results showed that the rate of public sector investment, real GDP growth, and level of per capita GDP was positively related to private investment. The effect of real interest rates, debt service ratio, debt to GDP ratio and domestic inflation was negative on private investment.⁴ Solimano (1989), in the simultaneous equation model for Chile found that

² The rental price of capital services is the price of using one unit of capital per period analogous to the real wage rate, which is the price of using one unit of labor per period.

³ Developing countries do not have well functioning capital market so that large part of domestically financed investment passes through extra-capital market channels.

⁴ The external debt burden may also adversely affect private investment in the country. This is the so called the debt-overhang hypothesis.

private investment is reduced by real depreciation rate in the short run.

Rama (1993) presented a survey of thirty one developing countries on the determinants of private investment. Aggregate demand appeared an important variable in explaining private investment. The implication is that the pure classical model (in which there is no income accelerator) may not be suitable for developing countries. Most of the studies discussed crowding out effects of public investment with only few for the possibility of an externality on private investment. The availability of credit, foreign exchange (proxies by exports, international reserves, and real exchange rate) also emerges as one of the decisive arguments for private investment in many developing countries.

Seruvatu and Jayaraman (2001) estimated an unrestricted error correction model over the period 1966 to 1988 for Fiji. Empirical results showed that the terms of trade and the dummy variable (for a coup and its after effects) explain the variations in private investment. The effects of other conventional economic variables were insignificant on private investment in Fiji.

Ouattara (2004) using the data for the period 1970-2000 estimated a private investment function for Senegal in the long run. The Johansen Cointegration technique and the ARDL bounds approach were used to estimate the investment function. The results of both models indicated that real income, government investment, and foreign aid inflows affect positively the private investment. The author founds that private investment is negatively affected by terms of trade and credit availability.

Khan and Khan (2007) conducted a study on the determinants of private investment in Pakistan. They used ARDL Cointegration approach for estimation purposes on a data set for the period 1972-2005. They found empirical support for the crowding-out hypothesis. They found little or no support for traditional factors. The external debt affects private investment negatively both in the long run and short run. They suggested for focus on the overall institutional framework of entrepreneurial activities to facilitate investment activities in Pakistan.

In a recent study Waheed and Amber (2012) examined the effects of economic uncertainty on investment using the accelerator model on a sample of 50 developing countries for the average period of 1981-2008. The results indicated that uncertainty related to government expenditure, taxes, trade, foreign direct investment and

remittances affect negatively the investment expenditure. The authors concluded that volatility in economic policies cause uncertainty and results in reduction of investment and growth.

Research and Methodology

Model and Results

Based on the review of theoretical and empirical literature, following domestic private invest (PRIV) function is developed:

$$PRIV = f(CV, AV) \quad (4.1)$$

Where, CV represents the conventional variables such as real gross domestic product (GDPR) and interest rate (INTD). For additional variables (AV), we have included, public investment (PUBI), credit to the private sector (PSC), trade openness (OPEN), external debt (DEBT), real exchange rate (RER), foreign direct investment (FDI), and a dummy variable (DUM) for political regime (military government or democratic regime).

The first step is to check the order of integration of variables of the model. The Augmented Dickey Fuller (ADF) and Phillip Perron (PP) tests are used to determine the order of integration of variables.⁵ The ADF and PP tests results are shown in Table 1. The results of both tests confirm that all variables are stationary at first difference.

The long run model is estimated over the period 1982 to 2012. The general to specific approach was then utilized to arrive at good fit model. Table 2 shows the long run determinants of domestic private investment in Pakistan. Table 2 shows that the coefficient of government investment variable has positive sign and it is highly significant. Thus, public investment has long run positive effects on domestic private investment and crowding in hypothesis is valid in case of Pakistan.

The real exchange rate could promote or retard domestic private investment. The real cost of capital may rise as a result of real depreciation that might negatively affect private investment. On the other hand, a real depreciation increases the prices of tradable goods relative to the price of non-tradable, which help to increase investment in tradable sector

⁵ See Dickey and Fuller (1979) and Phillips and Perron (1988).

