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The Interest Rate and Investment in Manufacturing

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Abstract:

There is continuous tussle between the Reserve Bank of India and the Finance Ministry in terms of the desired conduct ofmonetary policy. At the core of it remains the difference in their opinion about what can monetary policy do and where can we use monetary policy as an instrument. While the government especially during slump and stagnation considers policy rates high the central bank exercises caution in reducing policy rates, at times in fear of a price spiral or its own concerns. As pointed earlierthis conflict has roots in belief centred in what interest rates can do? Recently,the RBI has echoed that slump, stagnation has more to do with non-monetary factors while the government remains (or pretends to remain) concern about policy rates and believes that let alone interest rates are responsible for any suchpersistent dismal situation as reflected in their recent remarks.

In this context this paper examines the influence interest rates have on organized manufacturing in the country. The manufacturing sector according to world bank dataconstitutes almost 15 per cent on average of total value added during the period of this study (1998-2008), now despite having less share than service sector for the same, this sector assumes importance by its

very nature whereby it has both forward and backward linkage and has the potential to absorb large reserve army of labour.So we decided to focus on organised manufacturing given these considerations.

While the aggregate relationship between interest and investment is significantly negative, one looks at sector level data to ascertain the validity of such negative relationship. During this we are able to classify the sectors on the basis of their responsiveness to interest rates, the sector wise analysis which shows how specific sectors are more responsive to interest rate fluctuations coincidentally appear to be capital intensive while the low-responsive cohort typically belongs to consumer durables and semi-durables. There are interestingly two sectors which show positive correlation and one of them have a considerable share in total investment over the period of analysis. We at best make a guess about the neutrality of the sector to interest rates however to establish the positive correlation seems a difficult task.

However the purpose of the exercise was to ascertain whether interest rates are important or not? We conclude that for organised manufacturing they are definitely important and we observe negative relationship with lending rates and investment in these sectors, however to draw policy implications from the same would be too early as the study has several limitations but despite all those limitations it ascertains the negative relationship between interest and investment for manufacturing in particular.

1.1 Introduction and Background:

One finds widespread attention to policy rate changes of central bank by academia, media and organizations across globe. Mohanty (2012) remarks do such policy rate changes really matter? He further states that response to such a question lies in an assessment of how does the policy rate changes the cost of credit and ultimately impacts investment and consumption decisions of economic entities[1]. There are two ways by which a change in interest rate can impact investment, one is whereby an increase in rate of interest can raise the cost of holding cash thus affecting firms largely dependent on cash flows for their day to day business and putting them at disadvantage and two whereby an increase in interest rate makes cost of capital high for firms reducing returns on investment made and impacting investment activity. We are here particularly focussing on the latter part of the story whereby this

paper aims to examine the behaviour of investment activity in organized manufacturing during 1998-2008 with respect to market lending rates.

The background for this analysis can be understood in this light, the Reserve Bank of India in 2012 in its mid-quarter review came in defence of its anti-inflationary stance (high policy rates) by stating "high interest rates are only one of the several factors causing slowdown in growth, real interest rates which could be more relevant for affecting investment activities are lower now (June 2012) than high growth phase before the recent global financial crisis[2],pointing to role of non-monetary factors in slowing down investment and growth". To account for slowdown in Growth and Investment across sectors during this tightening of monetary policy, we get the echo of non-monetary factors largely at play by the central bank.

During the period of study one finds that in manufacturing share of profit in gross value added rose to 54 per cent in 2007-08 from 27 per cent in 1998-99 while share of emoluments remained in the slab of 19-25 per cent and fuel consumption showed a small dip in share from 26 to 23 per cent[3]. There is relatively considerable drop observed in interest payments as share of gross value added; it fell down from 23 per cent to 9 per cent. On the lines of economic survey 2009-10, whereby it's argued that since profitability rests on emolument, fuel consumption and interest payments and in case the first two variables show constant share in gross value added, interest rate structure are important in determining the firm's internal accruals which in turn determine their investment decisions[4]. So one can safely conclude that central government has heralded interest rate as the prime factor in determining the investment decisions of firms.

