

Drivers of Corporate Investment Slowdown in India: A Firm Level Analysis

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Abstract: *Majority of the existing literature has focused on examining the determinants of investment behaviour and the factors responsible for its slowdown at an aggregate level. There have only been a few studies analysing investment behaviour at firm level, and those are confined to the manufacturing sector using static panel models. In this context, we examine the sector specific heterogeneity of investment dynamics in India using firm level investment data spanning the period 2001-19. The study employs dynamic panel models on micro-level data to provide better clarity on the macroeconomic issue of investment slowdown in the country. This paper finds that a variety of factors contributed to the investment decline in India, including slower expansion of profitability and bank credit amounting to the twin balance sheet problem, debt sustainability, higher burden of indirect and corporate taxes, higher policy rates, rising real interest rates and increasing uncertainty related to economic policy.*

Keywords: Corporate Investment, India, Monetary policy, Financial sector, Economic Uncertainty.

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I. Introduction

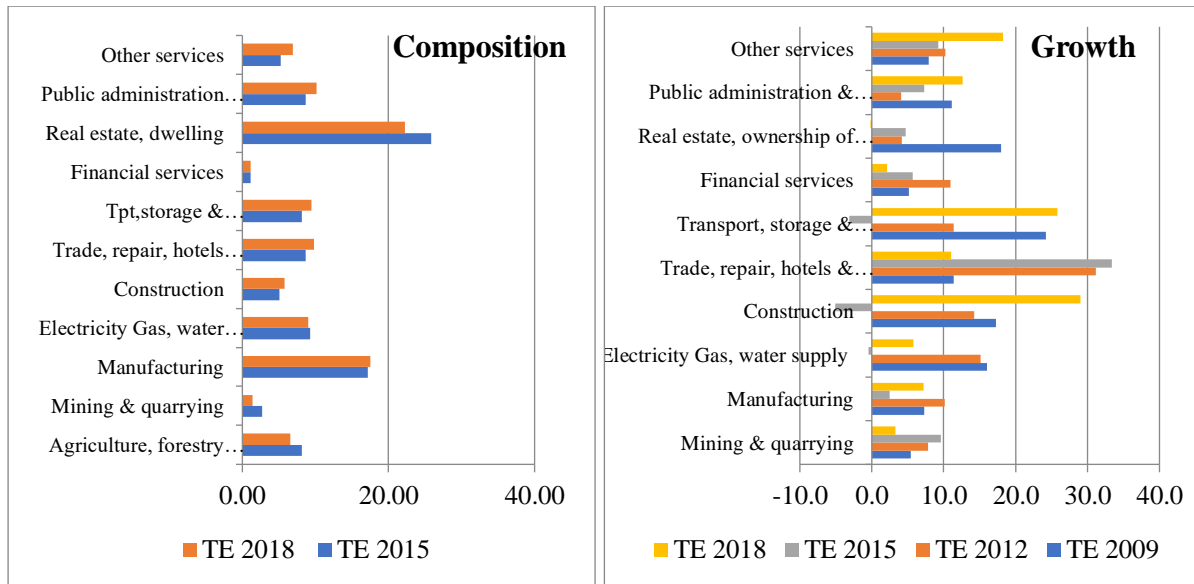
The role of investment in enhancing productivity-led growth has been well established in economic growth literature. All growth theories - starting from exogenous growth theories (Solow, 1957; Jorgenson and Griliches, 1967) to new growth theories (Arrow, 1962), to endogenous growth theories (Romer, 1986; Lucas, 1988; and Grossman and Helpman, 1991) - have recognized the importance of capital accumulation in an economy. On an empirical front, the high growth trajectory of Asian region during the 1990s has been linked to its high investment rate (Sahoo and Dash, 2009; 2012; Dash and Sahoo, 2010). Similarly, in the first decade of the twenty first century, India recorded a near double-digit economic growth rate which was accompanied by an unprecedented 9 percentage point increase in domestic savings and investments (Economic Survey, 2017-18). Moreover, the importance of investment lies with its contribution to one third of the Indian GDP.

However there has been a slowdown in investment in India in recent years, the same has invited considerable interests of policymakers given its multidimensional contribution to the Indian economy. The investment growth rate has fallen from 15% during 2004-08 to 5.7% during 2014-18. Even the investment ratio (as percentage of GDP) has plummeted by around 7% points of GDP between 2007 and 2018, falling to 28.9% of GDP in 2018 (WDI, 2018). The fall in aggregate investment has been mostly due to a reduction in private investment (Sahoo and Bishnoi, 2021). The slowdown of private investment - which accounts for three-fourth of the total investment - has serious implications for the growth potential of the country and can adversely affects its long-term growth trajectory. The current phase of investment slowdown in India has been relatively long and continues to plague its economy (Economic Survey, 2016-17). Thus, there is a need to understand the key factors behind the slowdown in private investment and accordingly, design appropriate policies to revive it.

A compositional analysis of investment reveals that the real estate sector occupied one-fourth of India's total gross fixed capital formation (GFCF). It was followed by the manufacturing sector which accounted for one-fifth of the GFCF. Electricity, gas and water; trade and hotels; transport sector and defence sector accounted for 10% each. In terms of relative positions, real estate sector, mining and electricity sectors have reported a fall in their shares in total GFCF during TE 2018 as compared to period of TE 2015 (Figure 1, Panel A). As for growth, investment rates have significantly come down in electricity, construction and real estate sectors (Figure 1- Panel B). Given the differential behaviour of the different components of

investment, it is imperative to acknowledge and understand the heterogeneous nature of investment slowdown across different sectors.

Figure 1: Composition and Growth Rate in Real GFCF (%)



Source: Authors' Compilation from NAS Data

There exist a number of studies that have examined the investment dynamics in India. While most have studied investment at an aggregate level, far fewer have analysed it at a more microstructural level. The literature has already highlighted factors such as slower demand, tighter monetary and fiscal policies, rising economic uncertainty, debt ridden corporate sector and the twin balance sheet problem as possible reasons for the investment slowdown in India. However, the macro drivers need to be ascertained through an empirical analysis of investment behaviour at a micro-level, such as at the level of firms. But literature on firm level investment dynamics, barring a few studies in manufacturing, remains sparse in the current regime of weak investment growth in India. Therefore, the present study aims to fill this research gap by empirically investigating the issues highlighted in the ongoing debate on investment slowdown using micro-level data of firm specific indicators. Unlike other studies focusing exclusively on firms in the manufacturing sector, our study tries to identify the investment drivers using a sample of representative firms covering all the sectors viz. electricity, mining, manufacturing, construction, real estate and the non-financial services sector. Moreover, earlier studies had examined investment behaviour through static models. But in our study, we use GMM technique to understand the dynamic behaviour of investment at firm level for the period 2001-19; the period covering both the phases of high investment growth and the subsequent slowdown thereafter.

II. Review of Literature: Determinants of Firm Level Investment

Broadly, there are four main theories that can be used to explain investment behaviour, namely: (i) acceleratory theory, which emphasizes on demand side factors as measured by the level of output for determining investment; (ii) neoclassical theory, which pays more attention to the cost function, including the rental cost of capital; (iii) Q-theory, which hypothesis about the role of excess market valuation over replacement costs leading to investment and; (iv) liquidity theory, which recognises market imperfections due to asymmetric information between firm and funds suppliers and, accordingly highlights the role of internal sources of funds as a key factor to affect the investment decisions of firms (Celiket *et al.*, 2018; Fazzari *et al.*, 1988).³ The fundamentals of firm-level investment theory were propounded way back in the 1930s (Keynes, 1936; Fisher, 1930). The theory argued that investments are made until the present value of expected future revenues is equal to the opportunity cost of capital. On an empirical front, numerous factors have been regarded as investment drivers including output, cash flows, cost of capital, prices, technology shocks etc. (Samuel, 1996).

In financial literature, there are diverse views on the role of firm specific factors in explaining corporate investment. While some studies have found that financial factors, such as leverages, cash flow, sales, and stock of liquid assets, have a positive impact on firm level investment (Ariyo, 2008; Zicchino, 2006), others find that such factors may negatively affect investment (Obreja, 2013). In contrast, the neoclassicals believe that financial factors are irrelevant given their assumption of perfect competition, by virtue of which internal and external sources of funds can be considered to be perfect substitutes of each other (Modigliani and Miller, 1958). Findings from the real world departs from this assumption and accordingly, there are a number of studies that highlight the importance of financial factors in determining investment. But results of these studies have yielded mixed outcomes. Therefore, there is need to revisit the role of financial factors in explaining corporate investment in an economy.

Alongwith the financial factors, business risk and firm size are also considered to be key factors for corporate investment (Nguyen and Dong, 2013). Buettner & Hoeing (2016) used a panel data of 500 German firms for the period 1994-2007 and, found that firm's cost of capital and business climate play significant roles in explaining the stock of capital in an economy. Studies have also shown that the impact of financial factors has varied with respect to the size and extent of profitability of firms. In a sample of 2456 Portugal SMEs manufacturing firms for the

³https://www.rbi.org.in/scripts/bs_viewcontent.aspx?Id=2358

period 2011-2015, Pacheco (2017) claimed that SMEs with higher profitability, debt and liquidity, and of smaller size tend to be involved in higher levels of investment. In the context of emerging economies, Borensztein & Ye (2018) noted that corporate debt overhang imposes a sizable effect on investment at the firm level. This linkage is more pronounced for large firms and highly leveraged firms. In contrast, Baum et al. (2010) reporting for a set of US firms, found that access to external capital can help in stimulating investment. There have also been studies looking at how the impact of financial factors varies with occurrences of global shocks. In the context of UK, Disney *et al.* (2018) found that firms operating persistently with high debt and financial distress were less likely to undertake an increase in investment after the recession.

Along-with the firm specific indicators, a number of studies have also examined the role of policy indicators in influencing firms' investment decisions. Nagahata and Sekine (2005) studied the effects of monetary policy on firm investment in Japan after the collapse of the asset price bubble. On the basis of their results, they noted that the monetary easing after the bubble burst worked through the interest rate channel, but not through the credit channel, mainly due to deterioration in bank balance-sheet conditions. It was also found that the contraction in investment was more severe for smaller non-bond-issuing firms than for larger bond-issuing firms. Similarly, Fu and Liu (2015) investigated the effects of monetary policy on corporate investment of China's listed large firms for the period 2005–2012 using an asymmetric framework and found that the monetary easing worked through the interest rate channel.

