THE CAPITAL STRUCTURE OF MANUFACTURING INDUSTRIES IN INDIA

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ABSTRACT

This study examines the growth performance of the capital structure of Indian manufacturing industries over the period from 1981–82 to 2019–20, using secondary data sourced from the Annual Survey of Industries (ASI). The analysis covers the key principal characteristics, namely number of factories, fixed capital, working capital, invested capital, and depreciation, deflated to constant prices with 2011–12 base year. Methodologically, the study employs the semi-logarithmic in that log-quadratic trend models is obtained to estimate the overall growth trends, as well as a two-kink exponential model to capture the sub-period growth rates across the period of pre-reform (1981–82 to 1990–91), post-reform (1991–92 to 2000–01), and transformation (2001–02 to 2019–20) phases. The findings reveal that the pre-reform period was marked by negative and decelerated growth rate, reflecting regulatory rigidities and limited access to capital. However, the post-1991 liberalization reforms catalysed accelerated growth rate across all the capital structure indicators, with particularly sharp increases in fixed capital, invested capital, and depreciation in the transformation phase. Overall, the results highlight the sector's transition from a period of sluggish and uneven growth to accelerated capital accumulation and financial strengthening in the post-reform era. The study underscores how liberalization policies improved access to finance and structural reforms significantly influenced the composition and growth of capital structure, thereby enhancing the long-term growth potential and sustainability of India's manufacturing industries.

INTRODUCTION

The Indian manufacturing sector has undergone a remarkable and predominant structural transformation, transitioning from a predominantly agrarian economy to a rapidly industrializing one (Dangayach & Deshmukh, 2003)[4]. This evolution has been characterized by significant shifts in its contribution to the national GDP and employment, reflecting to the widespread economic development patterns observed in other emerging economies (Sharma, 2013)[15]. In this study, the growth trajectory, particularly evident over the past four decades, unequivocally underscores the sector's pivotal role in driving economic expansion and industrialized modernization, thereby necessitating a comprehensive analysis of its capital structure to ascertain the financial underpinnings of its sustained growth and resilience (Sofat & Singh, 2017)[16].

Capital plays a fundamental role in industrial development, as it determines the capacity of firms to expand production, modernize operations, and adopt technological innovations. Adequate capital structure enhances financial stability and facilitates long-term growth (Chadha & Sharma, 2015)[3]. Moreover, access to capital enables industries to invest in infrastructure, research and development, and skill enhancement, which were crucial for improving productivity and competitiveness in a globalized market (Rajan & Zingales, 1998)[13]. For Indian manufacturing, the availability and efficient utilization of capital have been central to industrial expansion, particularly in adapting to market liberalization and integrating with global value chains (Panda & Nanda, 2020)[12].

In the early 1980s, the Indian manufacturing was constrained by stringent industrial licensing, limited access to credit, and an inward-looking, domestically focused market environment. Gradually liberalization measures were introduced, including

efforts to facilitate deregulation, licensing requirements and promote exports in some fields. These initial steps relied on more comprehensive improvements in 1991, which was marked the crucial breakdown of the past and enter the new era of economic liberalization and globalization. The New Industrial Policy marked a deep imprint on the structure of the Indian industry, it has abolished industrial licensing for most sectors (except for 18 industries related to security and strategic concerns), significantly reducing access barriers. It also ended the monopoly of the public sector, the policy allowed up to 51% Foreign Direct Investment (FDI) through by the automatic route in 34 priority sectors and eased restrictions on foreign technology collaboration and extending royalty payment duration (G. Iyer, 2011)[7]. The liberalization stimulated substantial growth and structural changes within the manufacturing sector, shifting it towards a more organized and globally integrated framework (Sharma, 2013)[15]. This shift catalysed an increased emphasis on efficiency, productivity, and competitiveness, fostering an environment where capital accumulation and technological advancements became paramount for industrial success (H. Jain, 2015)[8]. In recent times, the Indian government has launched various initiatives, such as "Make in India," "National Policy for Advanced Manufacturing," and "Atmanirbhar Bharat," alongside substantial investments in infrastructure through the National Infrastructure Pipeline, all aimed at bolstering manufacturing output and integrating the sector more deeply into global value chains (Reddy & Sasidharan, 2023)[14].