Now these two opposing claims can be verified if we could show that firms rely on banks as their prime lender. In a study by Reserve bank of India's (RBI), finances for public limited companies reveals dominant share of external sources of finance during 1980s and 1990s, while there has been a decline in the share of external finance in the initial three years of 2000-10 the share has picked up since then rising as high as 64.5 per cent of total in 2007-08[5]. During the period 1990-2008, borrowings from banks form the second largest individual share only less than provisions among the various internal and external sources of finance for these companies on average[6]. This asserts relevance of bank lending given their large share among various sources of

finance; this fact takes care of adverse possibility whereby our study would have seemed to focus on lending rates via banks while bank credit had small share in borrowings by firms. In a slightly passive measureof borrowing where we examine share of industry to non-food gross bank credit over years, we find that during the period 1998 to 2008 industries amount to 35.8 per cent of total non-food gross bank credit disbursed[7].

Having stated the differing emphasis on interest rates as prime factor in determining investment activity, this paper investigates how the industrial investment has responded over years with respect to interest rate. Furthermore we observe how within industry different sectors have responded to changes in interest rate. This would help examining the relationship between interest rates and investment behaviour at sector widelevel to find out sectorswhich are relatively more responsive to interest rate changes than their counterparts.

1.2 Choice of Model:

Since our study focuses on the movements of these two variables we rely on neo-classical theory of investment. The neo classical theory links investment behaviour with cost function of firms whereas cost itself is a function of factor prices. In real world wages are sticky or usually lag for some period before appreciating while interest rates (factor payment rate for capital employed) are exogenous for individual units. Given that interest rate changes come as exogenous to individual firms; it can be seen to impact investment behaviour via changes in cost structure. It can be argued that investment behaviour at aggregate level is dependent on two things, one is interest sensitivity of investment and other is comparison of interest rate to changes in marginal efficiency of capital. This tells us that any change in borrowing rate transmits via both of these and thus impacts investment behaviour. For example, it may happen that in a gloomy economic climate despite rate cuts which improve internal rate of return for a firm over interest rate, one fails to attract investment because interest sensitivity of corporate investment is quite low, so despite marginal efficiency of capital being greater than revised lower rates a firm doesn't invest. Now it amounts to tell that non-monetary factors too affect marginal efficiency of investment at macro level and marginal efficiency of capital at micro level, thus impacting investment behaviour. It then becomes difficult to ascribe the changes in investment behaviour to monetary and non-monetary

factors individually, however one can definitely test whether non-monetary factors are at play by examining the movement of investment and interest rate and if they are not moving opposite as expected in neo-classical theory then definitely non-monetary factors are at play. Such exercises will help draw conclusions relevant for policy regime. However one must be cautious to draw a picture for aggregate level, for sector specific credit policy may downplay such conclusions based on a weighted average lending rate.So we analyse the movement of interest rate and manufacturing investment to examine the behaviour of manufacturing investment taking interest rate movements as reference and probing further to deduce sector level evidence.

1.3 Literature Review:

We can divide the related literature in two parts, one those catering to the theoretical discussions revolving Investment while the other catering to empirical works in this context.

Investment by its definition is change in capital stock during a period; hence it's a flow concept unlike capital which is a stock concept. We can measure investment during a period as the difference between capital stock at end to that at the beginning. Now if all of the capital used by the firm is circulating and gets exhausted within a time period then no amount of capital generated during the previous period is going to be used in current period here the theory of investment and capital converges else one needs to deal with them separately. As stated earlier investment is a flow variable, its study can be divided into two parts whereby one focuses on speed of flow and the other focuses on amount of flow. The literature can be thus divided into Hayekian and Keynesian approach. The former conceives it as adjustment towards equilibrium and thus the optimal amount is simply optimal speed towards adjustment. This approach focuses on the various time paths between two different levels of capital stocks. While Keynesian approach places emphasis on behavioural aspect of investment, they relate investment to decisions to invest than enquiring about speed towards adjustment, for them it's simply what entrepreneurs do in every period. For Keynesians the main attribute is'decision regarding investment' hence capital stock decisions are following from investment patterns (which are actually decided in a period) than capital stock being decided beforehand. The Keynesian approach has a

