
Private investment slowdown in India: an empirical assessment

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Abstract: Theoretically, it is well documented that investment plays an essential role in the growth generating process of an economy. Recently, India has experienced a slowdown in investment rate and, the same has invited considerable interests of policymakers in reviving the investment for sustained long-run growth. The present study is an attempt to empirically identify the possible factors causing the slowdown in investment rates of India. For this purpose the study utilised a co-integration approach for a wide range of data spanning from 1981 to 2015. It is found that there is a long-run equilibrium relationship between private investment and economic variables such as market size, infrastructure development, banking soundness, external sector performance and public investment. The study finds that the high interest rate, slowdown in bank credit, fluctuating exchange rate and low quality infrastructure seem to lower the investment rate in India. Moreover, the rising public investment is found to have a crowding-out effect may be due to increased pressure on interest rates and limiting the access of financial resources for private investment.

Keywords: private investment; co-integration; ECM; infrastructure; banking; external sector; demand; equilibrium; granger-causality; India.

Reference to this paper should be made as follows: Bishnoi, A. and Garg, S. (2022) 'Private investment slowdown in India: an empirical assessment', *Int. J. Economic Policy in Emerging Economies*, Vol. 15, No. 1, pp.70–85.

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1 Introduction

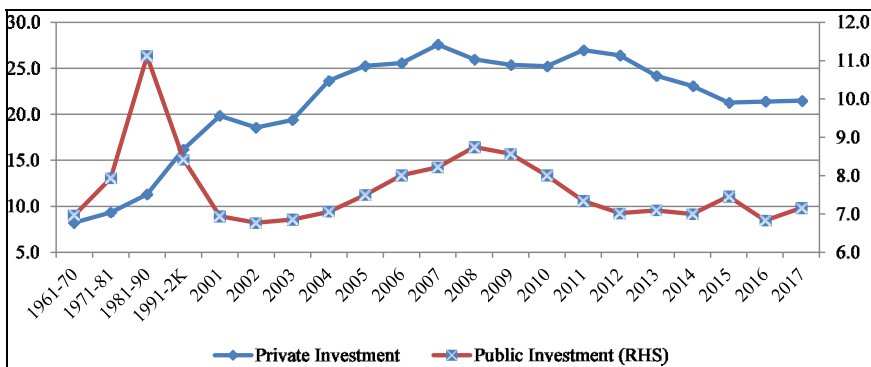
It is well documented in the literature that investment plays essential role in the growth generating process of an economy. The role of investment is heightened for providing a pace to the self-sustained growth to an economy through accumulation of capital and enhancement of labour productivity. Investment also boosts the demand in an economy through increased real wages and household incomes amid rising productivity and technological advancements. There is close connection between the level of investment and the rate of economic growth (Ben, 1998; Chari et al., 1997; Barro, 1991; Khan and Reinhart, 1990; Kormendi and Meguire, 1985; Åkare and Sinkoviä, 2013). Seruvatu and Jayraman (2001) evidenced that the Asian growth trajectory during 1990s was accompanied by rising investment level, well above the rate of 25% of gross domestic product (GDP). The Asian giant, China has recorded accelerated economic growth due to increase in capital productivity associated with massive influx of investment (Namaki, 2014). India's high growth trajectory (about 10% growth during 2000s) was accompanied by an unprecedented 9 percentage point increase in domestic saving as well as investment (Economic Survey, 2017–2018). With the growing role of investment, Asian region has enlarged investment footage by launching policy packages and has remained the most lucrative investment destination for foreign participants. It is estimated that by 2030 China is going to occupy almost one third of the global investment, India (7%), Brazil (3%) as compared to the 11% in USA (World Bank, 2013).

However, the emerging economies' investment, mainly dominated by private investment (around three fourths of the total investment), has not been much favourable in the recent past period, and the global growth has also subdued. Investment growth has remained below the long-term average rate over the past couple of years, and could not get revived despite of counter-cyclical fiscal policies across emerging markets. The fluctuations in external sector have been regarded as key factor for this investment slowdown. Parallel, the recent past statistics of Indian investment has also alarmed the policymakers. As per the National Accounts Statistics (NAS) data, the growth in capital formation was 5.1% during 1990–1995 and peaked at 17.5% during 2004–2008, but slowed down thereafter, reporting a growth of 4.3% during 2012–2016 (at 2011–2012 base year). The ratio of gross fixed capital formation to GDP climbed from 26.5% in 2003, reached a peak of 35.8% in 2007, and then slid back to 28.9% in 2018. In the same period, private investment has slid from 27.6% in 2007 to 21.5% in 2017 (WDI, 2018). The fall in investment was highly skewed towards private investment (Economic Survey, 2017–2018). The investment growth in India has been subdued even after the active policy initiatives in terms of launch of 'Make in India' program in 2014, infrastructure development, FDI reforms, quick approvals and clearances, etc. (Sahoo, 2017). This slowdown in investment casts doubt about the long-run sustained growth of India in the next decade. In this backdrop, present study aims to identify key factors which have slowed down the investment growth momentum of India. The study will serve purpose of policymakers in taking corrective measures for investment revival in the country and sustaining economic growth trajectory.