Table 1. Results of Order of Integration of Variables

Augmented Dickey Fuller test statistics					Phillips-Perron test statistics			
At Level			At First difference		At Level		At First difference	
Var.	I	I & T	I	I & T	I	I & T	I	I & T
PUBI	-0.37 (0.90)	-2.19 (0.48)	-4.94 (0.00)	-4.91 (0.00)	-0.11 (0.94)	-2.09 (0.53)	-5.07 (0.00)	-5.55 (0.00)
PSC	-4.75 (0.00)	-3.62 (0.05)	-4.06 (0.00)	-4.28 (0.01)	-2.24 (0.20)	-1.78 (0.69)	-4.06 (0.00)	-4.28 (0.01)
DEBT	1.93 (0.99)	-2.42 (0.36)	-5.72 (0.00)	-6.76 (0.00)	2.57 (1.00)	-2.49 (0.33)	-5.77 (0.00)	-18.00 (0.00)
OPEN	-1.38 (0.58)	-2.73 (0.23)	-6.95 (0.00)	-7.15 (0.00)	-1.26 (0.63)	-2.63 (0.25)	-6.98 (0.00)	-7.52 (0.00)
RER	-1.76 (0.39)	-0.84 (0.94)	-4.11 (0.00)	-4.52 (0.01)	-2.59 (0.10)	-1.02 (0.92)	-4.11 (0.00)	-4.53 (0.00)
FDI	-2.74 (0.08)	-4.54 (0.01)	-3.22 (0.03)	-3.27 (0.09)	-2.03 (0.27)	-2.02 (0.57)	-2.78 (0.07)	-2.83 (0.08)
PRVI	-1.93 (0.99)	-2.42 (0.36)	-5.72 (0.00)	-6.76 (0.00)	2.57 (1.00)	-2.49 (0.33)	-5.77 (0.00)	-18.00 (0.00)
INTD	-1.93 (0.32)	-2.16 (0.50)	-5.42 (0.00)	-5.32 (0.00)	-1.95 (0.31)	-2.26 (0.44)	-5.42 (0.00)	-5.32 (0.00)
GDPR	-0.34 (0.76)	-2.95 (0.16)	-4.27 (0.00)	-4.22 (0.01)	-0.96 (0.75)	-2.42 (0.36)	-4.15 (0.00)	-4.09 (0.01)

Note: “I” stands for intercept and “T” stands for trend.

Source: Author’s estimation.

Table 2. Long Run Determinants of Domestic Private Investment

Variable	Coefficient	Std. Er.	t-Stat.	Prob.
C	4.289	2.674	1.604	0.124
PUBI	0.058	0.022	2.633	0.016
PSC	0.016	0.008	2.127	0.046
RER	0.031	0.007	4.331	0.000
DEBT	-0.946	0.201	-4.711	0.000
DUM	0.143	0.060	2.393	0.026
OPEN	0.011	0.008	1.318	0.202
FDI	0.110	0.042	2.657	0.015
GDPR	-0.359	0.200	-1.790	0.088
INTD	-0.013	0.006	-2.075	0.051
Adj.-R ²	0.920	F-statistic		39.43
DW Statistic	2.237	Probability (F-statistic)		0.000

Source: Author’s estimation

Table 2 shows that real exchange rate has significant positive effect on domestic private investment. Hence a real depreciation may result in an increase in private investment in the country.

Theoretically, interest rate is a crucial factor for private investment however the sign of this variable in investment model is an empirical issue. In neo classical theory the interest rates are expected to negatively affect

private investment through increased user cost of capital. The Mckinnon-Shaw hypothesis states interest rate can have a positive effect on investment through the saving after financial sector reforms. However, most of the studies found insignificant effect of interest rate on investment. This has been a problematic finding in investment function

This study uses interest differential variable (difference between domestic and foreign interest rate) in investment model. It is clear from Table 2 that interest differential variable has significant negative effect on domestic private investment. Hence, the McKinnon-Shaw hypothesis is not valid in case of Pakistan.

The availability of credit to the private sector has been a major issue in Pakistan. Table 2 shows that the credit availability to the private sector has significant positive effect on domestic private investment in the long run.

A high debt diverts resources previously used to finance local companies towards service payment, and also result in low infrastructure facility in the country. Table 2 shows that external debt burden has significant negative effect on domestic private investment in the long run. Hence, debt overhang hypothesis seems to be valid in case of Pakistan.

The deteriorating law and order condition is a major concern for the investors in the country and has significant affect on investors' confidence. The inflow of foreign direct investment which is used as a proxy for the improved law and order condition has significant positive effect on domestic private investment in the long run.

The conventional variable such as output (GDP) has statistically insignificant effect on domestic private investment. Also the openness variable is statistically insignificant. The regime dummy variable is statistically significant and has positive sign. This implies that private investment tends to be higher in democratic political regime compared to non democratic political regime.⁶

The estimated long run model passed different diagnostic tests as indicated in Table 3. The Jarque-Bera test result indicates that residuals are normally distributed.