On the fiscal policy front, Azarmi and Schmidt (2016) assessed the impact of corporate tax on firm investment. Their results supported the tax distortion hypothesis which suggests that higher tax burden on corporates lowers their investment rate through reduced working capital and raw materials. However, for classified firms, the effect of taxes on firm-level investments was found to be heterogeneous. Egger *et al.*, (2019) noted that the impact of corporate taxation was up to 70% higher for entrepreneurial firms than for managerial ones. They also reported that dividend taxation negatively affected the investment of financially constrained firms, but had no significant impact on cash-rich firms. In addition, some empirical studies have also underlined the role of uncertainty in weakening firm level investment (Wensheng *et al.*, 2014). Pei-Fen (2019) empirically evidenced that firms in US lower short-term, long-term, and total firm investment when encountering higher economic policy uncertainties.

There also exists several studies that have examined investment dynamics at firm level in the Indian context. Some prominent studies include Pandit & Siddharthan (1998); Krishnamurthy & Sastry (1975); Sarma (1988) Kumar *et al.* (2001) and Rajakumar (2008). In most of the studies, flexible accelerator model and financial variables have been used to explain investment behaviour. Pandit & Siddharthan (1998)⁴ found that variables such as in-house R&D, intra-firm transfer of technology through foreign equity participation and; import of machinery and equipment were important determinants of firm investment. Another study reported that cash flow was more important for investment to the firms who have limited access to capital markets (Athey and Reeser 2000)⁵. Kumar *et al.* (2001) investigated the presence of financial constraints among investing firms in the post-liberalization period 1993-98, using Indian manufacturing firms as a case study. The authors suggested that exporting firms faced less restrictive financial constraints than their domestic counterparts. The sales accelerator was only significant for domestic and small firms and not for the exporting firms.⁶ Similarly, Bhattacharyya (2008) noted the applicability of accelerator theory of investment for Indian manufacturing firms and claimed that internal funds, rather than profitability, had a bigger role in determining investment. The findings of these studies and the research gaps that exist therein, provide an impetus for re-investigating Indian firms to see if they are still bound by financial constraints as capital markets have advanced substantially since the 1990s. In addition, the identification of investment drivers in the backdrop of slowly developing capital markets, provides ample opportunity for attesting the role of financial factors in corporate investment.

With regard to the role of leverage, it was pointed out that excessive borrowings by the Indian corporate sector during 2003-08, a period of credit boom, followed by sluggish external demand amidst the global financial crisis (GFC) had increased debt and debt servicing repayments, which in turn had restricted Indian firms from increasing their capital spending (Nagaraj, 2013). The investment slowdown was further exacerbated by the issue of debt overhang which had adversely affected capital expenditure in the wake of the stressed balance sheets of commercial banks and non-financial corporate sector (Economic Survey, GoI, 2017).

4 utilized the sample of seven Indian industries - textiles, metals, electricals, chemicals, drugs, automobiles and machinery

5 using a panel of 142 firms from 7 industrial groups in India over the period 1981-96

6 For detailed survey literature of firm level investment factors prior to 2008, please refer the study (Rajakumar, 2008)

Meanwhile, Bhardwaj and Kumar,(2019)⁷ tried to relate the investment slowdown with monetary policy channels. They found that monetary policy transmission channels of both interest rate⁸ and credit flow⁹ had a significant impact on corporate investment. More recently, Shukla and Shaw (2020)¹⁰ examined the effect of firm's leverage on corporate investment to find that a firm's leverage adversely affected its investment activities after a certain threshold. The negative effect of leverage on investment was higher when the debt-asset ratio was above 90% per cent. In order to revive investment, the study advocated for initiatives to clean up balance sheets of banks and deleveraging non-financial corporates.¹¹

The analysis of the existing literature show that there has been a lot of focus on leverage and financial factors as factors for explaining investment dynamics in India. However there needs to be more clarity around the effect of policy specific factors and firm specific financial factors and their impact on corporate investment. Additionally, most studies have concentrated on manufacturing firms for their analysis and there has not been sufficient attention given to firms belonging to other sectors. In this context, our study aims to bridge the existing research gaps in two distinct ways. Firstly, the empirical analysis in our study has used investment data for firms spanning across all major sectors for the period 2001-19. Secondly, the investment estimation functions in our study have considered a wide range of factors for explaining corporate investment and as such, includes a mixture of indicators covering firm-specific factors, policy measures and economic uncertainty. The role of twin balance sheet problem in weakening corporate investment in India has also been empirically analysed. The current study also differs from other studies as the latter had largely used static panel models. In contrast, the present paper recognises that there may be reverse causality between investment and financial factors as changes in investment may affect financial decisions and thus, firms' financial performances (Gatchev *et al.*, 2009). Thus, we employ dynamic panel models especially the Generalized Method of Moments (GMM) developed by Arellano & Bover (1995) to address the issue.

III. Stylized Facts about Corporate Investment in India

7 Study utilized panel data of manufacturing firms for the period 2000-01–2013-14 with a total of 22501 observations for 1612 companies.

8 Interest rate channel is measured with user cost of capital

9 Credit channel is proxied through cash flow to capital stock.

10 Using the fixed effect regression model for panel data of 5,779 India firms during the period 2004-2017.

11 Shukla and Shaw (2020). Impact of Leverage on Firms' Investment: Decoding the Indian Experience, RBI Working Paper Series No. 07

This section provides a brief overview of firm¹² level investment in India between 2001-19 and maps its behaviour over the years against firm-specific, financial and business climate indicators such as leverage, debt sustainability, twin balance sheet indicators, firm size, business climate variables and, fiscal and monetary policy measures, so as to get a preliminary view of the association among variables of interest.

III(a). Investment Behaviour across Sectors

Figure 2 presents the average rate of investment for sample firms across different sectors for both pre and post GFC periods. Investment rates had been considerably high for construction and non-financial services in 2001-08, mainly fuelled by higher credit growth amid bullish growth prospects. However, all sectors have recorded a dip in their investment rates after 2008, with construction sector recording the largest fall as investment rate in the sector fell from 38.5 % to 22.6% between 2001-08 and 2015-2019. After the GFC crisis, investments from construction firms were adversely affected by a credit crunch; banks' reluctance to finance construction projects; falling property prices; and certain economic policies like demonetization¹³. The investment rates of manufacturing sector firms have also reported a fall of around 8% points between 2001 and 2019. The sector is dominated by private players and is thus, governed by market-based principles. Thus, investment by manufacturing firms has suffered as a response to the sluggish demand of the economy after the crisis, twin balance sheet problem, etc.

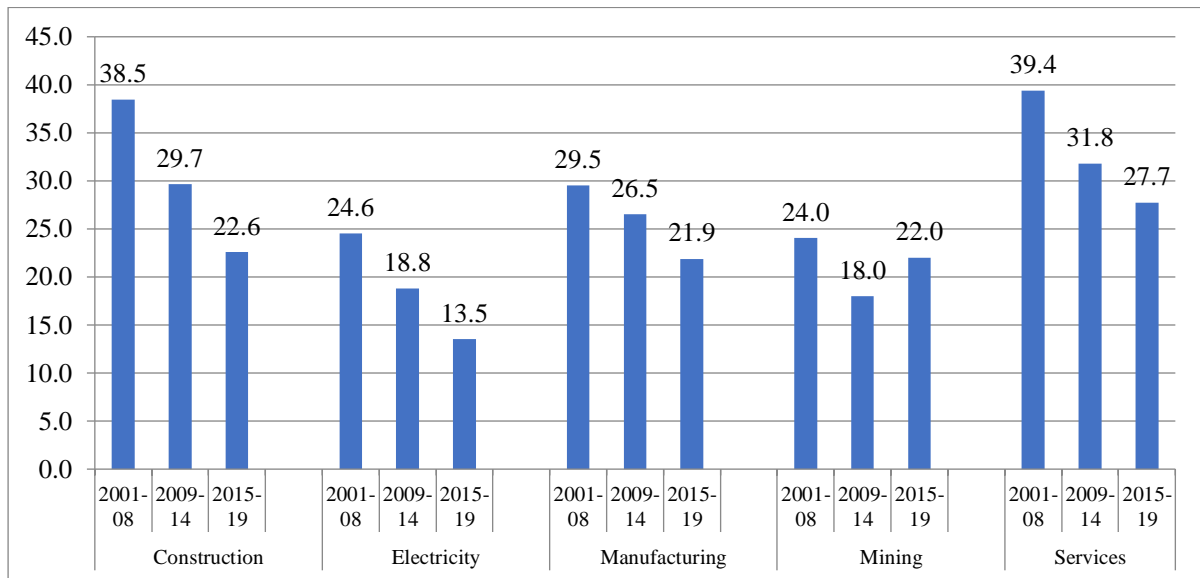
Firms in the electricity and mining sector have also witnessed a slowdown in investment in the post GFC period. The lower rate of investment in the electricity sector may be due to the fact that the sector continues to be dominated by state run enterprises with limited presence for the private sector. Similarly, investment may be low in the mining sector due to lack of transparency, corruption and various regulatory issues. Mining sector firms registered a fall in the investment rates between 2009 and 2014, a period of high uncertainty in the sector. But investment has recovered to a certain extent in recent years as the government has implemented certain policy measures to address the issues of non-transparency and corruption in the sector. This sectoral difference in investment rate invites attention to underline their respective financial behaviour and policy environment. For the purpose, Figure 3 reports on average sectoral investment at firm level and juxtaposes it against select economic variables.

¹²For sampled 2194 firms.

¹³Investment rate reached to historical lowest of 19.5 % in the year 2016.