In fact, the inter-temporal behaviour reveals that the private investment was less than 10% of GDP during 1970s, has shown remarkable growth, touching the level of 27.6% of GDP in 2007, but slowed thereafter. This indicates that the open economic reforms have created much scope for Indian private investment to proliferate. For the same period

public investment has attained more or less the stagnant behaviour (Figure 1). Since, public investment has different motivation and is not purely guided by market principles, whereas the private investment mainly gets incentivised through market driven forces. India has travelled a long journey of market oriented economic system since 1991 and exhibited significant growth in the private investment. This phenomenon puts forth the ample scope for assessment of underlying factors of investment behaviour. The study adds on the existing literature on two grounds – one it considers the sample period of post economic reforms of 1991, an era of market governing environment. Second the study has advantages of methodological advancements both in variables as well as method of analysis. The study is classified into five sections. Next section presents the review of related literature. Third section discusses the research methodology. Fourth section presents the results, and discusses the practical implications of study. Final section concludes the study.

Figure 1 Private and public investment in India (as % of GDP) (see online version for colours)



Source: WDI (2018)

2 Review of literature

2.1 Theoretical literature

Theories of investment are founded by many noblest economists from different perspectives. The fundamental determinants of investment are broadly covered with four models; the accelerator model, profit, model neo-classical and Tobin's q models (Clark, 1917; Jorgenson, 1967; Eisner and Nadiri, 1968; Sakr, 1993; Seruvatu and Jayraman, 2001). The accelerator model postulates that a firm's investment decision is positively influenced by the demand for the firm's finished product. Under the profit model of investment, profits play a vital role in the facilitation of internal and external investment financing to realise the profitable projects and thereby boost investment. The next phase in the evolution of investment theories has come up with the neo-classical model. This model of investment states that investment decisions are based on both anticipated earnings and the cost of capital. Tobin's q model puts forward that the investment decisions are undertaken only when the replacement costs of physical assets are lower than the increase in the value of firm shares.

2.2 Empirical literature

Towards empirical literature, numerous studies have captured the investment determinants across countries as well as country level. In order to assess the role of public investment, Blejer and Khan (1984) estimated an investment model for 24 developing countries and found that infrastructure investment has a positive effect on private investment and non-infrastructure investment crowds-out private investment. Greene and Villanueva (1991) identified the determinants of private investment for a panel dataset of 23 countries. They considered the key factors such as real GDP, real interest rates, domestic inflation, the debt services ratio and the ratio of debt to GDP and found that except real GDP, the remaining factors were negatively related with private investment. Servén (2003) examined the link between real-exchange-rate uncertainty and private investment in developing countries. The paper utilised a GARCH measure of real-exchange-rate volatility and found that it has a strong negative effect on investment. In addition, the negative effect of real-exchange-rate uncertainty on investment is significantly larger in economies that are highly open and in those with less developed financial systems. Le (2004) utilised the sample of 25 developing countries for the period 1975–1990, and evidenced the link between private investment and macroeconomic variables such as differential rate of return, risk aversion and political and economic risks. It was concluded that the variability of government political capacity hinders private investment. Mlambo and Oshikoya (2001) took the panel data of 18 African countries for the period 1970–1996 and found that the fiscal measure, financial and monetary policy, macroeconomic uncertainty and trade variables were significant determinants of private investment in Africa. Ali (2010) evidenced from panel data of 71 developing countries for the period 1984–2000, and hailed that corruption has a robust negative effect on the rate of private investment.

Peltonen et al. (2011) utilised the panel data for Asian and Latin American countries, and evidenced that the market size measured by GDP and the cost of capital are the key fundamental determinants of investment. Besides, the equity prices, credit and lending rate play a relevant role on the dynamics of investment. Lim (2014) utilised the panel data of 129 countries and found that financial development and institutional quality are reasonably robust determinants of cross-country capital formation, with latter displaying more stability in the sign and significance of its coefficient. Ucan (2014) investigated the role of financial factors for domestic private investment using panel data of G7 countries for the time period 1994–2010 and found positive relationship between interest rate and private investment. Kose et al. (2017) analysed the causes of investment slowdown in 73 EMDEs for the period 1998–2015. It was found that weak activity, heightened political risk, negative terms-of-trade shocks, declining foreign direct investment inflows, elevated private debt burdens and adverse spillovers from major economies are major factors for restricting the investment potentials. Besides, the decreases in household consumption, weak foreign investment, inefficient government spending and decreased export competitiveness have been regarded as key factors causing the economic stagnation (Nikensari et al., 2019).

For country specific study, Ang (2009) analysed the role of financial sector policies in determining private investment in India and Malaysia for the period 1950–2005. The private investment function is estimated with key variables such as GDP, interest rate restraint, public investment, directed credit programs, user cost of capital, reserve and liquidity requirements. The results confirmed that the interest rate control affects the

investment positively. But directed credit programs, high reserve and liquidity requirements tend to have a negative influence on private investment in India. Narayan (2008) tried to identify the role of democracy in the Fijian private investment, and found the contributory role of democracy in the investment. Sisay (2011) investigated the major constraints of private investment in Ethiopia via using time series datasets for 1950–2003. According to the estimation, private investment responded positively to the domestic market, return to capital, trade openness and liberalisation measures, infrastructural facilities and FDI. Government spending macroeconomic uncertainty and political instability hampered the private investment. Similar effects were also found by Jenkins (1998) for fall in private sector investment of Zimbabwe. The possible explanatory variables into consideration were public investment, capital price, real interest rates, private gross operating profits, tax rates, foreign exchange availability, input price and output price. The findings revealed that foreign exchange shortage was the key constraint on private investment, while the availability of domestic savings has not been a constraint. Uncertainty about political developments, price controls and the government policy with respect to labour were also observed as discouraging factors for investment. Molapo and Damane (2015) provided an empirical investigation on the determinants of private investment in Lesotho for the time period of 1982–2013. It was concluded that the level of economic growth and public investment directly affect the private investment while increase in the price level and macroeconomic instability affects the investment negatively. Using quarterly data of South Africa for the period 1994–2009, Biza et al. (2015) found that budget deficits significantly crowds out private investment in the long-run. Zakharov (2017) investigated the relationship between corruption and fixed capital investment from Russian region and found an adverse impact of corruption on investment.