longer history given focus on circulating capital from early days like that by Turgot (1776), Fisher (1930)[8] and Keynes himself. Subsequently we come across four main strands of different thoughtsnamely Accelerator theory (Aftalion-Clark), Neo-classical theory (Jorgenson), Quantity theory (Brainard and Tobin) and liquidity theory of investment behaviour(Fazzari). The Accelerator Theory states that a rise in investment by firms is consequent upon an increase in demand (rise in income with unchanged propensity to consume for the least). The Neo-Classical theory of investment considers the optimization problem for a firm and relates it to the rental cost of capital which affects the total investments by a firm. The Q-theory of investment have incorporated expectations into investment decisions and stated stock market being the guide to investors whereby investment decisions will be made till the market value of assets equals the replacement costs of assets. Since in the Q-theory there is an implicit assumption of perfect capital market, it gives rise to the Liquidity theory of investment. The hypothesis from this model is under imperfect capital market firm's investment behaviour depends on internal liquidity as determined by cash flow; cash in vaults, provisions, etc.

Having mentioned the theories around investment we look for empirical literature related to our work. We find that there is no specific study discussing manufacturing investment and interest rates in particular and especially about India except for the economic surveys released by the ministry of finance which devote a chapter every year to industries and talk about general trends and changes in sector wide composition and growth story rarely talking about interest rate and industrial movement together. However we find literature which has denounced the role of interest rate to investment activities in general. The studies done by Kothari (2013) of MIT Sloan School of Management shows how for minor 100-200 basis percentage points revision of interest rates there is no significant impact on investment activity for the US economy in general. In another study by Sharpe and Suarez (2013) of Federal Reserve Board Washington, they have shown that CFOs of multi-national firms are less considering of interest rates while taking investment decisions. These studies have generated a lot of debate and they were widely quoted in media and definitely they must have influenced the academia and policy circles. In fact Kothari in a guest article to a business daily in India has mentioned the focus on non-monetary factors especially physical infrastructure and doing away with bureaucratic hurdles as key to embark on a new growth journey. He

discards role of interest rate by comparing Indian and Chinese lending rates whereby both have similar rate structure but china witnessed unprecedented investment.The other set of literature in this connection has mostly covered financing of investment decisions of the corporate firms by breaking them into internal and external sources. Works of Modigliani & Miller (1958), Fazzari (1988) and other studies have focussed on guiding factors for investment decisions and have discussed role played by profitability, cash flow, external finance availability, etc. In Indian context there is a study by Rajakumar (2005) which has done empirical verification of relationship between corporate financing and investment behaviour for the period 1988-1998.

In an inter-departmental study by RBI published in 2012 it'sbeenshown that most of the sectors are significantly sensitive to real interest rates with growth in gross fixed assets as dependent variable, however the limitations of the study is it rests on data set exclusively available with RBI and they use nominal variables further it doesn't tell us how within manufacturing each sector's share of investment has responded. This study by RBI immediately brings us at conflict with what Kothari, Sharpe and Suarez have stated regarding sensitivity of investment to interest rate, this exercise will help us debunk the myth surrounding this emerging controversy.

1.4 Methodology and Data:

Since we are interested in examining the manufacturing investment trend and compare it with interest rates movements, we construct variables for our purpose.

(1) **Data Source**: We have used time series data on Annual Survey of Industries published by EPW research foundation which are based on data released by Ministry of statistics and program implementation, Govt. of India while looking for sector wise (within manufacturing) investment figures. Given ASI is a comprehensive survey for industrial statistics we considered extracting investment data for organized manufacturing based on this data source. For the interest rate we used tables generated by Mohanty (2012) in his working paper and adjusted using GDP deflator[9]. The interest rate are calculated as nominal weighted average lending rate per year for different occupation types (industry being one of them) and it's based on data available from Basic Statistical Returns of 47 commercial banks which forms 95% of non-food

gross credit dispersed.