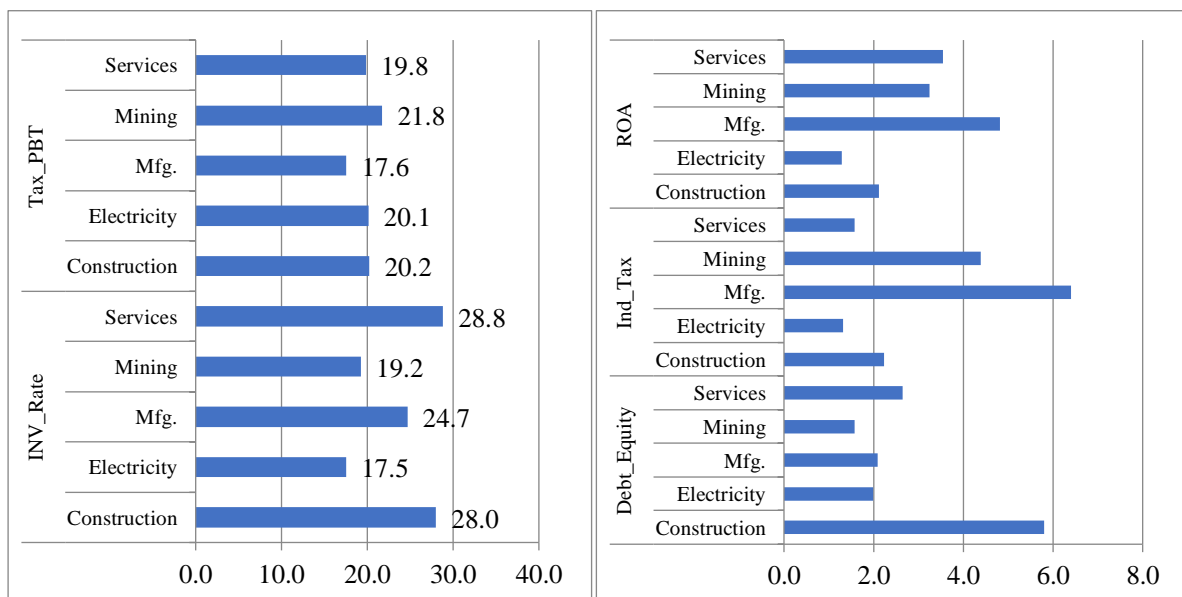
Figure 3 reports on average sectoral investment at firm level and juxtaposes it against select economic variables. It may be noted that tax to PBT (profit before tax) ratio was highest for construction and mining sector, which may be one of the factors causing lower investment in the sectors. The construction sector has also remained highly leveraged. The manufacturing sector is prone to higher indirect tax to income ratio, which may be linked to cascading effect on taxes in the sector due to multiple production processes.^[1] Thus, even though the manufacturing sector has relatively lower tax burden, its investment rate has been low as result of the higher burden of indirect taxes.

Figure 2: Investment Rate of Firms across Sector (Average)



Source: Authors' Compilation from Prowess Database of CMIE

Figure 3: Investment Rate and Financial Variables across Sectors (Average, 2001-19)



Source: Authors' Compilation from Prowess Database of CMIE, Note: For variables' abbreviation, please refer table 2.

Figure 4 disaggregates firm level investment behaviour for different sectors over different time periods during 2001-19 and presents it along with the performance of the chosen economic variables. It can be seen that investment for construction sector firms reached at an all-time high of 38.5% of the GFCF during 2001-08, which was accompanied by high leverage to the tune of 10% and lesser liquidity. After the GFC, the sector experienced a fall of almost 8% points between 2001-08 and 2009-14 as the sector maintained the standard limit of liquidity (current ratio increased to 3.7% during 2009-14 from previous 1.8% during 2001-08) and also safeguarded against high leverage (debt to equity ratio fell to 1.8% during 2009-14 compared to 10% before GFC). Between 2009-14 and 2015-19, the sector recorded a further fall in investment rate by 7% points as it needed to maintain liquidity with marginal increase in leverage and met with higher corporate tax burden (23.2 %, compared to 16.4% of 2001-08). Profitability had fallen to its lowest level at 0.27% as sales growth reduced from 9.2% to 1.3% between 2001-08 and 2015-19. The sluggish demand side and a cautionary move against the higher debt levels have played a key role in investment slowdown.

In the electricity sector, firms' investment has come down to 13.5 % during 2015-19 from its former value of 24.6 % in 2001-08. A possible reason for this could be linked to lower financial leverage and accordingly, less tax advantages. The sector has faced relatively higher tax burden at 33% of PBT during 2015-19. Moreover, the sector is dominated by state-run enterprises funded by banks which were adversely affected by the financial crisis. As a result, the sector was making losses during the post GFC period as ROA turned negative. Thus, there is a need for the sector to use an appropriate capital structure with more weight towards debt and utilise some portions of the profit for expanding investment.

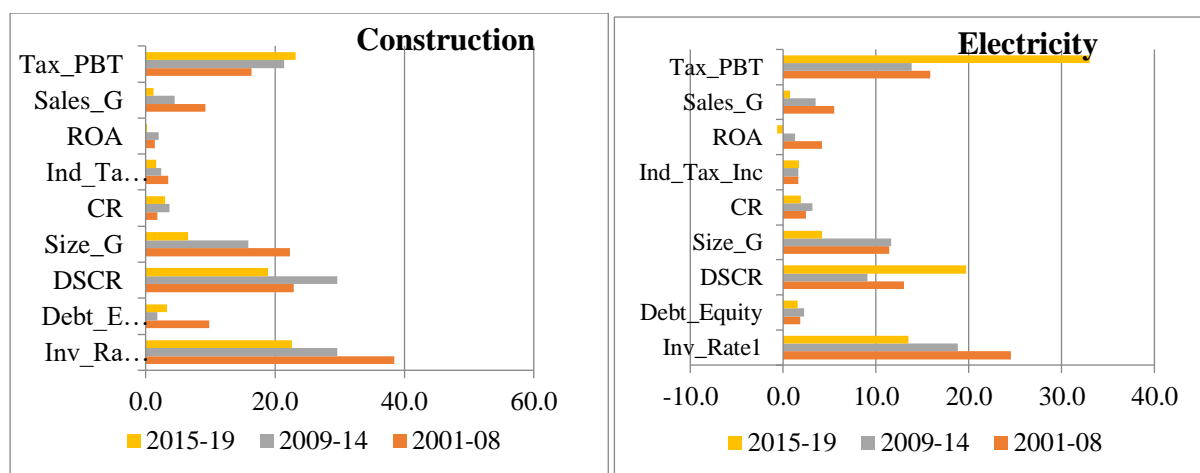
Manufacturing sector firms accounts for a considerable share of corporate investment in India. In the period 2001-08, investment in manufacturing remained around 30% which was accompanied by sales growth of 8.2% and profitability rate of above 5%. During 2009-14, the investment reduced by 3% points as the sector remained cautious towards the leverage level and growth prospects in the aftermath of the GFC. But after 2015, the sector recorded a sharper downfall in investment of 5% points, even though profitability had only come down by 1%. Investment may have fallen in the sector due to a credit squeeze arising out of the twin sheet balance problem and the negative spillover effects of slowdown in other major sectors such as construction, electricity and non-financial services. It is also interesting to note that the ratio of

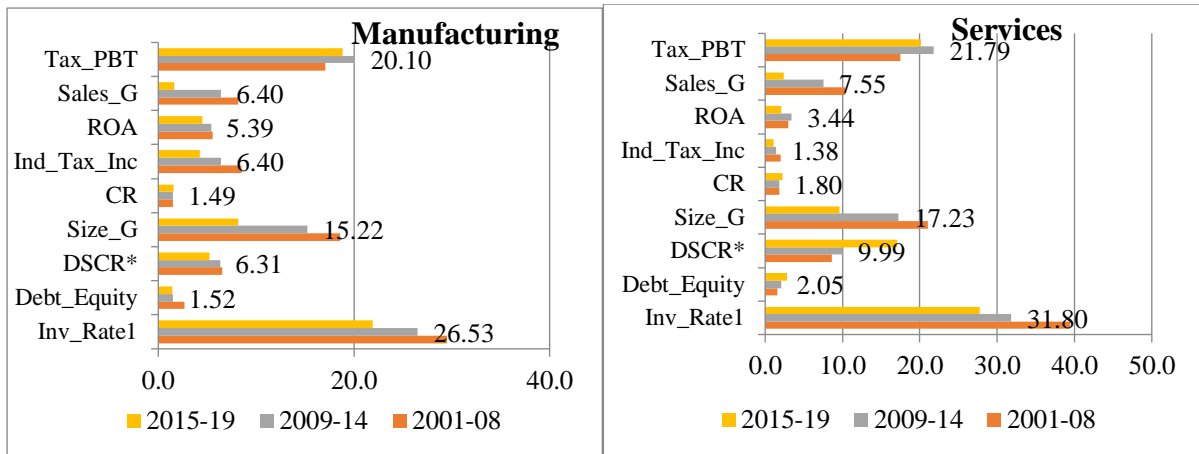
indirect tax to income in the sector has reduced from 8.5 % to 4.3% between 2001-08 to 2015-19 as investment has been declining; the reason for this anomaly may be attributed to uncertainty created by the implementation of the new tax regime under GST.

Mining sector investment rate was 24 % during 2001-08, but declined drastically by almost 7% points with the outbreak of crisis (Figure 2). The decline can be attributed to the fact that mining has forward linkages with the construction sector where growth has halved during 2009-14, as compared to the 2001-08 period. Additionally, the sector continues to be plagued by corruption and judicial issues, which have negatively affected investment in the sector. But with the introduction of more transparency in auction processes, the investment rate has revived to 22% - less than 2 % for the peak investment. There also seems to be scope for the mining sector to increase the leverage level and dilute some tax burden, which can increase profitability and consequently, investment in the sector.

Lastly, a decline in investment rate after the GFC was observed for the non-financial services sector as well. Non-financial services sector firms had reported an investment rate of close to 40% during 2001-08, largely driven by the momentum of service-led growth in India. But since the financial crisis, investment rate in the sector has declined by 7.6% points during 2009-14 and further by 4% points by 2015-19. During this period, the sector had reported increased profitability with rising debt level. But falling sales growth (decreased from 10% to 2% between 2001-08 and 2015-19) may have made firms cautious and less willing to invest in the sector.