For India specific, Dash (2016) tried to estimate the impact of public investment on private investment in India using ARDL model for the data span of 1970–2013, and observed that the crowding out effect of public investment on private investment has dampened in the post-liberalisation period. Chhibber and Kalloor (2016) utilised the ordinary least square method for sample period 1980 to 2014, and found that public investment, real exchange rate and the availability of credit to the private sector had crowd-in effect on the private investment. In a research report of The NCAER (2018), it was found that public investment has crowding out effect on private investment once the sample period ranges from 1950–2012. However, the post reform era (after 1980s) confirms the crowding-in effect of the public investment. Similar findings were also revealed by Muthu (2017) in Indian context. Based on the empirical findings, it was observed that aggregate public investment has a positive effect on private investment both in the long-run and the short-run. Among the various categories of infrastructure sector, a positive and significant impact in the case of electricity, gas and water supply was observed. The result also indicated that the public investment in machinery and equipment and construction had substantially influenced the private sector machinery and equipment investment in the long-run and the short-run. Macroeconomic uncertainty has been found with negative impact on private investment and the impact is higher in the short-run than in the long-run. Dastidar and Ahuja (2019) analysed the investment slowdown in India using OLS method for the data spanning from 1995–2017 and considered the demand as well as supply side factor. It was observed that uncertainty in the overall macroeconomic and business environment, demand-side factors, especially

external demand and real interest rates, and the pace of public investments plays an important role in affecting private business investments in India.

The above review of literature indicates that the variables such as fiscal policy, political stability, public investment, rate of returns, interest rate, exchange rate, infrastructure facilities and financial resources play important role in explaining the private investment behaviour. To the best knowledge of authors the infrastructure dimension has been overlooked by existing literature in Indian context. Also, most of existing studies have considered the market size of the economy by GDP which already had inclusion of investment, thereby quite possibilities of overestimation of the investment function. Present study extends the existing literature while considering the infrastructure dimension and the demand side through consumption expenditure along-with the other macroeconomic variables for investment determinants. The study has also advantage of sample period, mainly characterised with the operation of market based forces which is most suitable for exploring the investment determinants especially the private sector.

3 Research methodology

3.1 Selection of variables and data sources

After reviewing the existing literature, present study tried to consider every possible dimension of the investment function including the demand side, supply side and the external sector. To capture the demand side, we considered the private final consumption expenditure. As per the accelerator theory, output growth leads to expansion in the investment. In this regard various studies have taken the growth rate of GDP and reported a positive impact on investment (Athukorala, 1998; Julio and Yook, 2012). Here it is worth mentioning that GDP has already inclusion of investment expenditure¹, so it necessitates to be excluded while estimating the private investment function. Since public investment is considered separately to account for the crowding-out/in effect in the study, accordingly present study takes the private final consumption expenditure as proxy for expansion in the output and size of the economy. It is added in the literature that the external sector comprising foreign direct investment² (both inward and outward) and trade openness has significant bearings on domestic investment. To represent the external sector, here real effective exchange rate is taken into consideration as it captures all the dynamics of the external sector performance related to foreign investment (inward as well as outward), net trade and reserve accumulation. Inclusion of numerous variables in the limited sample period would render the imprecise estimation. We also considered the availability of infrastructure facility as well as the public investment in the economy. In order to quantify the infrastructure development, study used the principal component analysis (PCA) to express the multiple dimensions of infra variables into single dimension. The possible infra variables included: fixed telephone subscription, rail line availability, air transport freight, per capita energy consumption and electric power consumption. Interest rate was taken for proxy of the cost of capital. The prevailing interest rate also captures both the demand-supply dynamics of financial resources in an economy. Here it is worth mentioning that the interest rate would have a negative impact on private investment if the investment is financed in the local credit market. However, an increment in interest rate could have a positive effect in the capital flow from abroad,

like it usually happens in emergent markets which can boost the private investment. The access of finance is important factor for the investment and, the same rests on the level of financial development. In this regard the bank credit as percentage of GDP is considered for proxy of financial development. Keeping in view the limited data sample period, study estimates two models where bank credit and interest rates are used as separate explanatory variables. The sample period is annual data ranging from 1981–2015, considering the availability of real investment data with one base year of 2004–2005. The data are sourced from World Development Indicator, *Handbook of Statistics on Indian Economy* (publication of Reserve Bank of India), and International Monetary fund (IMF).

3.2 The model

Based on the review of literature, present study considers following function to identify the key investment determinants in India.

$$GFCF_P = F(PFCX, Infra, REER, Interest, Pub_inv \text{ and } Credit)$$

Detailed descriptions of selected variables are provided in Table 1.