(2)**Investment**: Investment refers to increasing the total capital assets by the firm. The annual survey of industries gives gross capital formation (GCF) figures in its publications; GCF values are sum total of gross fixed capital formation and addition to total stocks. We have used it as investment figures. It may be noted that Economic Surveys have also used GCF as a measurement of investment[10]. Now onwards we will use the term Investment for gross capital formation.

(3)**Interest rate**: The central bank changes policy rates and such changes in policy rates are assumed to be reflected in commercial bank borrowings. Though it could be interesting to understand and develop a model for transmission from policy rates to market lending rates, we leave this question considering it beyond the scope of this work. In this context only, one finds that in reality there exists several rates for borrowings and hence we use one single nominal weighted average lending rate (WALR) for industry[11]. We also understand the limitations of using one interest rate to study the impact on investment expenditure of manufacturing firms but it can be fairly assumed that for monetary policy, translation of policy rate changes into effective cost of borrowing is what matters; hence we stick to one such representative measure. Since RBI reports occupation wise basic statistical returns (BSR) data and our purpose is to examine response of sectors within manufacturing to changes in interest rates, we have used WALR for industry occupation. This is in tandem with our purpose whereby we examine the response of sectors to changes in interest rate which is relatively relevant for them.

We use nominal weighted average lending rate (WALR)as discussed in Mohanty (2012) for Industry type occupation. Now one can bring in the question of whether real or nominal interest rates determine investment decisions, despite studies stating nominal interest rates playing a determining role[12]it can be safely assumed that expected inflation would be present in calculating the Net Present Value (NPV) of the investment project thus implicitly firms take into consideration their own real rate of return[13], hence for our analysis we also calculate real WALR (RLR) from WALR. We use fisher equation to reach at real interest rates. While there is no unambiguous way to determine expected inflation we content ourselves with ex-post real interest rate since Fisher equation

can be used in either ex-ante or ex-post meaning. We used GDP deflator data to adjust for realised inflation values from the nominal interest rates. Before moving to explain the methodology we must state two more reasons to use WALR, firstly announcement of changes in policy rates are not annual in nature so using a yearlong period to calculate average interest rate over the period helps us to take care of changes arising out of such mid-year announcements, if any. Secondly, given ASI results are published annually it was in best of our interests to use an average value of interest rate representing the fiscal year.

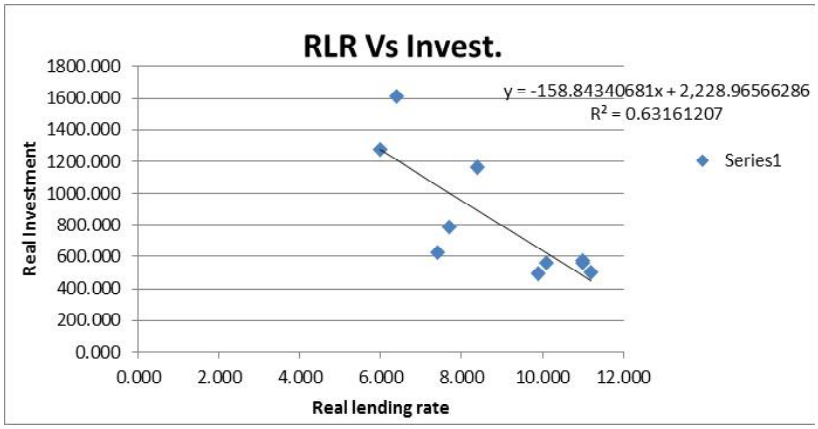
(4)**Methodology**: We have investment figures at two digit level for each sector in manufacturing over the period 1998-2008. First of all we compare the movements of real lending rate for industry with that of investment figures for industry as a whole. After observing these aggregate level trends we switch to decipher the sector wise response to changes in interest rates. For this we calculated correlation values between real investment over years and real interest rate for all sectors and classified them. Meanwhile we generated a time series of 'share of each sector in total investment' according to 2-digit classification of ASI over the period of study.We also divide our sectors as high, low or medium based on their correlation coefficient, for all absolute values more than 0.70 are considered high, 0.50 to 0.70 are considered medium while those below 0.50 are considered low.