Figure 4: Investment Rate and Economic Variables across Sectors (* is multiple of 10)





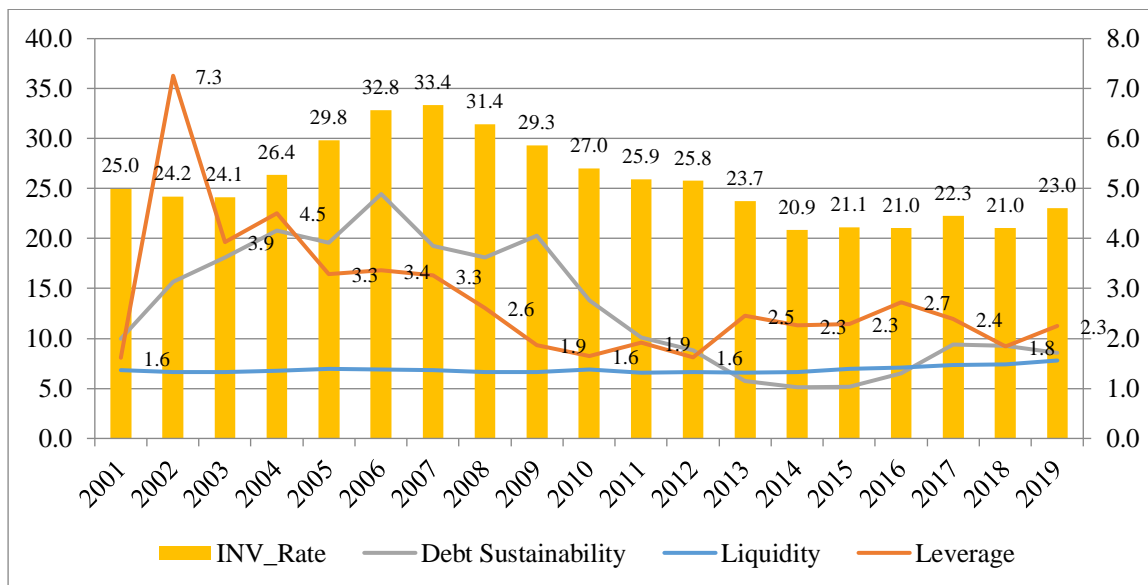
Source: Authors' Compilation from Prowess Database of CMIE

III(b). Corporate Investment, Firms Characteristics and Policy debates

(i) Corporate Leverage and Investment

From figure 5, it can be seen that firms had substantially higher investment activity prior to GFC, with average investment rate reaching a peak level of 33.4% in 2007 from its prior value of 25% in 2001. However, investment rate slowed down to 21% in 2014 and has fluctuated around that value since then. A comparative analysis of investment with debt indicators reveals a pattern of positive association. It is evident that investment rate improved with higher financial leverage and debt sustainability before the GFC. But investment declined after the crisis, and was accompanied by a downfall in both indicators of financial debt.

Figure 5: Corporate Investment, Liquidity, Leverage and Debt Obligations (Mean Values)

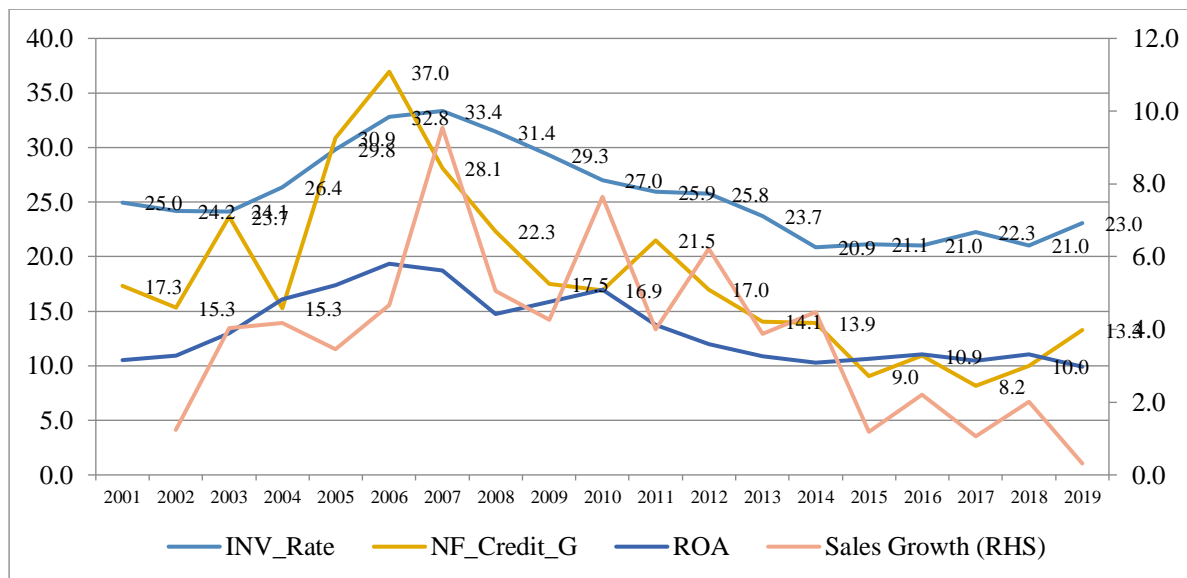


Source: Authors' Compilation from Prowess Database of CMIE

(ii) Corporate Investment and Twin Balance Sheet Issues

In order to understand the potential impact of the twin balance sheet crisis, we rely on proxy indicators such as corporate profitability (ROA) (for firms' balance sheets) and non-food credit growth rate (NF_credit_G) (for banks balance sheets). Figure 6 relates the investment rate with the twin balance sheet indicators and reports an explicit trend between the two dimensions. It is evident from the figure that investment reached its highest level in 2007 with enhanced credit growth and improved corporate profitability. However, after the GFC, both credit growth and corporate profitability have shown a significant decline. The former has declined due to increased financial stress amid rising NPAs in the banking sector, while the latter has declined due to the falling sales growth rate amid sluggish demand in the economy. The decline in two indicators has been almost mirrored by a similar decline in corporate investment in the post GFC period.

Figure 6: Corporate Investment, Profitability, Sales and Credit



Source: Authors' Compilation from Prowess Database of CMIE

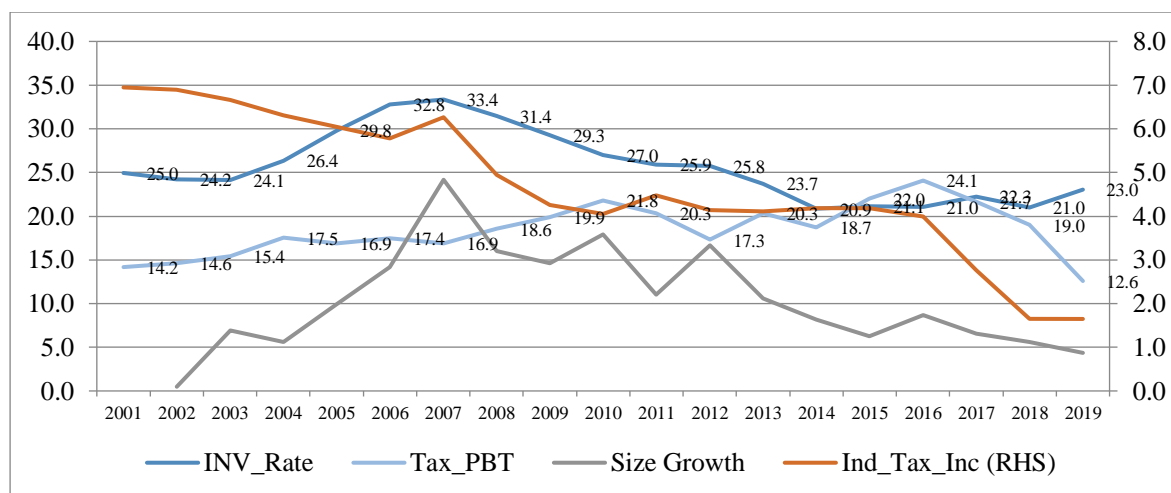
(iii) Corporate Investment and Fiscal Measures

Figure 7 tracks corporate investment rates against indicators of fiscal policies i.e., the indirect tax and corporate tax burden on the corporate sector. During the investment boom period (2001-08), the indirect tax to income ratio declined marginally to 6.3% while the corporate tax burden remained more or less stable at around 17%. In the post GFC period, the indirect tax ratio further declined. However, the corporate tax burden has been on rise during the period, reaching a peak value of 22.3% in 2018. The increase in corporate tax burden could be due to

the introduction of more tax compliance norms in recent years. In fact, the effective corporate tax rates vary according to sizes of firms in India¹⁴

From Figure 7, it can be seen that investment has not revived for the sector in the post GFC period even though the indirect tax burden has eased. This could be attributed to the expansionary fiscal policy measures introduced by the country after the crisis, which resulted in fiscal deficit to the tune 6% of the GDP in 2013-14. The rising fiscal deficit may have cautioned the corporate sector against possible increases in corporate tax rates or increases in interest rates under the crowding out effect, all of which may have led to the decline in corporate investment. Moreover, the firms remained cautious towards over accumulating debt level and accordingly approached for less leverages, thereby more tax burden. Overall investment has moved in opposite direction to the proxy indicators of fiscal policy measures.

Figure 7: Corporate Investment, Size and Tax Burden



Source: Authors' Compilation from Prowess Database of CMIE

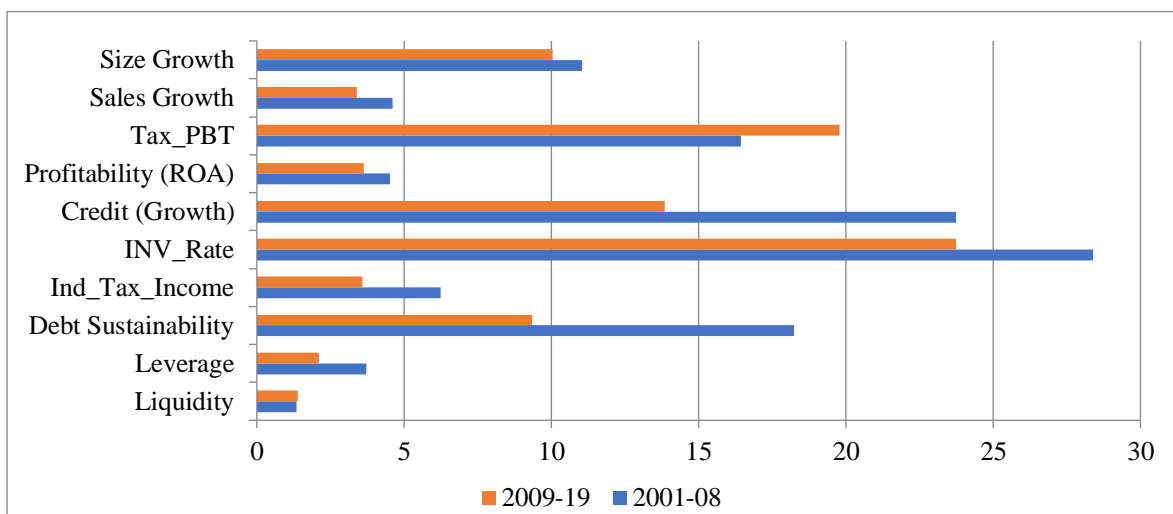
(iv) Investment Rate and Economic Variables Before and After GFC

Figure 8 reports the behaviour of variables of interest that affect firm level investment for the periods before and after the outbreak of the GFC. It seems that high average investment rates in the pre-crisis period appear to be driven by a higher credit off take and, better growth prospects as reflected in improved sales growth and upsurge in profitability. The post crisis investment rate declined by 5% points because of slower sales growth, falling profitability,

¹⁴ Agarwal and Chakraborty (2019) reported that the effective tax rate is only 22.88 per cent for business firms (with PBT greater than 500 crore), as compared to 29.37 per cent for companies with profit before tax up to one crore. Also Guha (2007) noted that the larger the company, the lower is the effective tax rate. Accordingly Union Budget of India 2018-19 has reduced the corporate tax rate to 25 per cent only for those firms with turnover up to Rs 250 crores.

rising corporate tax burden, lower financial leverage, deteriorating debt sustainability and a massive fall in credit growth. This finding is in alignment with the observations of Subramanian and Felman (2019), wherein they pointed out that excessive lending by banks and corporate sector’s optimistic growth outlook during 2004-08, led to overleveraging of banking and corporate sectors. The problem has become worse with the policy paralysis associated with delays in land and environment clearances and rising financing cost. Moreover, the credit squeeze - as a result of rising NPAs and more recently, the NBFC crisis – has further amplified difficulties for firm level investment.