Table 1 List of selected economic variables

<i>Dimension</i>	<i>Measurement</i>	<i>Description</i>	<i>Explanation</i>
Private investment	Real gross fixed capital formation for private sector (% of GDP)	GFCF_P	It represents the total investment of private sector.
Aggregate demand	Growth rate of private final consumption expenditure	PFCX	It represents the demand side or market size factor of the economy. It is a proxy for gross domestic product.
Infrastructure development	Index of infrastructure (obtained through PCA)	Infra	It is a composite index of various dimensions such as telephone subscription, rail line availability, air transport freight data, energy consumption and electric power consumption.
External sector	Real effective exchange rate	REER	It captures the dynamics of external sector performance of an economy.
Cost of capital	Interest rate (%)	Interest	It serves as proxy for cost of capital for private investment.
Public investment	Public investment (% of GDP)	Pub_inv	It represents the government spending for productive purposes in the economy.
Financial development	Bank credit (% of GDP)	Credit	It embodies the financial capability of a country to meet the finance requirement of private sector.

3.3 Method of analysis

The study utilised the time series econometric methodology to identify the investment determinants in India. For the time series analysis, co-integration method is widely used in the research to understand the long-run equilibrium relationship among the economic

variables. But the using of co-integration method requires that the select economic variables are characterised with first order integration. Estimating the relationship among non-stationary variables through OLS estimation makes the regression model spurious. Hence study first examines the integration order of the series while using the ADF and Philips Perron tests. Having identified the series of integrated of order one, we can utilise the Johansen and Juselius (1990) approach of co-integration among multiple variables.

The study considers following functional form to identify the private investment determinants.

$$GF_{CF_P_t} = \beta_0 + \beta_1 Infra_t + \beta_2 REER_t + \beta_3 Interest_t + \beta_4 Pub_inv + \beta_5 PFCX_t + u_t \quad (1)$$

$$Gfcf_P_t = \beta_0 + \beta_1 Infra_t + \beta_2 REER_t + \beta_3 Credit_t + \beta_4 Pub_inv + \beta_5 PFCX_t + u_t \quad (2)$$

Once identifying the co-integration behaviour among the specified variables, the short-run dynamics is investigated using the error correction model (ECM). At widely, an ECM derived from the Johansen test can be expressed as the given equation:

$$\begin{aligned} \Delta GF_{CF_P_t} = & \beta_0 + \sum_{i=1}^p \varnothing_i \Delta GF_{CF_P_{t-i}} + \sum_{i=1}^p \delta_i \Delta Infra_{t-i} \\ & + \sum_{i=1}^p \gamma_i \Delta REER_{t-i} + \sum_{i=1}^p \phi_i \Delta Interest_{t-i} \\ & + \sum_{i=1}^p \omega_i \Delta Pub_inv_{t-i} + \sum_{i=1}^p \theta_i \Delta PFCX_{t-i} + \alpha ECM_{t-1} + u_t \end{aligned} \quad (3)$$

$$\begin{aligned} \Delta GF_{CF_P_t} = & \beta_0 + \sum_{i=1}^p \varnothing_i \Delta GF_{CF_P_{t-i}} + \sum_{i=1}^p \delta_i \Delta Infra_{t-i} \\ & + \sum_{i=1}^p \gamma_i \Delta REER_{t-i} + \sum_{i=1}^p \phi_i \Delta Credit_{t-i} \\ & + \sum_{i=1}^p \omega_i \Delta Pub_inv_{t-i} + \sum_{i=1}^p \theta_i \Delta PFCX_{t-i} + \alpha ECM_{t-1} + u_t \end{aligned} \quad (4)$$

where ECM_{t-1} is the past error terms in the model and u_t is the error term.

4 Results and interpretation

Before estimating the investment function, study captures the descriptive behaviour of selected variables. It is found that the private investment rate in India was around 15% in early 1990s accompanied by around 6% economic growth, one fourth of the GDP as bank credit, public investment as half of the private investment and interest rate well above 10%. Over the period of two and half decade, private investment has increased to 25%, GDP growth has remained stable after reaching to highest level of 8% during 2006–2010, bank credit penetration has doubled and interest rate has fallen. The infrastructure is represented by an index obtained using PCA has shown gradual improvement. Also, the domestic market size measured through private final consumption expenditure has expanded gradually (Table 2).

Table 2 Descriptive behaviour of economic variables

<i>Period</i>	<i>GDP*</i>	<i>GFCF_P</i>	<i>Credit</i>	<i>Interest</i>	<i>REER</i>	<i>Pub_Inv</i>	<i>Infra</i>	<i>PFCX*</i>
1991–1995	6.54	14.70	24.02	11.75	101.40	7.59	–0.59	4.01
1996–2000	5.70	17.97	25.22	9.58	105.15	5.75	–0.22	5.36
2001–2005	7.59	21.48	34.22	6.31	110.34	5.33	0.20	5.71
2006–2010	8.05	25.98	48.15	6.00	105.23	7.17	0.77	8.22
2011–2015	6.42	24.64	51.95	8.21	108.02	8.22	1.66	6.57

Note: *growth (%)

Source: Authors' compilation from WDI

4.1 Testing for integration

To check the stationary behaviour of the above series, augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests have been utilised. The test statistics described in Table 3 highlights that most of the series are non-stationary in level form while first difference of the series indicate stationary process based on the ADF and PP test.

Table 3 Unit-root test for selected economic variables

<i>Variables</i>	<i>ADF test</i>		<i>Phillips Perron test</i>	
	<i>Level</i>	<i>1st difference</i>	<i>Level</i>	<i>1st difference</i>
GFCF_P	–1.21	–6.12*	–1.21	–6.13*
Infra	–2.88	–1.55	3.95	–5.68*
REER	–2.21	–5.21*	–2.24	–4.98*
Interest	–1.38	–3.97*	–1.30	–3.97*
Pub_inv	–1.60	–6.22*	–1.60	–6.22*
PFCX	–4.04	–11.58*	–4.17	–17.85*
Credit	0.63	–1.94	0.14	–5.35*

Note: *denotes the statistically significance level at 1%.

