

# DETERMINANTS OF INVESTMENT FUNCTION IN INDIA

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## ABSTRACT

*Investment is one of the most important macroeconomic variables for economic growth in any economy. High rate of investment is one of the factors responsible for the good economic performance. Due to importance of investment in economic growth, it is essential to understand the variables which determine investment in economy. This study attempts to find all possible variables which has significant role in determining investment in Indian Economy over the period 1979-80 to 2011-12. The result reveals that private investment as a % of GDP is mainly determined by public investment to GDP ratio, real exchange rate at trade based, credit availability as a % of GDP and trade openness.*

*Keywords: Private Investment, Public Investment, GDP, Real Exchange Rate, Trade Openness, Credit Availability.*

## INTRODUCTION

Investment is one of the key macroeconomic variables to any economy. It plays a crucial role in the models of economic growth. Also the capacity of production depends on the capital available to produce goods and services in the economy. There is no clear-cut definition of investment. Generally speaking investment refers to all economic activity which involves the use of resources to produce goods and services. However investment could be putting capital in an enterprise with the expectation of profit.

Econometric evidence (Beddies 1999, Ghura and Hadjimichael 1996, Ghura 1997) indicates that private investment has a stronger and more favorable effect on growth rather than government investment, probably because private investment is more efficient and less closely associated with corruption.

This model is based on time series analysis and the aim of my study is to find out the principle determinants that have influenced private investment in India from 1979 to 2011. In my econometric analysis I have included the following variables (from existing literature) which may affect the private investment these are real prime lending rate, public investment as percentage of GDP, real effective exchange rate based on trade, trade openness, credit availability to GDP ratio and weighted price index (WPI). This model cannot include all the variables because of associated data problem, like political instability, corruption, business environment etc.

The hypotheses tested in this study included the following-

There is no relationship between private investment as a percentage of GDP and the seven identified variables including public investment as a percentage of GDP, domestic credit to the private sector as a percentage of GDP, real prime lending rate, inflation (WPI), trade openness  $\{(\text{import}+\text{export})/\text{GDP}\}$ , real effective exchange rate, and rate of growth of GDP.

## LITERATURE REVIEW

This section gives an overview of the existing knowledge in the area of investment and its determinants. In this section the focus is to summarize the arguments and ideas of others, which form the basis for this study.

Williamson (2002) found a negative relationship between investment and real interest rate. Hence, a key determinant of investment is the real interest rate, as it represents the opportunity cost of investment.

Credit availability is positively associated with private investment. Credit availability was found to significantly boost investment only in the short run. Acosta and Loza (2004) found similar findings. It should be noted that one of the principal constraints on investment in developing countries is the quantity, rather than the cost, of financial resources and it would be legitimate to hypothesize that a private investor in a developing country is restricted by the level of bank financing (Blejer and Khan 1984).

Ramesh Jangili and Sharad Kumar (2010) shows that real effective exchange rate (REER) and inflation at the macro level are negatively related with the corporate investment. McCulloch (1989) found a negative relationship between investments and real exchange rate suggested that devaluation seems to decrease investment substantially. Devaluation of the exchange rate might cause the cost of imported capital to increase, thus reducing private investment. Nucci and Pozzolo (2001) found significant relationship between exchange rates and investment for Italian manufacturing firms.

There is huge debate among economists whether public investment crowds out/in private investment. Many authors have empirically tested the real (direct) crowding out and found contradictory results. Ramirez (1994), Greene and Villanueva (1990), Buiter (1977), Aschauer (1989), and Erenburg (1993) found that public investment and private investment have a complementary relationship; while Blejer and Khan (1984), Cebula (1978), Shafik (1992), Parker (1995), Ostrosky (1979), TunWai and Wong (1982), Sunderrajan and Takur (1980), Pradhan, et al. (1990), Krishnamurty (1985), Kulkarni and Balders (1998), and Alsenia, et al. (2002) did find evidence for crowding out between public and private investment.

Accelerator theory states that investment is proportional to output so that the rate of expected output becomes the prime determinant of investment.

## DATA & METHODOLOGY

The data covers a wide range of macroeconomic variables that include public investment, rate of growth of GDP, inflation, non-food bank credit to the private sector, real effective exchange rates, real prime lending rate and trade openness. The data used in this study is annual time series data obtained from different sources.