Figure 8: Investment Rate and Economic Variables Before and After GFC



Source: Authors’ Compilation from Prowess Database of CMIE

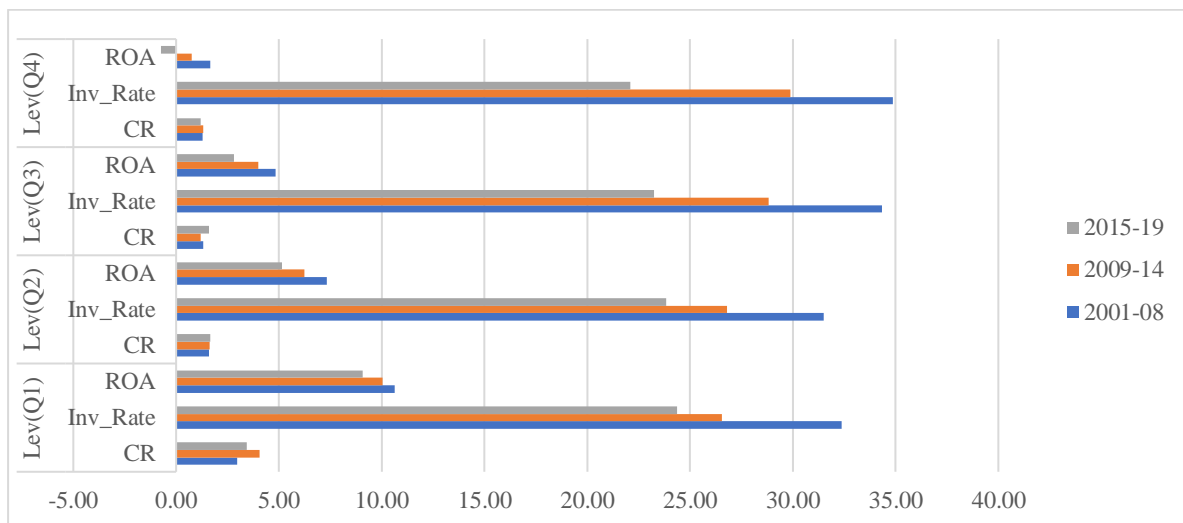
(v) Investment Rate across Different Levels of Leverages

Figure 9 presents information on liquidity, investment rate and profitability across different quarters of leveraged firms for three periods viz., pre-crisis period (2001-08), during crisis and revival (2009-14) period and, a period of massive twin balance sheet problem (2015-19). Higher debt accumulation during the credit boom period of 2001-08 left Indian corporate firms vulnerable after the outbreak of the crisis with more debt services and weakened financial

positions. From figure 9, it is evident that the firms standing on fourth quarter (Q4) of financial leverage witnessed a marginally higher investment rate during 2001-08 than the firms of lowest leverage level (Q1). However, investment declined at a faster rate for highly leveraged firms as compared to its less leveraged counterparts, especially in the period of twin balance sheet problem. This suggests that the top quarter of leveraged firms might have to bear the burden of previously accumulated debt, as a result of which they may start making losses and reduce their investment activities significantly.

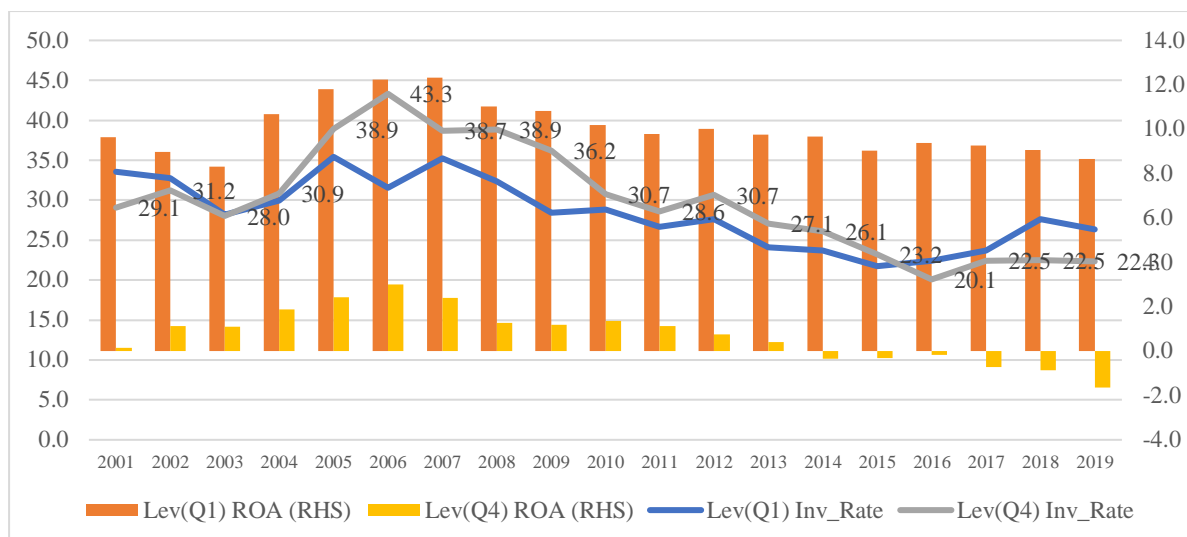
Figure 10 supplements the findings of figure 9, as it shows that highly leveraged firms maintained higher investment rate during the peak period of credit boom in India. But since 2015, the investment rate of high leveraged firms has been lower than that of the less leveraged firms. This may be attributed to the fact that low leverage firms have been able to maintain their profitability and hence, invest. On the other hand, high leverage firms have been ridden with excessive debt obligations which has affected their financial conditions and their ability to invest, especially during the period of twin balance sheet problem.

Figure 9: Investment Rate, Liquidity and Profitability across Leverage Quarters



Source: Authors' Compilation from Prowess Database of CMIE

Figure 10: Investment and Profitability of Low and High Leveraged Firms



Source: Authors' Compilation from Prowess Database of CMIE

(vi) Investment Rate, Economic Indicators and Fiscal Measures across Different Leverage Quarters

Table 1 indicates that firms having higher debt service coverage ratio (DSCR) usually tends to have higher investment rates. Generally, there are two measures for debt sustainability- interest coverage ratio and DSCR. Interest coverage ratio is a debt and profitability ratio which used to see if firms can pay interest on its outstanding debt. The DSCR is a slightly more robust indicator of a company's financial fitness because it takes into account principal payments in addition to interest.

From Table 1, it is apparent that investment rate for firms lying in third quarter of leverage is almost similar in value to that of highly leveraged firms. However, the average leverage (as measured by debt equity) for Q4 firms was almost 7 times higher (7.88) than the leverage of Q3 firms (1.05). This finding clearly shows that the investment rate in India is plagued by debt overhang problems. At this juncture, it is important to ascertain the threshold level for debt, on crossing which debt goes from being good to bad. The finding indicates that as debt goes more than 1 % of equity, the firms are vulnerable (Stephen et al., 2011).

Moreover, low leverage firms have higher tax to PBT ratio. This suggests that firms opt for debt to take the tax advantages. But it seems that the higher debt service payment of Q4 firms has partly offset the tax advantage attached to debt financing, such that these firms record profitability (ROA) of less than 1%. In contrast, the profitability of Q1 firms stood close to 10%. This observation underlines the scope for identification of stable firms on the basis level of leverages and some tax incentive schemes to stable firms can boost investment activities.

More leveraged firms have also reported higher retained earnings to neutralize the pressure of debt servicing. This might be leading to the problem of conflict between shareholders and debt holders, which in turn lower the investment as these firms either indulge into risky projects at the cost of shareholders or postpone the profitable projects in the wake of debt service obligations

Across different quarters of DSCR, it can be seen that high leverage firms are less debt sustainable than low leverage firms. As such, sustainable firms are more likely to keep the level of retained earnings low and experience better sales growth, eventually leading to improved investment rates. Thus, the most viable solution for investment revival seems to lie in incentivizing firms which are more debt sustainable.

Table 1: Investment Rate across Quarters of Leverage and Debt Sustainability*

Classification by quarters of Leverage								
Quarter	INV	ROA	Size	Sales_G	RE	Ind.Tax_Inc	Tax_PBT	Debt_Equity
Q1	27.64	9.95	14.02	5.02	76.64	3.82	26.15	0.04
Q2	27.76	6.34	14.77	6.18	81.66	4.41	23.46	0.41
Q3	29.93	4.09	16.18	6.67	83.99	4.74	18.04	1.05
Q4	30.56	0.85	17.48	6.45	87.79	4.95	16.09	7.88
Classification by quarters of DSCR								
Q1	22.68	-5.24	7.87	0.82	89.20	3.81	12.41	4.64
Q2	26.01	3.29	12.13	5.61	85.06	4.50	20.09	3.54
Q3	32.91	5.36	19.47	8.71	82.40	5.12	20.04	1.42
Q4	32.08	11.43	19.96	8.16	76.87	4.96	26.22	0.49

Source: Authors' Compilation from Prowess Database of CMIE, Note: * indicates the average values for the period 2001-19.

In a nutshell, the descriptive analysis indicates that the slowdown of corporate investment in the post crisis period is linked to slower sales growth, falling profitability, rising corporate tax burden, lower financial leverage, deteriorating debt sustainability and a massive fall in credit growth. Moreover, the problem of debt overhang is quite visible as the investment rate for highest leveraged firms is not significantly different from the investment of firms falling in the third quarter of leverage. It is intuitive that the tax advantage of higher debt has rendered the corporate sector to keep more retained earnings for higher debt service obligations. The next section performs an empirical analysis to understand the direction and magnitude of these factors' impact on firm investment.