Next we compare the above results to test if the sectors which have shown negative coefficients (preferably high) and they constitute a higher share in total investment than others and othersare having lower share in total investment.In an ideal scenario most sectors should havenegative correlation and have a combined large share in total investment. While sectors having positive correlation should be insignificant and definitely a lower share in total investment. If the above holds we can assert that during this period one finds evidence of negative relationship between interest and investment at disaggregated levels (sector level) too otherwise wedon't have sufficient evidence to make this claim. In case the above ideal scenario doesn't hold it amounts to say that there is ambiguity regarding negative relationship between investment and interest rate at sector level.

1.5 Result:

We find a negative relationship as shown in the graph between real

Investment and real lending rate as expected. The real investment here is obtained from gross capital formation values adjusted by wholesale price index of machinery and machine tools with 1993-94 as bases[14].



The correlation coefficient between real investment and real lending rate is -0.79 and is significant. This is a high value of correlation and suggests that at aggregate level there exists significant negative relationship between interest rate and investment. However behind this veil of aggregation sector wide responses are muted and we therefore look at sector specific significance results and their signs and shares. The sector specific results would give us evidence of which are the most responsive sectors which would help us explain the negative relationship as seen above, for we can pick sectors which are significantly negative and do have a large share in total investment over the period. We produce a table below which gives us sector wise correlation coefficientsand share in total investment over the period.

The table below gives us certain results[15].

- The sectors 17, 22, 24, 25, 27, 28, 29, 33, 34 were the significant and highly responsive sectors to interest rate during the period of study. They altogether constitute almost 55-60 per cent of total share.
- The sectors 21, 32, 36 are least responsive sectors to interest rates and coincidentally their share in total investment is quite low resting

around 5 per cent.

- The sectors 18, 19, 26, 31 and 37 falls in medium range given their response to interest rates and together they capture around 10 per cent share in total investment.
- It's interesting to note that sector level analysis has also brought two unusual results whereby one finds that sector 23 and 30 have positive signs of correlation coefficient and they together capture almost 12 per cent in total investment share.
- It's clear from the table that sector 23 doesn't respond to interest rate conventionally and despite having a considerable share in investment over the period its response has been contrary to the general wisdom. Similarly in case of sector 30 one observes this unusual trend though quite insignificant and low.

Codes	CORRELN	Ranking	% Share (overall)
15	-0.37296	Low(-)	10.02
16	-0.57197	Med(-)	0.35
17	-0.77554	High(-)	8.98
18	-0.68251	Med(-)	1.39
19	-0.63857	Med(-)	0.56
20	-0.8542	High(-)	0.27
21	-0.44037	Low(-)	2.59
22	-0.82761	High(-)	1.20
23	0.180719	Low(+)	10.95
24	-0.76568	High(-)	12.93
25	-0.76375	High(-)	2.95
26	-0.69009	Med(-)	5.60
27	-0.8923	High(-)	17.11
28	-0.74011	High(-)	2.97
29	-0.87489	High(-)	4.20
30	0.174552	Low(+)	0.57
31	-0.68472	Med(-)	2.79
32	-0.35711	Low(-)	2.11
33	-0.79821	High(-)	0.50
34	-0.78917	High(-)	6.27
35	-0.90761	High(-)	1.77
36	-0.40169	Low(-)	1.31
37	-0.68879	Med(-)	0.02
Total	-0.79474	High(-)	100.00

1.6 Conclusions:

The study presented here explains the aggregate level negative relationship between real interest rate and real investment figures in manufacturing industry over the period 1998-2008. This might sound an unnecessary task being carried given negative relation between investment and interest rateis considered obvious, however the tussle between reserve bank and finance ministry whereby former holds non-monetary factors responsible for slowdown in growth via slowdown in investment and the government blames central bank for its high policy rates causing slowdown in investment needs to be weighed out. As mentioned in the beginning Mohanty (2012) remarks, are interest rates really important given the amount of attention they receive? We can safely conclude from this task that interest rates are important when it comes to manufacturing investment. However the purpose was not only to test for an obvious relation at aggregate level, the purpose was to probe into sector level responsiveness and uncover what's behind the veil of this negatively sloped investment while we look at sector wise data. Are the sectors also responsive to interest rate changes in the negative direction as observed usually at aggregate level? In this process we analysed sector level responsiveness to interest rates and we had several conclusions to follow from them.