1.1 Objective
To study the overall growth performance of the capital structure annual series of principal characteristics performance in Indian manufacturing industries during the period between 1981-82 to 2019-20.

1.2 Statement of the problem
The remarkable transformation and significant contribution to India's GDP and employment, the manufacturing sector continues to grapple with critical questions regarding its financial structure and sustainability. Since, the 1991 economic reforms, such as deregulation, liberalization of foreign investment and the abolition of industrial licensing have expanded opportunities for industrial growth, they have also altered the financing requirements of Industries. The increasing capital intensity, technological upgradation, and integration into global value chains have made capital structure into a sustaining competitiveness.

However, most of the existing studies on the Indian manufacturing have concentrated on productivity growth, employment patterns and industrial performance with comparatively limited attention given to the dynamics of capital structure and its determinants. The period from 1981–82 to 2019–20 is particularly significant, as it encompasses both the pre-liberalization and post-liberalization phases, offering a unique opportunity to assess how financial structures of manufacturing industry evolved in response to shifting policy regimes and market forces. Understanding these patterns is crucial for identifying whether the manufacturing sector's growth has been underpinned by efficient and sustainable financing choices or constrained by structural imbalances in access to capital. Therefore, the problem addressed in this study is to critically analyse the capital structure of Indian manufacturing industries over by nearly four decades, in order to evaluate its growth performance and to assess the impact of reforms and policy shifts to provide insights into the sector's long-term financial resilience.

1.3 Scope and significance of the study
This study examines the capital structure of Indian manufacturing industries over the period 1981-82 to 2019-20, using data sourced from the Annual Survey of Industries (ASI). Covering nearly four decades, it captures both the pre-liberalization era—characterized by regulatory rigidity and limited financing avenues—and the post-liberalization phase, marked by globalization, foreign direct investment, and structural reforms. Within this scope, the study analyses key principal characteristics such as number of factories, fixed capital, invested capital, working capital and depreciation to assess how financial structures evolved under changing policy regimes and market dynamics.

The significance of this research lies in its ability to fill an important gap in the existing literature, which has largely emphasized productivity, employment, and growth while paying less attention to the financial underpinnings of industrial performance. By linking capital structure to broader patterns of industrial development, the study provides valuable insights for academics, policymakers, and industry practitioners. Academically, it contributes to the understanding of capital structure determinants in a developing economy context. while practically, it offers guidance for policymakers in designing supportive credit frameworks and investment incentives, and for making informed financing decisions. Thus, the study is both timely and relevant, highlighting how financial strategies have shaped the resilience and competitiveness of Indian manufacturing in the context of liberalization and global integration.

2.0 OVERVIEW OF LITERATURE REVIEW AND RESEARCH GAP
The Indian manufacturing sector has long highlighted the interplay between productivity growth, capital intensity, and financing patterns, which are central to understanding capital structure decisions. The economic reforms initiated in the early 1990s are widely recognized as a turning point that reshaped industrial performance, efficiency, and financing behaviour. (**Goldar and Kumari, 2003**)[5] explored the impact of trade policy reforms on industrial performance, focusing on the decade following India's 1991 liberalization. Using industry-level panel data and productivity estimation techniques, the authors found that a sharp reduction in import tariffs and the dismantling of quantitative restrictions significantly contributed to productivity improvements across organized manufacturing. The study emphasizes that greater access to cheaper and better quality imported intermediate and capital goods enabled industries to modernize production processes, adopt advanced technologies, and enhance efficiency. However, the gains were uneven, with capital-intensive and export-oriented industries experiencing more pronounced improvements than labour-intensive ones, partly due to their stronger absorptive capacity for new technologies. The findings provide empirical support for the argument that trade liberalization was a critical driver of post-reform productivity growth in Indian manufacturing, though it also accentuated structural imbalances in terms of sectoral distribution of benefits and employment absorption. (**Kaur and Kiran 2008**)[10] analysis the performance of India's manufacturing industries during the period 1980–81 to 2002–03, with a sharp distinction between the pre- and post-reform phases. The authors find that while the sector achieved an impressive long-term growth in value added of 7.78% annually, this was overwhelmingly driven by rapid capital accumulation (6.05%), whereas employment growth remained sluggish at only 0.65% per year. Consequently, capital intensity increased by 5.36% per annum, reflecting the sector's structural transition towards capital-deepening rather than labour absorption. The study highlights how the 1991 reforms, by dismantling industrial licensing, liberalizing trade and easing access to capital goods, accelerated productivity improvements and reoriented growth drivers in favor of efficiency and competitiveness. However, it also notes that the benefits were uneven, with limited job creation relative to output growth, raising concerns about the inclusiveness of post-reform industrial expansion. Overall, the paper provides the valuable insights into how the reforms reshaped the capital structure and growth trajectory of Indian manufacturing. (**Kathuria, et al 2010**)[9] analysed the contrasting trajectories of the two major segments of Indian manufacturing following the 1991 liberalization reforms. Using the data sourced from the Annual Survey of Industries (ASI) for the organized sector and the National Sample Survey Organisation (NSSO) for the unorganized sector during the period between 1994 and 2005, the authors highlight that organized manufacturing experienced significant improvements in output growth, total factor productivity (TFP) and capital intensity, driven by trade liberalization, deregulation and enhanced access to modern technologies. In contrast, the unorganized sector lagged behind, showing stagnation in productivity growth and limited capital deepening due to weak access to finance, inadequate technological capabilities and skill constraints. The study underscores how reforms created opportunities for scale