IV. Methodology

IV(a). Data and Sample Overview

As noted above, the investment slowdown has varied across different sectors with the largest dip being observed for the real estate sector followed by construction, electricity and mining. The current study tries to capture sector specific differences in investment by utilizing firm level panel data spanning all sectors including, electricity, mining, manufacturing, construction and real estate (C&RE) and non-financial services (NFS) sector.¹⁵ For the first two sectors, we have considered all the firms available in the Prowess data set. However, for the other three sectors (viz. manufacturing, C&RE and NFS) we have only included a representative number of firms from the database as the total number of firms available are very large. Thus, we have used a sample of the top 2000 firms (in terms of sales) for each of these three sectors, wherein the sampled firms contribute to around 90 % of the total sales for each of these sectors. On the basis of these considerations, we obtain a total initial sample of 6735 firms for these five broad sectors. But the final sample is obtained by filtering the data in the following steps which entailed: (1) Dropping observations with missing values or negative values for investment rate (defined from the % change in the gross fixed assets plus depreciation and; (2) trimming variables of interest at the 1st and 99th percentiles to reduce the impact of extreme values which are common for ratios in firm panels drawn from accounting data. This procedure yields a sample of 37038 firm-years observations representing 2194 different firms. Manufacturing sector consists around 53% of observations followed by services (25%), construction (14%) and mining and electricity (around 4% each).

The sample period of the study pertains to the period between 2001 and 2019, as it covers both the phases of high investment growth and its subsequent slowdown after the GFC. In this context, the present study sets out to identify the possible drivers of corporate investment in India in order to design suitable policy measures for reviving it. The data used in our analysis is sourced from Prowess database of Centre for Monitoring Indian Economy; ‘Handbook of Statistics on Indian Economy’ published by the RBI and the ‘Annual Survey of Industries’ published by MOSPI, Government of India.

IV(b) Variables Selection and Measurement

In keeping with the existing literature (López-Gutiérrez *et al.*, 2015; Gebauer *et al.*, 2017 and Ferrando *et al.*, 2017), investment is measured through the gross fixed assets and defined as percentage annual change in total fixed assets plus depreciation. The demand side is measured

¹⁵Prowess includes a total of 274 firms in mining sector and 994 firms in electricity sector. The numbers of firms for manufacturing, C&RE and NFS are 17567, 3948 and 17041, respectively.

through the log value of sales and expected to exert a positive relation with investment in accordance to the accelerator principle of investment. Size of firms is quantified with the log value of total assets. Generally, it is assumed that larger firms have higher investment rates as these firms can tap capital markets more easily for accessing financial resources. Moreover, the literature suggests that the financial condition of corporate houses also affects the investment decisions of firms (Martinez-Carrascal and Ferrando, 2008). In the existing studies this dimension is measured with three indicators of financial pressure viz. profitability (profit to fixed capital ratio), indebtedness (outstanding claims to fixed capital ratio) and debt burden (interest payments to profit ratio). Investment is expected to respond positively to profitability which is commonly measured through return on assets (ROA) and as such, indicates the cash flow behaviour of firm. Several studies have considered ROA as a proxy for the degree of financial constraints facing a firm, since investment of credit-constrained firms are more sensitive to the availability of internal funds, i.e., cash flow. Some have treated ROA as a measure of the efficiency of a firm in generating returns from its assets, without being affected by management financing decisions. In order to test for the presence of financial constraints, some scholars (Kumar *et al.*, 2001) considered investment in fixed assets to a sales accelerator, cash flow, stock of long-term debt and stock of liquid assets. Numerous studies have also considered cash flow to be an important dimension for measuring the balance sheet performance of firms (Nagahata & Sekine, 2005).

The indebtedness ratio can have a positive impact on investment as it complements the internal finance of firms for realizing profitable projects. However, the commitment of repayment may limit the firms in accessing external credit for financing the projects, thereby restricting the expansion of investment activities. Some of the studies have considered the share of long-term debt (as % of total assets) to understand the balance sheet position of firms while others have relied on the leverage position of the firms. Debt burden, also called debt service ratio, captures the firm's abilities to meet interest payments with its earnings. A higher debt burden is expected to influence investment decisions negatively as it limits the firm's internal financial resources. The current study utilizes the debt service coverage ratio (DSCR) to account for the indebtedness as well as debt burden. Generally, better DSCR reflects the sound financial position of the firms. Liquidity is the ratio of current assets to current liabilities and indicates the capability of firms to meet short-term obligations; it is expected to have positive impact on investment provided that the liquidity is maintained at a certain threshold level. Towards liquidity position we rely on current ratio across firms. Both the indicators, liquidity and long-

term debt are indicative of how a firm manages its internal funds and the extent to which it relies on external funding. Collectively, these variables indicate the financial soundness of the firm. Experts have opined that the momentum of corporate investment halted in India due to the rising debt burden of the corporate sector during credit boom period of 2005-10 which in turn taking a substantial pie of current financial performances. We tried to incorporate these dimensions of debt overhang through financial leverage (defined as debt-to-equity ratio) and debt payment through DSCR.

One of the main objectives of the study has been to assess the role of twin balance sheet problem in explaining investment behaviour in India. The twin balance sheet problem relates to the poor financial statements on the banking side due to rising NPAs as well as the corporate sector side due to its weak financial position in the aftermath of the GFC. Studies have compiled a proxy indicator for bank balance sheet using capital adequacy ratio of largest banks adjusted with the lending to respective firm by these banks (Nagahata & Sekine, 2005). Since there is a lack of such data at the firm level in the Indian context, we consider two parameters - corporate profitability and non-food credit growth, with an assumption that rising NPAs would have put a pressure on financing channels of the banks. The latter indicator also serves as a source of external funding for the corporate sector and also represents the supply side dimension of financial resources.

Along-with the firm specific factors, the study intends to capture the role of policy side variables in determining corporate investment. Theoretically monetary policy effect on investment can occur through two channels - credit channel and interest rate channel. Expansionary policy reduces the external financing constraints and lowers the cost of capital amid increased credit flow, and thereby renders the projects profitable (as per the discounted approach criteria). This can induce higher investment by firms. In the existing literature, the interest rate channel is measured through user cost of capital and credit channel is measured by cash flows to capital stock ratio (Bhardwaj & Kumar, 2019). For monetary policy different studies have assumed different proxy measures such as weighted average of repo and reverse repo rates (Shukla & Shaw, 2020), money supply growth and dummy variable for monetary policy expansion or contraction (Fu and Liu (2015); and real interest rate (Geng & N'Diaye, 2012). In our study, we have considered different indicators for representing monetary policy

dimensions including the repo rate, real interest rate and monetary policy dummy variable¹⁶. Moreover, we have tried to capture the monetary policy transmission effect by studying how lending rate spreads away from the repo rate in the economy.

As for fiscal policy, it has been pointed out that fiscal policy has both direct as well as indirect effects on investment. It may have positive effect on investment through increased demand with expansionary fiscal policy. Additionally, fiscal expenditure towards productive purposes such as education, worker training, and infrastructure can have a positive spillover effect in increasing the firm profitability, and thereby investment (Brown *et al.* 2009). At the same time higher fiscal deficit may have adverse effect on investment as it may limit financial resources by increasing the cost of borrowing to the private sector. We take into account the gross fiscal deficit at centre and state level as % of their GDPs. The effect of corporate tax on investment can happen through wealth effect wherein reduced available resources limit investment, but this effect is mitigated to a certain extent with the improved wealth distribution. On the other hand, corporate taxation may lead to the “underinvestment effect”, wherein corporate investment gets reduced proportionately higher than the tax rate through the NPV criteria (Ted & Carolin, 2016). Here we consider firm specific corporate tax to PBT ratio and indirect tax to total income as alternative variables to account for the role of fiscal policy measures in the Indian economy.

Lastly, some studies have also added the dimension of uncertainty through proxy indicators. These include the volatility in GDP growth (Geng & N’Diaye, 2012) and the economic policy uncertainty compiled through news based indicators (Pei et. al, 2019; Shukla & Shaw, 2020). We also consider the uncertainty dimension by our own compilation of index using the economic expectation survey data of RBI about business perspectives.¹⁷ Refer table 2 for variable measurement their abbreviations.

Table 2: List of Variables for Firm Level Investment Drivers

Dimension	Description	Measurement
Investment rate	Inv_Rate1	Annual change in net total fixed assets plus depreciation (in %)
Size	size	logarithm of total assets
Demand	Lsales	Log of sales

16 Following the Qiang (2015) The dummy variable holds value 1 for contractionary monetary policy. The basis of assigning value is based on common judgment from the combinations of higher repo rate, lower non-food credit growth and shortfall of money supply growth as compared to the nominal GDP growth.

17 Following Bachmann et al. (2013). economic uncertainty is measured with cross sectional dispersion in subjective expectations of overall business situation in India carried out by RBI under Industrial outlook survey.

Sales	Sales_G	Growth rate in sales
Liquidity	CR	ratio between current assets and current liabilities
Credit	NF_Credit	Non-food Growth rate of bank credit
Profitability	ROA	Cash flow to total assets or Net earnings to Assets
Debt sustainability	DSCR	Debt service coverage ratio
<i>Leverage</i>	<i>Debt_Equity</i>	Ratio of financial debt to equity, with financial debt including
Indebtedness	Long_Debt	Ratio of financial debt to total assets (%)
Corporate tax	Tax_PBT	taxes that were actually paid by the firm divided by net income before taxes
Indirect Tax	Ind_Tax_Inc	Indirect tax to income ratio
Macroeconomic variables		
Effective policy rate	Repo	We have used repo rates, RIR, LR_Repo and MP dummy variables
Real interest rate	RIR	
Monetary transmission	LR_Repo	Lending rate over and above the repo rates
MP Dummy	MP_Dum	MP equals 1 if in a tight monetary policy period, and 0 otherwise. We follow the majority rule. We judge the monetary policy state to be that of the majority of the above three methods
Fiscal Deficit	GFD	Gross fiscal deficit as % of GDP
Policy uncertainty index	EPU	Uncertainty Index

V. Econometric Analysis

V(a). Model Specification

Following previous literature, both theoretical and empirical, we estimate the following investment function:

$$INV_{it} = \beta_0 + \beta_1 Size_{it} + \beta_2 ROA_{it} + \beta_3 Leverage_{it} + \beta_4 Liq_{it} + \beta_5 DSCR_{it} + \beta_6 X_{it} + u_i \quad (1)$$

Where i and t subscripts are for each individual firm and time respectively. INV is investment rate, Sales is the log value of sales, Size is measured as log of total assets, Liq is liquidity, DSCR is debt service coverage ratio and X_{it} is a set of policy variables for monetary as well as fiscal policy. The detailed list of variables is presented in Table 2.