1. The sectors 17(Textiles), 24(Chemicals andChemical Products), 27(Basic Metals) were the most responsivesectors during 1998-2008 and they only explain the negative slope of the investment schedule during the period for they had high negative coefficient correlation along with a significant share.
2. The study also gives evidence of other sectors having high responsiveness but they are less important than above mentioned to explain the obvious result. These are 22(Publishing, Printing and reproduction of Recorded Media), 25(Rubber and Plastic Products), 28(Fabricated Metal products, except machinery and Equipment), 29(Machinery and Equipment), 33(Medical, Precision and Optical instruments, Watches and Clocks), 34(Motor vehicles, Trailers and semi-trailers). In fact the above two contains sector which seem more capital intensive than others and thus a

higher degree of responsiveness seem natural.

3. The least responsive sectors happened to be 21(Paper and Paper Products), 32(Radio, TV and communication equipment and apparatus), 36(Furniture, Manufacturing, n.e.c) and 15(Food products and Beverages). Given that it holds around 10 per cent share in total investment, this having a low responsiveness means some kind of exogenous unfettered investment which seems true given the nature of demand for such products. In fact all the sectors mentioned here are consumption goods sector and especially consumer durable and semi-durable sector which are relatively immune to interest rate movements than durables and investment goods sector.
4. There is an interesting observation whereby sector 23(Coke, Refined Petroleum products and Nuclear fuel) shows positive correlation though low in nature. It's a paradox to the general wisdom whereby sector wise investment has been positively sloped against interest rates. This needs a further probe in such behaviour, though at best one can make a guess about their neutrality to interest rate given their high-end and continuous use pattern whereby interest costs are less likely to disrupt daily operations and thus guide investment decisions. Also one observes the same positive relation for sector 30(Office, Computing and Accounting Machinery) but is insignificant.

Having mentioned the conclusive findings from this work, one is free to extend the conclusions for further time period though we must warn that this study caters to a short run period and it's highly possible that with time there are structural changes in the sectors or simply the results don't hold in another period for it's a social science exercise and we at best can explain our past than predicting future with certainty.

Endnotes:

1. Source: Speech by Shri Deepak Mohanty, Executive Director, Reserve Bank of India, delivered to the Association of Financial Professionals of India

(AFPI), Pune, August 23, 2013.https://www.rbi.org.in/scripts/BS_SpeechesView.aspx?id=832 (Accessed on 10 Feb 2015)

2. Source: Pattanaik S, Behera H, Kavediya R in an Inter-Departmental study conducted by RBI, RBI working paper series, published in 2013.*https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/IDGSR08082013.pdf*

   (Accessed on 11 Feb 2015)

3. Own calculations from data. See Appendix (A.1) for the table.

4. Source: Finance Ministry, GOI, Economic Survey, 2009-10. Chapter 9.

5. Own calculation from RBI's study. See Appendix (A.2) for the chart.

6. Borrowings from banks form an average 14 per cent of total share of corporate finance during 1990-2008. Also see Appendix (A.2).

7. Own calculations. See Appendix (A.3).

8. Given Fisher's assumption that all capital is circulating, there is no question of stock, hence his theory becomes that of investment.

9. Source: Mohanty, Deepak, et al RBI Working Paper Series, DEPR (7/2012); (Accessed on 10 March 2015)

10. As can be seen in various issues of Economic Surveys, especially chapter on Industry.

11. For a discussion on WALR, see appendix (A.4).

12. Source: Same as 2. The study quotes whereby the CFOs of banks have emphasized that nominal rate of interest is their prime concern while deciding investment activities.

13. In the same study, the authors have argued whereby inflation consideration would come up in NPV consideration based on their own assessment of expected inflation and future cash flows.