Source: Authors' computation

4.2 Testing for co-integration

In order to find the number of co-integrating vectors among the selected variables, study utilised the trace statistic and max statistic. The max statistics has the sharper alternative hypothesis than the trace statistics, so, it is more preferable to the trace statistics in deciding the number of co-integration present in a system of non-stationary variables (Enders, 2014). For estimating both the trace statistic, study considers one lag length as specified by the Schwarz Bayesian information criteria (SBIC). The trace statistic reported in Table 4 indicates two co-integrating vectors while considering the private investment as dependent variable. However max statistic confirms the one co-integrating vector among the selected economic variables. Having confirmed the presence of co-integration, it is appropriate to estimate the VECM model where both the long-run as well as short-run equilibrium relationships are captured.

Table 4 Johansen co-integration test

<i>Maximum rank</i>	<i>Trace statistic</i>	<i>Critical value (trace)</i>	<i>Max statistic</i>	<i>Critical value (max)</i>
0	126.37	103.18	46.77	45.10
1	79.60	76.07	38.16*	38.77
2	41.45*	54.46	18.40	32.24
3	23.05	35.65	15.14	25.52
4	7.91	20.04	7.82	18.63
5	0.08	6.65	0.08	6.65

Note: *Indicates the acceptance of null hypothesis.

Source: Authors' computation

4.3 Long-run analysis

After identifying a unique co-integrating vector, the next step involves the estimation of long-run behaviour of selected economic variables. It helps in understanding the directional effect and respective magnitudes of explanatory variables on the private investment. Table 5 presents the results of long-run behaviour. In model 1, the explanatory variable credit is considered whereas in model 2, interest rate is considered instead of credit. The inclusion of both the variables simultaneously is limited due to the short span of data period. As per the estimates of model 1 provided in table 5, bank credit, infrastructure development index and private final consumption expenditure are having positive coefficient values with respective magnitude of 0.23, 2.70, and 1.05. The coefficient values of bank credit and output expansion³ are statistically significant. It can be evidenced that increasing output and supporting bank finance contributes the private investment positively. The empirical analysis confirms that slowdown in bank credit due to increased NPAs in the recent past has slowed the private investment in India. The finding of output expansion to the economic growth is well supported by the accelerator principal. Infrastructure variable has positive coefficient value though insignificant, implying that the infrastructure has tendency to affect the private investment positively, but the insignificant behaviour, may be attributed to the low quality infrastructure. It is mentioned that the developed infrastructure contributes in terms of enhanced productivity, reducing the transaction and trade costs, minimising production costs and improving market competitiveness (Ullah and Naveed, 2012). India has paid due attention in the infrastructure facilities in the past decade while planning for allocation of \$1.5 trillion in the next five years. Herein quality infrastructure seems a most possible solution to incentivise the private investment. On the other hand, public investment has been observed with negative coefficient and statistically significant. Public investment is found with crowding-out effect on private investment. The crowding-out finding effect was also observed by Dash (2016) in Indian context. The real exchange rate has a tendency to lower the private investment as observed from negative coefficient value. The findings of model 2 indicate that the direction of common variables of both the models have remained same rather the infrastructure and REER have turned statistically significant. Here interest rate has negative coefficient value and statistically significant. The finding suggests that investment perceives the cost of finance as a hurdle factor. The descriptive statistics given in Table 2 indicates that the average interest rate was lower

during 2001–2010, a period of investment boom in India and the rate has increased above 8% in the recent past, a period of investment slowdown. Higher interest rate increases the borrowing cost for the firms and accordingly discourages the investment. This finding may be attributed to apprehension of rise in interest rate amid the rising public investment. Here it can be inferred that India should increase the public spending and control the exchange rate without affecting the interest rates. The Basel III norms put much weightage on common equity shares in the fulfilment of capital adequacy ratio. In this regard the innovative sources of financing to the banks can serve the better purpose for controlling the increase in interest rate which in turn can boost the private investment. Similar findings were also evidenced by other studies in different economies. Such as Hassan and Salim (2011), provided an empirical evidence for private investment in Bangladesh over the time period 1974–2003, and found that real interest rate was not significantly determining the private investment whereas national income was very much effective in the long run. On the other hand, government expenditure was found to be a significant determinant of private investment, both in the long-run and short run. Another study by Ang (2009) concluded that directed credit programs and high reserve and liquidity requirements tend to have an undesirable effect on private investment in India.

In sum, the quality infrastructure, enhanced bank credit and output expansion are key drivers of private investment in India. The public investment other than the infrastructural purposes does not persuade the private investment as entrepreneurs remain cautious about the possible fluctuations in policy rates amid rising inflation. High interest rate has remained a discouraging factor for the private investment. Moreover the depreciating exchange rate is also perceived as an alarming factor as its implications have also come on the interest rate in India. The recent past approach of maintaining high interest rate in India to stabilise the exchange rate and controlling inflation seems to affect the investment rate negatively.