efficiency and global competitiveness in the organized sector but simultaneously widened the performance gap with the unorganized sector, which remained vulnerable to structural weaknesses. Overall, the paper contributes to the understanding of dualism in Indian manufacturing, pointing to the need for targeted policies that support unorganized enterprises to ensure balanced and inclusive industrial growth. (Hasan, et al 2013)[6] examine the puzzle of why Indian manufacturing exhibits unusually high capital intensity despite India being a labour-abundant economy. Using cross-country comparisons with the USA and China, along with an international measure of labour regulation stringency and firm-level data from 1989 to 1996, the authors explore the role of labour laws, credit market imperfections and factor endowments. Their findings reveal that India's manufacturing sector tend to adopt more capital-intensive production techniques than expected, even when controlling for the factor prices and specialize in more capital-intensive varieties compared to the U.S.A, a far more capital-abundant economy. The study attributes this distortion largely to rigid labour regulations and underdeveloped credit markets, which limit industry's ability to choose labour-intensive production methods despite the availability of abundant labour. By highlighting the institutional and policy-driven constraints underlying production choices, the paper contributes significantly to debates on industrial structure in emerging economies. Importantly, the authors suggest that labour reforms and financial deepening could help realign the capital–labour mix, fostering labour-intensive growth and employment generation in the Indian manufacturing. All together, these studies reveal that while liberalization has improved productivity and competitiveness, the gains have been uneven across industries and states, with a clear trend towards greater capital intensity. This structural shift has important implications for capital structure, in capital-intensive industries to support technological upgrades and expansion. However, most of the existing literature has focused on productivity and efficiency rather than directly linking these structural changes to capital structure dynamics. This gap underscores the need for a comprehensive analysis of how capital structure in Indian manufacturing sector has evolved over the long term, particularly in the context of policy reforms, market liberalization, and global integration.

3.0 MATERIALS AND METHODS

The entire study is based on the secondary data during the period between 1981-82 to 2019-20, which was based on the annual series for principal characteristics namely number of factories, fixed capital, working capital, invested capital and depreciation extracted from the annual survey of industries (ASI)[11] published by ministry of statistical and programme implementation, Government of India. The definition **Number of factories** are registered under the sections 2m (i) and 2m (ii) of the Factories Act, 1948. The sections 2m (i) and 2m (ii) refer to any premises including the precincts whereon ten or more workers are working in any day of the preceding twelve months, and in any part of the work in the manufacturing process is being carried on with or without the aid of power. **Fixed capital** is the depreciated value of fixed assets owned by a factory, including land, buildings, machinery, furniture, transport equipment, water systems, roadways, and other facilities used for the factory personnel's benefit, with a normal productive life of over one year. **Working Capital** is the sum of total physical working capital of the total inventories comprising of raw materials and components, fuels and lubricants, spares, stores and others, semi-finished goods and finished goods. It also includes, the cash in hand and deposits at bank and the net balance receivable over amounts payable at the end of the accounting year. **Invested Capital** are the sum of total fixed capital and physical working capital, including depreciated fixed assets and physical inventories. It includes stock materials, fuels, semi-finished goods, and ready-to-sell goods made by the factory at the end of the accounting year. Finally, the **depreciation** is the factory's consumption of fixed capital due to wear & tear and obsolescence during the accounting year and provided by the factory owner or is estimated on the basis of cost of installation and working life of the fixed assets. In that the number of factories is in absolute terms and the referred fixed capital, working capital, invested capital and depreciation in the capital structure are in current prices which have been deflated into constant price at 2011-12 base year by using price index of machinery and equipment at 2011-12 base year, the price indices are obtained from RBI Bulletin, Reserve bank of India, published by Government of India.