14. See Appendix (A.5) for a table.

15. For various preceding charts see appendix (A.6).

Appendix

A.1

Table 1									
Year	Emoluments	Emolument/GVA	Interest	Interest/GVA	Profit	Profit/GVA	Fuel Consuption	Fuel/GVA	GVA
1998-99	44626	0.257	39693	0.228	47306	0.272	46260	0.27	173727
1999-00	47844	0.254	43877	0.233	47335	0.251	55198	0.29	188574
2000-01	50719	0.284	41987	0.235	35699	0.200	58968	0.33	178350
2001-02	51060	0.279	42218	0.230	34884	0.190	59726	0.33	183229
2002-03	55158	0.257	38352	0.179	61853	0.289	66576	0.31	214376
2003-04	58337	0.235	33972	0.137	92345	0.373	73713	0.30	247756
2004-05	64406	0.208	32454	0.105	144602	0.467	85854	0.28	309620
2005-06	74008	0.203	33398	0.092	184463	0.506	96630	0.26	364697
2006-07	88751	0.193	41311	0.090	241425	0.525	120067	0.26	460180
2007-08	105443	0.191	51487	0.093	297576	0.538	129562	0.23	552756
*Values are in Rs. Crores; Source: EPWRF									

A.2

Table 2

Source of Funds	**1990s**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Reserves and Surplus	124	9.1	10.5	-18.8	10.3	20	26.6	23.2	24.8	23.1
Provisions	222	30.7	48.4	83.8	56.3	33.1	28.1	15.7	10.3	12.1
Borrowings from Banks	96	8.4	6.9	21.5	27.7	21.4	15.2	24.3	22.4	20.7

Source: Volume 31, RBI Occasional Papers (2010)

A.3

Table 3

Year	Gross Bank Credit (Non-Food)	Industry Credit	Share
1998-99	3252	1305	40.1
1999-00	3751	1473	39.3
2000-01	4292	1628	37.9
2001-02	4827	1723	35.7
2002-03	6201	2352	37.9
2003-04	7284	2472	33.9
2004-05	9998	3523	35.2
2005-06	14048	4592	32.7
2006-07	18012	5794	32.2
2007-08	22048	7256	32.9

Source: Various BSR-1(a)forms

A.4

Table 4

Year	WALR (Industry)	GDP deflator	RLRdefl
1998-99	15.5	8.1	7.4
1999-00	14.9	3.9	11
2000-01	14.5	3.3	11.2
2001-02	14	3	11
2002-03	13.7	3.8	9.9
2003-04	13.5	3.4	10.1
2004-05	13.2	5.5	7.7
2005-06	12.6	4.2	8.4
2006-07	12.4	6.4	6
2007-08	12.4	6	6.4

Source: Mohanty D (2012), DEPR Working Paper

WALR: The nominal weighted average lending rate (WALR) for scheduled commercial banks (SCBs) is computed on the basis of granular data from the Basic Statistical Returns (BSR). Given our consideration for manufacturing we focus only on LBA (large Borrowal Accounts) for having credit limit more than 2 lakhs. The WALR is computed for the LBAs using BSR-1A data as follows

$$WALR = \frac{\sum_{j=1}^{m} i_j c_j}{\sum_{j=1}^{m} c_j}$$

Where for loan account j, the interest rate charged i_j and the loan amount outstanding is c_j as at end-arch of a particular year; m is the number of accounts for which WALR is computed. We have particularly focussed on Industry segment while considering the outstanding loan amount since our focus was to reach at a representative measure of effective industrial lending rate.

A.5

Year	GCF	#WPI Machinery and Machine tools (1993-94)	Real GCF	RLR Deflr
1998-99	72178	116.0	622.2240517	7.4
1999-00	64665	116.1	556.9800172	11
2000-01	61415	123.0	499.3073984	11.2
2001-02	73873	129.1	572.2154144	11
2002-03	63976	130.3	490.9928626	9.9
2003-04	74187	132.7	559.0588546	10.1
2004-05	110073	140.2	785.1132668	7.7
2005-06	171567	147.4	1163.955292	8.4
2006-07	199330	156.7	1271.990678	6
2007-08	262299	162.4	1614.871246	6.4

Source:RBI.