The Serial Correlation LM test shows that there is no problem of serial correlation in the residuals. Autoregressive Conditional Heteroskedasticity (ARCH LM test) and White Heteroskedasticity tests indicate that residuals are homoskedastic. The Ramsey RESET test indicates that there is no specification error in the model. The ADF and PP tests indicate that residuals are stationary at level confirming the long run relationship among variables in the estimate model.

To determine the short run effects of different variables on domestic private investment, an error correction model (ECM) is estimated and results are reported in Table 4.

The public investment, credit to the private sector, and real exchange rate depreciation have significant positive effect on domestic private investment in the short run. The external debt has significant negative effect on domestic private investment in the short run. The coefficient of residual is negative and statistically significant. This indicates the model converges to long run equilibrium with high speed of adjustment.⁷

The estimated short run model passed different diagnostic tests. The results of diagnostic test are reported in Table 5. The results show that the residuals are normally distributed as indicated by the Jarque-Bera test indicates.

The Serial Correlation LM test shows that there is no indication of serial correlation in the residuals. The residuals are homoskedastic as indicated by Autoregressive Conditional Heteroskedasticity (ARCH LM test) and White Heteroskedasticity tests. The Ramsey RESET test indicates that there is no specification error in the short run model.

⁶ The other variables such as inflation, domestic debt, foreign exchange reserve, workers' remittances, stock market index, and financial deepening, were also tested in the regression model, but their effect on domestic private investment was statistically insignificant.

⁷ The conventional variables such as output and interest rates were tested in the short run model, but their effect on domestic private investment was statistically insignificant.

Table 3. Diagnostic Test of Long Run Investment Model

Test	Test Statistic	Test Value	Probability
Jarque-Bera statistic	χ^2 -statistic	1.229	0.541
Breusch-Godfrey Serial Correlation LM Test	F-statistic χ^2 -statistic	0.282 0.893	0.758 0.641
ARCH LM Test	F-statistic χ^2 -statistic	1.196 1.229	0.283 0.268
White Heteroskedasticity test	F-statistic χ^2 -statistic	2.102 22.731	0.090 0.158
Ramsey RESET test	F-statistic L-R statistic	0.293 0.451	0.594 0.502
Residual Stationarity Test at Level Augmented DF Phillips-Perron	t-statistic Adj.t-stat	-5.182 -5.180	0.000 0.000

Source: Author's estimation.

Table 4. Short Run Determinants of Domestic Private Investment

Variable	Coefficient	Std. Er.	t-Stat.	Prob.
C	-0.007	0.014	-0.509	0.616
D(PRVI(-1))	0.034	0.012	2.793	0.011
D(PUBI(-1))	0.056	0.019	2.897	0.008
D(PSC)	0.017	0.006	2.749	0.012
D(RER)	0.014	0.006	2.321	0.030
D(DEBT)	-0.764	0.189	-4.034	0.001
RESID(-1)	-1.033	0.234	-4.424	0.000
Adj.-R ²	0.680	F-statistic		10.915
DW Statistics	2.582	Probability (F-statistic)		0.000

Source: Author's estimation

Table 5. Diagnostic Test of Short Run Investment Model

Test	Test Statistic	Test Value	Probability
Jarque-Bera statistic	χ^2 -statistic	2.349	0.309
Breusch-Godfrey Serial Correlation LM Test	F-statistic χ^2 -statistic	1.783 4.839	0.194 0.111
ARCH LM Test	F-statistic χ^2 -statistic	0.195 0.209	0.662 0.648
White Heteroskedasticity test	F-statistic χ^2 -statistic	0.247 4.533	0.991 0.972
Ramsey RESET test	F-statistic L-R statistic	0.004 0.006	0.947 0.938

Source: Author's estimation.

Conclusions

The determinants of domestic private investment have been widely investigated in empirical literature. In this study the long run and short run determinants of

domestic private investment has been estimated in Pakistan to understand factors that hinder its recovery.

The long run and short run models have been estimated over the period 1982-2012.

The results of the estimated models indicate that public sector investment, real exchange rate depreciation, and credit availability to the private sector have significant positive effect on domestic private investment both in the short run and long run. The external debt burden has significant negative effect on domestic private investment both in the short run and long run. The interest rate has significant negative effect on domestic private investment in the long run. The results of this study confirm that the crowding in hypothesis and debt overhang hypothesis are valid in case of Pakistan. This study did not find any support for Mackinnon-Shaw hypothesis. The improvement in law and order condition and existence of democratic political regime

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- in the country has significant positive effect on domestic private investment in the long run.
- As an implication of this study the government needs to increase public infrastructure investment, facilitate the availability of credit to the private sector, improve the law and order condition and reduce the external debt burden for early recovery of the private investment in the country.
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