3.1 The Annual Average growth model

The average annual growth trend is analysed by fitting the semi-log trend model which gives manufacturing growth performance of India for the different time periods.
The semi- logarithmic trend model is expressed as
$$Ln\,(yt) = a + bt + \mu t$$
Where, ln (yt) is dependent variable is a natural log at the time t, a and b are the parameters, and μ is the residual term of various times. The coefficient b represents the changes in the dependent variable at specific or different periods.
A country's manufacturing growth performance cannot remain constant over the different periods, or the growth rate of the time series data has been changing with the varying of time. Hence the coefficient of 'b' can be written as a linear function of the time i.e,
$$b = \beta + \gamma t$$
Substituting the semi-log trend model and linear function equation, the log– linear trend equation becomes a log quadratic model, which is expressed as
$$Ln\,(y) = \alpha + \beta t + \gamma t2 + \mu t$$
Where, ln(y) is dependent variable in natural log and α, ß and γ are parameters. The coefficient of ß is the average annual growth trend and if the coefficient 'γ' is statistically significant, then the growth rate is either accelerating which means that the coefficient γ is positive. If the sign of the parameter is negative, then the growth rate is decelerating. The log quadratic trend model is used as the average growth rate can be computed by
Growth rate = $\Sigma\lfloor(\beta+2\gamma t)\,n\rfloor*100$

3.2 Kinked exponential model

The usual technique for estimating growth rates in the sub- period of time series is to fit separate exponential trend lines by ordinary least square to each segment by the series (Boyce, 1986)[2]. Kinked model assumes that there is a discontinuity in trend, which can result inconsistency in sub-period growth rate resulting inconsistency of the estimated growth rate for entire period.
The present study examines the growth performance of the selected principal characteristics in capital structure of Indian manufacturing industries by using the two- kinked exponential model were used during the period between 1981-82 to 2019-20. The discontinuous growth rates for the three sub-periods can be estimated by using the dummy variable method
$$\ln Y_t$$
$$= \alpha_1 D_1 + \alpha_2 D_2 + \alpha_3 D_3 + (\beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3)\,t + u_t$$
Were,

    $D_1 = 1$, for the first period
     0, otherwise
    $D_2 = 0.5$, for the second period
    0, otherwise
    $D_3 = 0.5$, for the third period
    0, otherwise

The two-kink exponential model is derived by imposing linear restriction. Such, that the sub-period trend lines meet at K_1 and K_2.
$$\alpha_1 + \beta_1 k_1 = \alpha_2 + \beta_2 k_1 \qquad (2a)$$
$$\alpha_2 + \beta_2 k_2 = \alpha_3 + \beta_3 k_2 \qquad (2b)$$
Substituting for α_2 and α_3, we obtain in two-kink exponential model.
$\ln y_t = \alpha_1 + \beta_1\,(D_1 t + D_2\,k1 + D_3 k1) + \beta_2\,(D_2 t - D_2 k_1 - D_3 k_1 + D_3 k_2) + \beta_3\,(D_3 t - D_3 k_2) + u_t$
Here, the coefficient of β_1, β_2 and β_3 are the sub-period growth rate, the β_1 represent 1st sub-period of (1981-82 to 1990- 91), β_2 represent 2nd sub-period of (1991-92 to 1999-00) and the β_3 represent the 3rd sub-period of (2000-01 to 2019-20), with the kinks at point k_1 and k_2 respectively.