Table 5 Long-run estimates (dependent variable private investment)

<i>Variable</i>	<i>Model 1</i>		<i>Model 2*</i>	
	<i>Coefficient</i>	<i>P-value</i>	<i>Coefficient</i>	<i>P-value</i>
Credit	0.229	0.000	-	-
REER	-0.010	0.335	-0.02	0.007
Pub_inv	-1.252	0.000	-0.87	0.000
Infra	2.699	0.175	7.76	0.000
PFCX	1.054	0.000	1.17	0.000
Interest	-	-	-0.39	0.000
_cons	15.959	-	22.04	-

Notes: *model 2 variables also confirm the co-integrating relationship among the selected variables. Results are available with authors upon request.

Source: Authors' computation

Table 6 reports the results of short-run behaviour of the economic variables. It is observed that the error correction term has negative coefficient value and statistically significant in the estimation of private investment model. The ECM result indicates the speed of adjustment back to long-run equilibrium after a short-run shock. Based on coefficient value of ECM, it can be noted that it corrects to the short-run disequilibrium

and takes almost two years to bring back the long-run stability. The results of Table 6 also indicate the causality among selected economic variables. The negative coefficient values of ECM in both the models suggest that the explanatory variables viz. bank credit, infrastructure development, real exchange rate, interest rate, public investment and private final consumption collectives cause to the private investment. However no causality is observed for other variables except private final consumption expenditure as the coefficient values of ECMs are statistically insignificant.

Table 6 Results of Granger causality in a multivariate framework

<i>Model 1</i>							
<i>Dependent variable</i>	$\Delta GFCF_P$ (-1)	$\Delta Credit$ (-1)	$\Delta REER$ (-1)	ΔPub_inv (-1)	$\Delta Infra$ (-1)	$\Delta PFCX$ (-1)	<i>ECM</i>
$\Delta GFCF_P$	0.102	-0.042	0.055	0.931	-2.122	-0.243	-0.670**
P-value	0.669	0.822	0.182	0.073	0.835	0.189	0.022
$\Delta Credit$	0.493	0.223	0.038	0.24	-12.886	0.32	0.144
P-value	0.047	0.246	0.371	0.656	0.224	0.096	0.635
$\Delta REER$	-1.784	2.262	0.169	-3.51	16.29	0.77	1.246
P-value	0.15	0.018	0.431	0.191	0.757	0.421	0.411
ΔPub_inv	0.015	0.173	0.054	-0.363	-3.418	0.056	0.179
P-value	0.899	0.059	0.009	0.157	0.497	0.542	0.215
$\Delta Infra$	-0.004	0.001	0.001	-0.001	0.022	0.002	0.005
P-value	0.434	0.875	0.092	0.904	0.909	0.623	0.33
$\Delta PFCX$	-0.207	0.424	0.053	-0.861	8.752	0.023	1.203*
P-value	0.491	0.068	0.312	0.187	0.494	0.92	0.001
<i>Model 2</i>							
<i>Dependent variable</i>	$\Delta GFCF_P$ (-1)	$\Delta Interest$ (-1)	$\Delta REER$ (-1)	ΔPub_inv (-1)	$\Delta infra$ (-1)	$\Delta PFCX$ (-1)	<i>ECM</i>
$\Delta GFCF_P$	0.077	0.11	-1.009	0.073	-0.002	0.007	-0.791*
P-value	0.72	0.36	0.46	0.53	0.56	0.98	0.004
$\Delta Infra$	3.472	1.595	25.542	-4.053	-0.026	5.065	0.007
P-value	0.71	0.75	0.66	0.43	0.88	0.72	0.16
$\Delta REER$	-0.048	-0.013	0.088	0.053	0.001	0.001	0.56
P-value	0.19	0.5	0.7	0.01	0.04	0.97	0.72
$\Delta Interest$	0.458	0.279	-0.837	-0.098	0.001	-0.699	0.526
P-value	0.34	0.29	0.78	0.70	0.88	0.34	0.70
ΔPub_inv	0.965	0.228	-1.201	-0.24	0.00	-0.253	0.236
P-value	0.03	0.35	0.66	0.32	0.95	0.71	0.09
$\Delta PFCX$	-0.364	0.028	0.125	0.075	0.003	-0.179	0.775**
P-value	0.03	0.76	0.9	0.41	0.35	0.48	0.05

Notes: *, **, *** denotes significant at 1%, 5% and 10%, respectively.

Source: Authors' computation

4.4 *Bi-directional causality*

Table 7 presents the results of bivariate Granger causality among economic variables. As per model 1, the variables such as bank credit and public investment granger cause the private investment individually. Even bank credit and private final consumption expenditure are caused by private investment. The results of model 2 indicate that infrastructure, public investment, domestic demand and interest rate are causing to the private investment at individual level. In later three variables there is bi-directional causality.

Table 7 Bivariate Granger causality among economic variables

<i>Equation</i>	<i>Excluded</i>	<i>Model 1</i>		<i>Model 2</i>	
		<i>Chi2</i>	<i>P-value</i>	<i>Chi2</i>	<i>P-value</i>
GFCF_P	Credit	5.848	0.054	-	-
	REER	2.772	0.250	3.821	0.148
	Pub_inv	13.189	0.001	8.609	0.014
	Infra	2.461	0.292	10.420	0.005
	PFCX	5.295	0.071	10.060	0.007
	Interest	-	-	12.395	0.002
	ALL	24.247	0.007	33.896	0.000
Credit	GFCF_P	5.781	0.056	-	-
REER	GFCF_P	1.123	0.570	1.210	0.546
Pub_inv	GFCF_P	0.751	0.687	10.936	0.004
Infra_1	GFCF_P	0.324	0.850	2.1335	0.344
PFCX	GFCF_P	6.661	0.036	7.034	0.030
Interest	GFCF_P	-	-	8.508	0.014

Source: Authors' computation

4.5 *Theoretical and practical implications*

On theoretical front, present study has relevance in terms of revisiting the investment theories specifically accelerator theory, neoclassical theory underscoring the role of cost of capital and liquidity theory ascertaining the role of financial resources. Present study finds the results in corroborate to the theoretical literature. The study has practical implications in terms of drawing policy inferences to overcome the investment slowdown in India. The major policy thrust for investment revival can be towards gearing up the reforms for innovative financing which fulfils the investment demand with increased access of finance at competitive rates. It is also observed that the increase in public investment towards infrastructure development is important step to improve the investment climate.