Data on public and private investment as a percentage of GDP is taken from Statistical Appendix: Economic survey 2012-2013. Data on other macro variables of study (inflation, the availability of non-food credit to private sector, rate of growth of GDP, and real effective exchange rate base on trade, import and export) are drawn from various issues of the Handbook of Statistics on Indian Economy, published by Reserve Bank of India. While data on real prime lending rate is drawn from World Bank. The period of analysis is 1979-2011.

## ECONOMETRIC ANALYSIS

After collecting above data and arranging it as per the requirement, I performed the following linear regression:

$$Pvt\ I/GDP = a + b(publ/GDP) + c(credit/GDP) + d(RPLI) + e(REER) + f(Inflation) + g(TO) + h(ROG\ gdp) + \varepsilon$$

Where pvt/gdp is dependent variable while a, b, c, d, e, f, g, h are the coefficients of public I, credit availability, real prime lending rate, real effective exchange rate, inflation, trade openness and rate of growth of GDP respectively and  $\varepsilon$  is the error term.

The results of the above regression are given in the following table:

Pvt I/GDP	Coefficient	P> t
RPLR	.0553398	0.496
ROG GDP	.0428532	0.518
REER	-.0402063	0.008
Credit/GDP	42.38268	0.000
Trade openness	-14.97672	0.055
Inflation	.0426568	0.299
Public I/GDP	-.8848647	0.000
Constant	16.76251	0.000

We can see from the above table that only REER (real effective exchange rate), credit/gdp, Pub I/GDP are significant. In my next step I tried all possible arrangement i.e. dropping and adding variables likemoving averages of GDP, nominal rate of interest, rate of inflation and all permutation and combination of these. After doing the whole exercise of adjustment,I reached to the following plausible results:-

Pvt I/GDP	Coefficients	P> t
Public I/GDP	-1.064666	0.000
REER	-.0557447	0.000
Credit/GDP	46.07403	0.000
Trade openess	-10.29664	0.013
Constant	21.97838	0.000

All the four variables are significant at 1% level of confidence. From the above table it can be concluded that private investment is inversely related with public investment because it has a negative coefficient. Similarly REER and trade openess are also inversely associated with private investment while credit/GDP ratio is positively associated with private investment.

There is evidence supporting the fact that as the share of public investment (-1.064666) increases it will lead to decline in the share of private investment which is quite obvious because there is fixed pie of total investment. But we cannot say that public investment crowds out private investment because it may happen that private investment may not decline in absolute terms or it can even increase. The coefficient of the REER (-0.557477) is negative and significant means devaluation will decrease private investment through increasing the cost of imported capital. While credit/GDP ratio has a positive coefficient (46.07403) which means private investment rises with increase in credit availability. At last this study shows an interesting result that is private investment as a share of GDP declines as trade openess increases. A possible explanation for this can be that trade openess is the share of exports and imports in GDP and I have shown in my excel sheet that share of imports has always been greater than the share of exports, which means that there is less demand for the domestic goods which discourages private investors.

After this exercise we calculated the residual for the above regression and used the Dickey- Fuller test for checking the stationarity of the residual. The results of the Dicky- Fuller test are given below:-

	Test statistic	1 % Critical value
Z(t)	-5.577	-3.702

MacKinnon approximate p-value for Z(t) = 0.0000

If the estimated Dicky Fuller statistic is larger (in absolute) than its critical value (-3.702) then the null hypothesis is rejected suggesting that the series is stationary. The estimated Dicky Fuller statistic is -5.577. So we can say that series is stationary.

After checking for the stationarity of the residual, I checked for the serial correlation by applying Durbin-Watson test. The following results show that there is no serial co-relation. The D-W statistic should be between 1.6 and 2.4. Our Durbin-Watson d-statistic (5, 33) = 1.843782

After this, the last step is to check whether the variance of the error term was constant or not. For this purpose we performed Breusch-Pagan test (hetttest) for heteroskedasticity. We will accept the null hypothesis of constant variance if the p value is greater than 0.5, but in this the p value is not greater than the 0.5 but it is very near to 0.50.

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of pvti

chi2(1)	0.50
Prob> chi2	0.4791

So here also we don't have the serious problem of heteroskedasticity.

## CONCLUSION

In the above exercise while estimating the determinants of the private investment as a share of GDP in India during 1979-2011, I started with seven independent variables which are real prime lending rate, real effective exchange rate (REER), rate of growth of GDP, credit to GDP ratio, public investment as a percentage of GDP, trade openness and inflation. Out of these only four variables are REER, public investment, trade openness, credit availability to GDP ratio are found to significant and real prime lending rate, rate of growth of GDP and inflation were found to be insignificant.

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