4.0 RESULTS AND DISCUSSION

In the capital structure of Indian manufacturing industry, the number of factories was 105037 in 1981-82, after that it was marginally declined until to the year 1988-89. Conversely, during the above pre reform period between 1981-82 to 1987-88 all the capital structure of industrial characteristics namely fixed capital,

working capital, invested capital and depreciation at constant price was marginally increased. Whereas, the number of factories were started to raise during the year between 1988-89 to 1991-92, but all the above-mentioned principal characteristics are marginally declined, only after the implementation of economic reform in 1991, all the capital structure principal characteristics are gradually increased especially the invested capital at constant price was tremendously increased which was about 120222182.16 lakhs in 1997-98.

Table 1.1 The Principal characteristics of capital structures in Indian manufacturing industries during 1981-82 to 2019-20.

year	Number of factories	Fixed capital at constant price	Working capital at constant price	Invested capital at constant price	Depreciation at constant price
1981-82	105037	30521187.34	13240879.51	47485725.59	1907554.97
1982-83	93166	34257309.94	13633984.96	52624878.86	2061436.93
1983-84	96706	38302237.98	14581576.04	57127139.48	2666122.93
1984-85	100328	41296769.58	16809661.14	60618990.96	3053072.29
1985-86	101016	41154273.97	16300438.36	60350554.79	3014061.64
1986-87	97957	43656454.55	14157980.52	63436993.51	3017448.05
1987-88	102596	48954853.40	17187161.57	71075377.42	3900311.92
1988-89	104077	36873628.47	11272718.25	55018225.07	2948150.60
1989-90	107992	39253957.42	12431589.57	58421571.22	3180502.94
1990-91	110179	46276855.96	14723116.34	67490599.03	3484397.51
1991-92	112286	45507010.19	13321797.48	66277465.55	3397483.52
1992-93	119494	52183817.64	16907497.29	75143014.07	3902270.02
1993-94	121594	58854794.13	22845153.42	84066915.81	4315520.59
1994-95	123010	65917644.82	20725622.03	92007262.58	4433831.91
1995-96	134571	76890496.47	23756206.97	108113250.22	5213120.04
1996-97	132814	80381639.17	36306960.66	110438690.78	5823745.77
1997-98	136012	88178880.78	32225214.67	120222182.16	6626971.65
1998-99	131706	70275143.73	18458559.11	96490860.58	5078309.38
1999-00	131558	72135115.78	18629395.08	101711416.26	6031105.73
2000-01	131268	67706577.43	17825887.83	96882311.08	5884264.66
2001-02	128549	69738477.56	16210179.21	97822546.01	6284633.52
2002-03	127957	71138736.40	16014251.44	101963064.62	6723541.27
2003-04	129074	74341353.86	18726321.66	106737531.02	7039970.16
2004-05	136353	76270142.71	23792769.44	112890991.53	7390105.54
2005-06	140160	85762368.24	26065084.08	127395592.77	7465431.68
2006-07	144710	95785077.69	37796517.55	143517789.98	8633110.10
2007-08	146385	105720801.85	39648869.15	160135793.09	8902119.09
2008-09	155321	112528361.04	33166344.84	163595239.77	8903015.77
2009-10	158877	143361288.17	41109470.95	204946347.54	11139601.36
2010-11	211660	165739121.29	63981317.04	246862625.83	12433739.69
2011-12	217554	194955088.00	59107859.00	284114733.00	14065505.00
2012-13	222120	169802197.82	46994631.62	244868547.51	12097415.11
2013-14	224576	180373786.47	50356061.55	257185056.99	12900438.45
2014-15	230435	183837638.19	47610721.40	261067184.99	14081780.83
2015-16	233116	208122016.30	54854072.59	285414802.96	14873673.33
2016-17	234865	295679934.20	61453463.39	398170055.61	20586782.21
2017-18	237684	301734551.88	59147741.05	409636804.41	21790288.34
2018-19	242395	311416868.82	72656297.39	429224145.55	23499812.22
2019-20	246504	321958589.74	78099097.26	439754511.05	24146544.65

Source: Extracted from the Annual survey of industries (ASI) and Price index of machinery and equipment from RBI Bulletin.

Although, in the end of the post reform period and in the beginning of the transformation period all the above industrial characteristics are slightly declined up to the year 2003-04.