V(b). Model estimation method

The study utilises the panel data for having its advantages in addressing cross-section effects, and large information for getting better and robust estimation. Though dynamic panel analysis is known for the problem of heteroskedasticity of data, the can be controlled (Baltagi, 2008). Within dynamic models, the model called as Generalized Method of Moments (GMM) developed by Arellano-Bond (1991), Arellano-Bover (1995) and Blundell-Bond (1998) occupy significant place in the econometric literature. GMM estimation offers significant advantages over static models in terms of addressing the biases in estimation resulting from the endogenous

nature of some of the explanatory variables. GMM technique is also suitable for “short panels” defined with large number of individuals and short period of time. Keeping in-view the structure of panel data of the present study, GMM estimation is most suitable technique. Within GMM, two forms- difference GMM and system GMM are widely utilised. The difference-GMM estimator, developed by Arellano and Bond (1991), controls the unobserved time-invariant effects while using the first differences of the variables in regression equation. The joint-endogeneity in dynamic panel model is addressed through lagged values of explanatory variables and lagged dependent variables as instruments (known as internal instruments). However, the difference GMM fails to provide the efficient estimates in case of violation of key assumption of no serial correlation in the error term. Alternative to this model, the system-GMM estimator, developed by Arellano and Bover (1995) and Blundell and Bond (1998) which incorporates both- the level form as well as difference form into a system; and utilises the lagged values of the regressors as instruments for equation in difference and the lagged differences of the regressors as instruments for equation in levels (Roodman, 2009).

The system GMM estimator is suitable in a panel data composed with small time period and a large group. Also, the model relaxes the distributional assumption of normality (Petreski, 2009). However, the diagnostic test statistics known as Sargan and Hansen-J tests are developed to check the validity of system GMM estimator. In both the tests, the validity of instruments is checked. Parallel, the validity check is also assessed by the errors of regression equation and a perfect model is assumed to exert no second order autocorrelation. One caution of the system GMM is that in case of long panels consisting larger period and lesser cross section units, the problem of instrument proliferation can exist (Roodman, 2009). In that case apart from the Sargan and Hansen tests, the reduction of instruments through lag restriction can help the precise estimation of the model. In this regard it is specially mentioned that the number of instruments must not exceed the number of observations (Roodman, 2009).

V(c). Empirical Results

The results of our empirical estimation for firm level investment are presented in Table 3. The base model A1 captures firm specific indicators such as profitability, size and debt sustainability along with the repo rate and gross fiscal deficit (% of GDP) as proxy indicators for monetary and fiscal policy respectively. The results suggest that profitability, debt sustainability and fiscal policy have positive effect on the firm investment, whereas the repo rate and firm size have a negative impact on investment. Profitability signals the availability of internal finance to firms, and higher debt service coverage ratio indicates the ability of firms to

meet its debt obligations. Higher values of these factors lead to improved access to financial resources and hence, to investment. The impact of fiscal policy on corporate investment appears in the form of crowding-in effect as such expenditure can provide for enabling infrastructural facilities and boost aggregate demand in the economy. Higher repo rates can lead to a rise in cost of capital for firms which can affect corporate investment adversely through discounted value approach as various projects turn economically non-viable with higher benchmark rates. The negative association between firm size and investment indicates that smaller size firms grow faster than larger firms. This finding is in line with the previous literature on the subject, such as Gala & Julio (2016). In fact, some studies have even reported that there may be a negative association between firm size and profitability (Becker-Blease *et al.*, 2010; Banchuenvijit, 2012).

Model A2 extends the base model while using an alternative variable of monetary policy as it uses real interest rate instead of repo rate. The direction of the impact of all the variables remains the same as of base model, with the real interest rate having a negative coefficient value. With higher real interest rates, economic agents prefer to be cautious and opt for other options like seeking liquidity or bank deposits which has a negative effect on corporate investment. However, during the peak period of investment rate in India, RIR had fallen due to rising inflation but lending rates have stagnated. Firms had perceived the latter as a sign of increasing demand and had accordingly, expanded their investment activities. But after 2012, inflation had come down significantly owing to the tighter monetary policy. But it did not allow lending rates to get eased and the resultant higher real interest rate comprised one of the factors responsible for the investment slowdown in India. The impact of monetary policy is also checked through an alternate variable defined in terms of dummy values of “0” for expansionary monetary policy and “1” for contractionary policy (Model A3). Herein the dummy variable for monetary policy has a negative coefficient sign, but could not establish a significant relation.

In order to get a better insight about the role of fiscal policy measures, an alternative variable, viz. indirect tax to income ratio, has been used in place of gross fiscal deficit (Model A4). This model generates negative but insignificant coefficient value for indirect taxes. The finding indicates that the corporate sector perceives the higher indirect tax burden as a discouraging factor for the demand side and possibility of slowdown in the firm sales. All the models- A1 to A4 satisfies the condition of no second order auto-correlation, but only model A4 fulfils the diagnostic test requirement of Hensen test for over-identification restriction. This suggests for

extension of these models with inclusion of some other relevant variables explaining firm investment.

Table 3: Firm Investment Drivers: GMM Estimation

Variable	Model A1	Model A2	Model A3	Model A4
L1.	0.078*	0.079*	0.076*	0.090*
L2.	0.025**	0.028**	0.023**	0.035*
size	-10.13*	-10.29*	-6.461**	-11.88*
ROA	0.287*	0.293*	0.253*	0.321*
DSCR	0.000***	0.000***	0.000	0.001**
Repo	-1.050*			0.240
RIR		-0.255*		
MP_Dummy			-6.429	
GFD_CS1	1.772*	3.304*	2.444**	
Ind_Tax_Income				-2.26***
_cons	130.299	136.143	99.884	133.342
Obs.	29476	29476	29476	29476
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.647	0.830	0.580	0.885
Instruments	23	22	21	22
Wald Chi ² *	498.5	486.8	494.2	467.9
Hensen Test	0.079	0.032	0.048	0.190

Source: Authors' Compilation based on Prowess Database of CMIE, Note: *, **, *** indicates statistically significant at 1, 5 and 10% level, respectively.

The addition of firm specific variable in the investment function is carried out in step wise manner. First, we add the liquidity dimension to the base models of investment (Model B1). This dimension is measured with ratio between current assets to current liabilities. Higher liquidity allows the firms to meet any contingent situation and has an expected positive impact on investment. However, excessive liquidity reduces the channelling of funds for productive purposes and can negative affect on investment beyond a certain threshold. The results reveal a negative coefficient value for the variable, but it is insignificant (Table 4). All other variables have the same direction impact on investment as discussed in the above base models. Model B2 incorporates an alternative variable of fiscal policy to model B1 as it uses the indirect tax to income ratio instead of fiscal deficit indicator. Indirect tax burden is observed to have a negative coefficient value for both models B2 and B3. This finding suggests that increasing indirect tax burden has a discouraging effect on the investment rate. Model B3 takes an alternative variable of demand side to the model B2, as it uses growth rate sales instead of profitability indicator (ROA). Literature has largely used the log of sales as a demand side variable, but some of the studies have pointed out the high correlation between sales and profitability creating grounds for using the variable in our analysis. This demand side variable holds a positive and significant impact on investment, thereby supporting the accelerator theory of investment.

Table 4: Firm Investment Drivers: Impact of Financial Liquidity

	Model B1	Model B2	Model B3
Variable	Coeff.	Coeff.	Coeff.
L1.	0.078*	0.090*	0.092*
L2.	0.025**	0.035*	0.039*
size	-10.118*	-11.866*	-11.278*
ROA	0.287*	0.322*	
sales_g			0.236*
DSCR	0.000***	0.001**	0.001**
Repo	-1.048*	0.240	0.159
GFD_CS1	1.767*		
Ind_Tax_Income		-2.265***	-2.169***
Curr_ratio	-0.017	-0.023	-0.018
_cons	130.114	133.236	128.528
Obs.	29461	29461	29619
AR(1)	0.000	0.000	0.000
AR(2)	0.651	0.878	0.634
Instruments	24	23	24
Wald Chi ² *	498.6	468.5	564.1
Hensen Test	0.087	0.204	0.101

Source: Authors' Compilation based on Prowess Database of CMIE, Note: *, **, *** indicates statistically significant at 1, 5 and 10% level, respectively.

Following Shukla & Shaw (2020), we try to assess the role of leverage factor in explaining corporate investment. In this regard, model C1 extends the model B1 by incorporating certain variables for leverage in our analysis. The direction of impact of firm specific as well as policy indicators has remained same as of the base model (Table 5). The additional variable financial leverage is observed with a positive coefficient value indicating that higher leverage leads to expansion of investment. This result is in accordance with the findings of Shukla and Shaw (2020), who also postulated that leverage beyond a certain threshold level limited the firm's investment activities. In fact, companies prefer financial leverage to take the tax advantages and it can also serve as a useful source of finance for the firms. It is important to note that the increased debt service ratio of the companies reflects their desire to act against any defaults and thus, financial leverage indicates a positive signal about the firms' performance among shareholders. Accordingly, firms are able to get an adequate flow of funds to finance their investment. In the descriptive section above, it was noted that firms have experienced a downfall in DSCR during 2015-18, but still the level of debt sustainability has remained to the levels of 2001-08, a period of peak investment.

Model C2 uses an alternative variable of monetary policy as it adds real interest rate to the base model C1. The coefficient value for RIR is negative suggesting that the tighter monetary policy reduces firm level investment. The impact of other variables on investment is in the same direction as the variables in the model C1. In contrast. Model C3 gives priority to the demand

side as it uses sales growth instead of profitability (ROA). The sales growth has positive coefficient value and thereby supports the argument in favour of the accelerator principle. All other firm specific and policy variables hold the same impact on investment as given in the model C2. All the models satisfy the diagnostic tests of serial correlation and the instrumental validity.