5 Conclusions

It is found that private investment rate in India was around 15% in early 1990s accompanied by around 6% economic growth, one fourth of GDP as bank credit, public investment as half of the private investment and interest rate well above 10%. Over the period of two and half decade, the investment rate has increased to 25%, GDP has remained stable after reaching to highest of 8% during 2006–2010, bank credit penetration has doubled and interest rate has fallen. Towards the determinants of private investment in India, the empirical analysis confirms that falling bank credit due to increased NPAs has remained an important factor for slowdown in the investment momentum of India. Even the interest rate has also discouraged the private investment in India. Both these findings suggest for introduction of innovative banking system, especially the cost effective sources of funds, so as to expand the banking credit without adding to the NPAs and also providing the funds at competitive rates. Infrastructure variable has a tendency to affect the private investment positively, but the variable has insignificant impact on private investment. Herein the improvement in quality of infrastructure seems a most possible solution to incentivise the private investment. Public investment is found with crowding-out effect on private investment. The finding suggests that the public investment in the form of quality infrastructure would play an important role in boosting the private investment. Non-infrastructural public spending may create the environment of uncertainty among entrepreneur for changes in the policy measures either on monetary side or on fiscal side, thereby restrict the private investment. Moreover, the exchange rate has discouraging impact on private investment. This phenomenon demands a stable exchange rate without changing the monetary policy rates. The study has limitation that it considered the partial dimension of financial development as investment determinant, merely by taking the banking side; however there is much scope for incorporation of capital market developments which affects the investment growth in India. This limitation offers the scope for future research in India while taking the broader parameters of financial development as investment factor.

References

- Åkare, M. and Sinkoviã, D. (2013) 'The role of equipment investments in economic growth: a cointegration analysis', *International Journal of Economic Policy in Emerging Economies*, Vol. 6, No. 1, pp.29–46.
- Ali, A-S. (2010) 'Corruption and private domestic investment: evidence from developing countries', *International Journal of Economic Policy in Emerging Economies*, Vol. 3, No. 1, pp.47–60.
- Ang, J.B. (2009) 'Private investment and financial sector policies in India and Malaysia', *World Development*, Vol. 37, No. 7, pp.1261–1273.
- Athukorala, P.C. (1998) 'Interest rates, saving and investment: evidence from India', *Oxford Development Studies*, Vol. 26, No. 2, pp.153–169.
- Barro, R.J. (1991) *World Interest Rates and Investment*, NBER Working, Paper No. W3849.
- Ben, D.D. (1998) 'Convergence clubs and subsistence economies', *Journal of Development Economics*, Vol. 55, No. 1, pp.153–171.
- Biza, R.A., Kapingura, F.M. and Tsegaye, A. (2015) 'Do budget deficits crowd out private investment? An analysis of the South African economy', *International Journal of Economic Policy in Emerging Economies*, Vol. 81, No. 1, pp.52–76.