A.6

Sectoral value of REAL Investment over years													
Codes	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	Total	share	Corrln
15	30.33552	100.9192	86.68943	55.18985	49.67276	64.43218	22.45164	85.01113	139.5564	181.2683	815.5265	10.0228	-0.37296
16	2.277672	2.204823	3.882602	-0.10658	2.57099	2.111304	1.690942	4.1154	5.048665	4.971573	28.76739	0.353551	-0.57197
17	43.17595	57.04677	45.80626	17.97831	49.67145	59.94318	64.89757	105.6714	149.1897	137.1884	730.569	8.978679	-0.77554
18	3.542586	7.892076	7.472358	4.959101	8.942671	7.30844	14.98267	19.63555	20.16652	18.35558	113.2575	1.391933	-0.68251
19	3.090603	4.52317	4.08748	3.290473	3.806907	3.405727	5.325036	5.918318	6.677248	5.604102	45.72906	0.562009	-0.63857
20	1.806293	1.022997	1.28374	1.054686	1.427936	1.533986	2.139943	3.090434	3.861926	4.813103	22.03504	0.27081	-0.8542
21	14.91569	10.36141	10.33919	35.71735	20.01688	11.5636	14.10934	24.96126	30.23551	38.68983	210.9101	2.592081	-0.44037
22	9.197672	6.469509	7.155122	3.463362	7.617882	7.432931	8.838302	15.13826	18.07497	14.13843	97.52645	1.198598	-0.82761
23	78.87974	77.48174	43.15244	206.6662	72.63584	57.32758	72.102	129.6367	48.68475	104.5676	891.1345	10.95203	0.180719
24	94.82759	95.87123	83.41951	47.45507	68.74398	52.92638	89.39479	160.5985	171.9454	186.9552	1052.138	12.93075	-0.76568
25	13.61147	18.77847	14.40089	10.22494	13.86401	20.73233	37.12553	27.86499	35.29216	48.44723	240.342	2.953799	-0.76375
26	35.68345	23.19587	25.6913	55.05422	22.3396	22.91281	42.71262	57.61377	67.7642	102.7653	455.7332	5.600952	-0.69009
27	154.9042	10.03919	54.21756	48.58776	42.03676	118.2931	168.0862	245.7133	246.5773	303.6923	1392.148	17.10947	-0.8923
28	8.875086	7.648062	7.439593	7.982881	8.617882	14.76669	26.41298	34.53643	42.302	82.7277	241.3093	2.965687	-0.74011
29	26.43207	16.93032	17.95561	9.444771	16.86278	16.28093	44.37461	50.78318	63.70746	78.96399	341.7357	4.199925	-0.87489
30	0.523966	1.830319	5.181463	3.956003	7.692863	8.419819	4.87632	4.779647	5.348014	3.804837	46.41325	0.570418	0.174552
31	6.290431	20.70215	12.26171	10.43602	10.47606	9.372042	18.99001	31.2422	46.0176	61.00674	226.795	2.787306	-0.68472
32	9.252328	15.77881	14.44634	10.50496	16.97843	14.82457	19.99708	30.33094	20.33473	18.84072	171.2889	2.105137	-0.35711
33	3.794741	3.465978	3.067398	2.747792	2.237759	3.514393	4.476534	4.579715	5.377176	7.485926	40.74741	0.500785	-0.79821
34	49.04009	43.16701	25.59699	12.87142	31.21535	31.45916	64.68031	51.86214	69.25374	131.3723	510.5185	6.274263	-0.78917
35	11.43879	6.508355	7.328943	4.192486	12.01957	11.05976	18.45613	19.19607	28.10383	25.97387	144.2778	1.773171	-0.90761
36	6.299914	11.73032	5.986585	7.682417	8.724328	7.415599	12.72411	20.89457	12.9122	12.23291	106.603	1.310148	-0.40169
37	0.013534	0.004134	0.003089	0.028892	-0.02172	0.016654	-0.00093	0.136431	0.396537	0.73048	1.307107	0.016064	-0.68879
Total	622.2241	556.98	499.3074	572.2154	490.9929	559.0589	785.1133	1163.955	1271.991	1614.871	8136.709	100	-0.79474
RLR	7.4	11	11.2	11	9.9	10.1	7.7	8.4	6	6.4			

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