Table 5: Firm Investment Drivers: Impact of Financial Leverage

Variable	Model C1	Model C2	Model C3
L1.	0.071*	0.087*	0.088*
L2.	0.018	0.030**	0.035**
size	-9.840*	-7.193*	-6.572*
sales_g			0.303
ROA	0.679*	0.874*	-
DSCR	0.000	0.000	0.000
Repo	-1.051*		
RIR		-0.575*	-0.629*
GFD_CS1	1.801*	1.345*	1.175*
Curr_ratio	-0.016	-0.014	-0.008
Debt_Equity	1.461**	2.350**	2.757*
_cons	123.459	88.612	84.156
Obs.	27878	27878	28040
AR(1)	0.000	0.000	0.000
AR(2)	0.168	0.137	0.172
Instruments	24	24	24
Wald Chi ² *	364.8	289.9	299.1
Hensen Test	0.114	0.149	0.180

Source: Authors' Compilation based on Prowess Database of CMIE, Note: *, **, *** indicates statistically significant at 1, 5 and 10% level, respectively.

As mentioned before, one of the chief objectives of this study has been to examine the impact of policy measures and the twin balance sheet problem on investment. In this regard, model D1 extends model B1, while using the non-food credit growth instead of leverage. This variable along with the profitability indicator offers scope for studying the role of twin balance sheet problem in determining corporate investment. Model D2 uses real interest rate instead of repo rate of the model D1. Model D3 extends model D2 and considers an alternative variable of fiscal policy as it uses the indirect tax to income ratio instead of gross fiscal deficit. In all the models, the variable for non-food credit growth has a significant and positive coefficient value (Table 6). This suggests that the investment is positively affected by credit growth. In the past decade, the investment slowdown can be linked to subdued credit growth. Corporate profitability has a significant and positive coefficient value and hence it can be regarded that the investment is plagued by twin balance sheet problem. The sign and direction of other variables in these models are the same as in our previous models, the only exception being real interest rates. The positive impact of real interest may be due to the dominance of the positive

effect of credit growth in the economy. It can be argued that the boom period of investment (2002-08) is mainly accompanied by massive credit growth; obviously the interest rate channel has become secondary in that period.

Table 6: Firm Investment Drivers: Impact of Twin-Balance Sheet Problem

Variable	Model D1	Model D2	Model D3
L1.	0.080*	0.081*	0.071*
L2.	0.028**	0.028**	0.018
size	-7.126*	-4.650***	-3.086
ROA	0.260*	0.241*	0.223*
DSCR	0.000	0.000	0.000
Repo	-0.837**		
RIR		0.267	1.285*
GFD_CS1	2.301*	2.258*	
Ind_Tax_Income			-0.142*
Curr_ratio	-0.015	-0.013	-0.009
NF_Credit_G	0.338***	0.613**	0.899*
_cons	100.516	66.966	29.294
Obs.	29461	29461	29452
AR(1)	0.000	0.000	0.000
AR(2)	0.853	0.906	0.398
Instruments	23	23	23
Wald Chi ² *	494.4	511.0	495.1
Hansen Test	0.124	0.132	0.180

Source: Authors' Compilation based on Prowess Database of CMIE, Note: *, **, *** indicates statistically significant at 1, 5 and 10% level, respectively.

Recent literature has also noted the role of rising uncertainty as key factor for investment slowdown. The current study also aims to understand the role of economic policy uncertainty as given in Model E1. Model E2 uses an alternative variable of fiscal policy using tax to PBT ratio instead of indirect tax to income ratio. Model E3 considers the demand side variable and replaces profitability with log of sales in the base model E1. All these models suit well to incorporate the role of policy factors, twin balance sheet issues along with economic uncertainty as key factors for investment slowdown in India. In all the models, the economic policy uncertainty holds negative and significant coefficient value. This finding is in line with recent literature wherein rising uncertainty has been regarded as key factor for investment slowdown. This finding is in contrast to the findings of RBI (2020), wherein the economic policy uncertainty is observed with insignificant impact. Following the work of Arellano and Bond (1991), GMM estimator requires that there is first-order serial correlation but there is no second-order serial correlation in the residual. Our results confirm this assertion. Hence, we reject the null hypothesis of no first order serial correlation and accept the null hypothesis of there is no second order serial correlation. These results support the validity of our model specification.

Table 7: Firm Investment Drivers: Impact of Uncertainty

Variable	Model E1	Model E2	Model E3
L1.	0.075*	0.071*	0.076*
L2.	0.032**	0.031**	0.039*
size	-4.976**	-5.402**	-3.044
ROA	0.267*	0.303*	
sales_g			0.263*
DSCR	0.000	0.000	0.000
NF_Credit_G	0.553*	0.506**	0.672*
Ind_Tax_Income	-0.133*		-0.110***
Tax_PBT		-0.056	
Curr_ratio	-1.924	-2.611	-2.974
epu	-0.038*	-0.041**	-0.040**
_cons	63.660	70.269*	46.504
Obs.	29452	29418	29619
AR(1)	0.000	0.000	0.000
AR(2)	0.443	0.368	0.433
Instruments	22	21	22
Wald Chi ² *	481.7	440.1	610.8
Hensen Test	0.110	0.107	0.101

Source: Authors' Compilation based on Prowess Database of CMIE, Note: *, **, *** indicates statistically significant at 1, 5 and 10% level, respectively.

VI. Conclusion

Having an understanding of investment slowdown at the aggregate level, the current section examines the sector specific heterogeneity of investment dynamics in India by using firm level investment data for the period 2001-19. In other words, the study employs dynamic panel models on micro-level data to provide more clarity about the macroeconomic issue of investment slowdown. The study starts off by tracking the change in aggregate investment behaviour across the period. As such, firms have reported higher investment activity prior to the GFC, with average investment rates reaching a peak level of 33.4% in 2007 from its previous value of 25% in 2001. But with the outbreak of the crisis, investment rate had come down to 21 % in 2014 and has remained more or less the same since then. An inter-temporal analysis across financial variables indicates that financial leverage, credit growth, growth prospects, corporate profitability, lower tax burden in lieu of debt advantage, and accommodative monetary policy can be regarded as key drivers for corporate investment. Moreover, the problem of debt overhang is quite visible as the investment rate for highest leveraged firms is not significantly different from the investment of the firms falling in third quarter of leverage. It is possible that the tax advantage of higher debt has caused the corporate sector to keep more retained earnings for higher debt service obligations, thereby partly leading to the phenomena of agency cost problem.

Across sectors, the investment rate had been on much higher side for construction and non-financial services sector firms during 2001-08, mainly fuelled by higher credit growth and bullish growth prospects in the economy during this period. Since 2008, all the sectors have noticed a dip in investment rate with construction sector recording the highest fall from 38.5% to 22.6%. After the crisis, major infrastructure projects have been stalled amid credit crunch as there has been a reduction in the flow of credit from banks to the corporate sector. In addition, the sector has also been severely affected by demonetization. In contrast, electricity and mining sector firms have reported the lowest level of investment rates amongst the different sectors. The lower rate of electricity sector can be linked to the dominance of public sector enterprises which limits the applicability of market-based principles in the sector. Similarly, the mining sector records lower investment as the sector is plagued by corruption and lack of transparency. The mining sector had experienced a fall in investment rates during 2009-14, a period of high uncertainty in the sector. But investment has recovered in recent years with the launch of certain policy measures addressing corruption and non-transparency issues in the sector. The manufacturing sector firms' have also reported a downfall of investment by around 8% points during the sample period. The sector is largely governed by private players who responded to the sluggish demand in the economy after the GFC by reducing their economic activities and cutting back on their investment.

The empirical results suggest that profitability, scale of demand, debt sustainability and fiscal policy have positive effect on the firm investment. On the other hand, firm size and firm specific indirect tax burden are found to have a negative impact on firm investment. The negative association between firm size and investment indicates that smaller size firms grow faster than the larger firms. The alternative indicators of monetary policy measures indicate that the tight monetary policy has negative effect on the firm investment. Our study could not find any significant impact of the liquidity indicator on the firms' investment, instead it is financial leverage factor which is observed to have a positive impact on investment expansion. However, Shukla and Shaw (2020) noted that the leverage beyond a certain threshold level limits firms' investment activity. The same is also evident in our descriptive analysis as there did not seem too much difference in investment rates of firms in the Q3 and Q4 quarters of financial leverage.

One of the primary objectives of our study had been to study the role of the twin balance sheet problem in explaining the current investment slowdown in India. On this front, the non-food credit growth and corporate profitability are found to have positive and significant coefficient

values. This suggests that corporate investment has been plagued by the twin balance sheet problem as both factors have been subdued in the past decade. Additionally, economic uncertainty was also reported to have a significant and negative impact on corporate investment. In a nutshell, it can be argued that the slowdown of corporate investment in post crisis period is linked to slower sales growth, falling profitability, rising corporate tax burden, debt overhang, deteriorating the debt sustainability and a massive fall in credit growth. Besides these, macro-variables such as tighter monetary and fiscal policy stances and, increased uncertainty in the post-GFC period has also contributed to the investment slowdown in India.

On the basis of the descriptive and empirical analysis, some short-term and long-term policy measures may be suggested. In the short-run, there must be attention paid towards firms that are in a debt overhang, especially the ones that have experienced better sales growth but are registering lower profitability due to increased debt service payments. Even these firms had to maintain higher retained earnings to safeguard against the risk of defaulting. Thus, it is imperative to maintain appropriate flow of credit to these group of firms. There also have to be efforts made towards lowering the indirect tax burden and easing monetary policy for boosting investment from firms. Across sectors, there is a need to immediately revive the construction and manufacturing sectors as these can have positive spillover effects for the rest of the sectors in the economy.

As for long-term measures, it is suggested that firms ensuring moderate level of leverage and debt sustainability should be incentivized by providing them with better access to credit facilities or corporate tax holidays. Moreover, the government should address supply side bottlenecks by providing enabling back-end infrastructural services to the corporate sector. It should also ensure that inflation stays within a certain limit which can increase the scope of implementing and sustaining accommodative monetary policies. In fact, the lending rate has not responded adequately to changes in benchmark policy rates due to poor monetary policy transmission mechanism in the economy. Herein, stable inflation will not only benefit the demand side, but will also provide ample space to the banking sector to maintain the efficiency with better monetary policy transmission. In addition, expansionary fiscal policies should not create an extra burden on the corporate sector, through the imposition of indirect taxes or corporate taxes. It was also found that smaller size firms tend to have higher investment rates and accordingly, the recent move towards providing tax holidays for smaller and newly launched ventures should be continued. There is also a need to promote higher competition in the electricity and mining sector by way of addressing regulatory issues. Lastly, there have to

be efforts made to foster a healthy business environment and alleviate economic uncertainty for reviving investment in India.

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