- Blejer, M.I. and Khan, M.S. (1984) 'Government policy and private investment in developing countries', *IMF Staff Papers*, Vol. 31, No. 2, pp.379–403.
- Chari, V.V., Kehoe, P.J. and McGrattan, E.R. (1997) *The Poverty of Nations: A Quantitative Investigation*, Research Department Staff Report, No. 204, Federal Reserve Bank of Minneapolis.
- Chhibber, A. and Kalloor, A. (2016) *Reviving Private Investment in India: Determinants and Policy Levers*, NIPFP Working Paper, No. 181.
- Clark, J.M. (1917) 'Business acceleration and the law of demand: a technical factor in economic cycles', *The Journal of Political Economy*, Vol. 25, No. 1, pp.217–235.
- Dash, P. (2016) 'The impact of public investment on private investment: evidence from India', *Vikalpa*, Vol. 41, No. 4, pp.288–307.
- Dastidar, A.G. and Ahuja, R. (2019) 'A perspective on the slowdown in private corporate investments in India', in Bandyopadhyay, S. and Dutta, M. (Eds.): *Opportunities and Challenges in Development*, Springer, Singapore.
- Economic Survey (2017–2018) *Ministry of Finance*, Government of India.
- Eisner, R. and Nadiri, M.I. (1968) 'Investment behavior and neo-classical theory', *The Review of Economics and Statistics*, Vol. 50, No. 3, pp.369–382.
- Enders, W. (2014) 'Co-integration and error-correction models', in *Applied Econometric Time Series*, 3rd ed., John Wiley and Sons Inc., Hoboken, New Jersey.
- Greene, J. and Villanueva, D. (1991) 'Private investment in developing countries: an empirical analysis', *IMF Staff Papers*, Vol. 38, No. 1, pp.33–58, Palgrave Macmillan.
- Hassan, A.F. and Salim, R.A. (2011) 'Determinants of private investment: time series evidence from Bangladesh', *The Journal of Developing Areas*, Vol. 45, No. 1, pp.229–249.
- Jenkins, C. (1998) 'Determinants of private investment in Zimbabwe', *Journal of African Economies*, Vol. 7, No. 1, pp.34–61.
- Johansen, S. and Juselius, K. (1990) 'Maximum likelihood estimation and inference on cointegration – with applications to the demand for money', *Oxford Bulletin of Economics and Statistics*, Vol. 52, No. 2, pp.169–210.
- Jorgenson, D. (1967) 'The theory of investment behavior in determinants of investment behavior', in *Determinant of Economic Behaviour*, pp.129–188, National Bureau of Economic Research.
- Julio, B. and Yook, Y. (2012) 'Political uncertainty and corporate investment cycles', *The Journal of Finance*, Vol. 67, No. 1, pp.45–83.
- Khan, M.S. and Reinhart, C.M. (1990) 'Private investment and economic growth in developing countries', *World Development*, Vol. 18, No. 1, pp.19–27.
- Kormendi, R.C. and Meguire, P.G. (1985) 'Macroeconomic determinants of growth: cross-country evidence', *Journal of Monetary Economics*, Vol. 16, No. 2, pp.141–163.
- Kose, M.A., Ohnsorge, F., Ye, L.S. and Islamaj, E. (2017) *Weakness in Investment Growth Causes, Implications and Policy Responses*, World Bank Group, Policy Research Working Paper, No. 7990.
- Le, Q.V. (2004) 'Political and economic determinants of private investment', *Journal of International Development*, Vol. 16, No. 4, pp.589–604.
- Lim, J.J. (2014) 'Institutional and structural determinants of investment worldwide', *Journal of Macroeconomics*, Vol. 41, No. C, pp.160–177.
- Mlambo, K. and Oshikoya, W. (2001) 'Macroeconomic factors and investment in Africa', *Journal of African Economies*, Vol. 10, No. 2, pp.12–47.
- Molapo, S. and Damane, M. (2015) 'Determinants of private investment in Lesotho', *European Scientific Journal*, Vol. 11, No. 34, pp.473–491.
- Muthu, S. (2017) 'Does public investment crowd-out private investment in India', *Journal of Financial Economic Policy*, Vol. 9, No. 1, pp.50–69.

- Namaki, M.S. (2014) 'China's economic growth: past and future', in *Thinking for Turbulent Times*, 1st ed., pp.89–93, Palgrave Macmillan, London.
- Narayan, P.K. (2008) 'An econometric model of the determinants of private investment and a CGE model of the impact of democracy on investment and economic growth in Fiji', *International Journal of Social Economics*, Vol. 35, No. 12, pp.1017–1031.
- Nikensari, S.I., Santosa, P.B. and Sugiyanto, F.X. (2019) 'Economic stagnation in emerging market countries: should this justify Keynes's law?', *International Journal of Economic Policy in Emerging Economies*, Vol. 12, No. 3, pp.299–314.
- Peltonen, T., Recardo, S. and Isabel, V. (2011) 'Investment in emerging market economies', *Empirical Economics*, Vol. 43, No. 1, pp.1–23.
- Sahoo, P. (2017) *Why Private Investments Continue to be Sluggish in India*, Hindustan Times [online] <https://www.hindustantimes.com/opinion/why-private-investments-continue-to-be-sluggish-in-india/story-CPJLB6FGeb8el6gAQLjrxK.html> (accessed 10 July 2017).
- Sakr, M.K. (1993) *Determinants of Private Investment in Pakistan*, IMF Working Paper, No. 93/30.
- Seruvatu, E. and Jayaraman, T.K. (2001) *Determinants of Private Investment in Fiji*, Reserve Bank of Fiji Working Paper, No. 2001/02.
- Servén, L. (2003) 'Real-exchange-rate uncertainty and private investment in LDCS', *The Review of Economics and Statistics*, Vol. 85, No. 1, pp.212–218.
- Sisay, A.M. (2011) 'Determinants of private investment in Ethiopia: a time series study', *Ethiopian Journal of Economics*, Vol. 19, No. 1, pp.75–126.
- The National Council of Applied Economic Research (NCAER) (2018) *Crowding-Out or Crowding-In? Public and Private Investment in India*, The National Council of Applied Economic Research (NCAER).
- Ucan, O. (2014) 'The determinants of investment: panel data analysis of G7 countries', *European Scientific Journal*, February, Special edition, Vol. 1, pp.1857–7881.
- Ullah, S. and Naveed, T.A. (2012) 'Role of infrastructure in economic growth: a case study of Pakistan', *Journal of Asian Development Studies*, Vol. 1, No. 1, pp.13–21.
- WDI (2018) *World Development Indicators*, Data Catalogue, World Bank.
- World Bank (2013) 'The emerging pattern of global investment', *Global Development Horizons* [online] https://doi.org/10.1596/9780821396353_CH01.
- Zakharov, N. (2017) *Does Corruption Hinder Investment? Evidence from Russian Regions*, Discussion Paper, No. 33, University of Freiburg IEP.

Notes

- 1 The expenditure side GDP has four components – consumption expenditure, investment expenditure, government spending and external sector spending.
- 2 Inward foreign direct investment has dampened to some extent the crowding effect in India (Dash, 2016).
- 3 In the present study output expansion is measured through the growth in private final consumption expenditure. PFCE contributes almost 60% of GDP. The reason for inclusion of PFCE is that the study is estimating the investment function and hence the investment part needs to be excluded from the GDP.