Whereas, the number of factories were started to increase throughout the transformation period which was about 136353 to 158877 and in the year 2010-11 it was rapidly increased from 211660 to 246504. As show in the above table that the fixed capital, invested capital and depreciation at constant price was increased rapidly to 194955088, 284114733 and14065505 lakhs in the year 2011-12. On the other hand, the working capital at constant price was sharply declined at the same time fluctuating during the period between 2011-12 to 2017-18. Eventually, during the last five years of the study period fixed capital, invested capital and depreciation at constant price were increased which was concluded to 321958589.74, 439754511.05 and 24146544.65 lakhs except working capital at constant price was increased only for the last two years from 72656297.39 to 78099097.26 lakhs respectively.

4.1 The overall growth rate of principal characteristics in capital structure

The annual average growth rate of capital structure annual series of principal characteristics of Indian manufacturing industries are portrayed in the table 1.2 during the year from 1981-82 to 2019-20, are calculated by fitting a semi- logarithmic trend model, shows that during the pre- reform period between 1981-82 to 1988-89 the number of factories were marginally decreased, only after the implementation of new economic reform in 1991, the number of factories were increased rapidly throughout the study period can be seen in the above table 1.2. The growth rate was estimated by using log- quadratic model shows an accelerated growth trend of 2.59 percent per annum, the regression coefficient of 'γ' was 0.001 are found statistically significant at 5 percent level, the R square was 0.939 percent.

All the industrial characteristics in capital structure namely fixed capital, invested capital, working capital and depreciation at constant price at 2011-12 base year shows an accelerated growth trend. The fixed capital at constant price was also estimated by using the log quadratic model, shows that the R square was 0.955, the regression coefficient of 'γ' was 0.001, found significant shows an accelerated growth rate of 5.74 percent per annum.

Table 1.2: Trends of capital structure in Indian manufacturing industries during 1981-82 to 2019-20.

$$\text{Log } y = a + bt + ct^2$$

Sl. No.	Characteristics	R Square	Coefficients			t-values			significant			Growth Rate	Nature of growth
			a	b	C	a	b	c	a	b	c		
1	Number of factories	0.939	11.500	0.004	0.001	288.822	0.940	4.847	0.000	0.354*	0.000	2.59	A
2	Fixed capital	0.955	17.400	0.016	0.001	232.601	1.824	4.988	0.000	0.076*	0.000	5.75	A
3	Working capital	0.840	16.451	0.004	0.001	135.078	0.270	3.084	0.000	0.788*	0.004	4.58	A
4	Invested capital	0.963	17.802	0.013	0.001	268.958	1.727	5.767	0.000	0.093*	0.000	5.59	A
5	Depreciation	0.975	14.629	0.041	0.000	256.635	6.162	3.023	0.000	0.000	0.005	5.98	A

Source: Extracted from Annual survey of industry, Significant at 5% level. A indicated the accelerated growth rate respectively.

Then again, the working capital at constant price was also increasing at the same time fluctuating over the period during 1981-82 to 2019-20, but here in the overall period growth rate shows an accelerated growth rate of 4.58 percent per annum, the estimated regression coefficient of 'γ' was 0.001, found positively significant, the p-value was 0.004. Additionally, the invested capital at constant price, regression coefficient of 'γ' was also 0.001found significant at 5 percent level with the accelerated growth rate of 5.59 percent per annum. Eventually, the depreciation at constant price estimated regression coefficient of 'γ' was 0.000, found significant, the P-value was 0.005 also shows accelerated growth rate of 5.98 percentage per annum.

4.2 The sub-period growth rate of principal characteristics of capital structure

According to (Ahluwalia, 1991)[1] India took some steps in the direction to high growth and poverty reduction, through policies that emphasized greater export orientation and encouragement in 1980s, but it was not possible until 1991. After the implementation of economic reforms in the year 1991 have created many positive features in the Indian manufacturing industry. Therefore, to analysis the growth of manufacturing industries kinked exponential model was used in that two-kink break point model were taken into account for to analysis the study period between 1981-82 to 2019-20, this period was categorised by the following as pre reform periods (1981-82 to 1990-91), post reform periods (1991-92 to 2000-01) and transformation periods (2001-02 to 2019-20) of economic reforms are portrayed in the table 1.3.

Table 1.3 Kinked exponential model of the principal characteristics of capital structure during 1981-82 to 2019-20

Variables	R Sq.	Coefficients				t-values				Sig			
		a	b1	b2	b3	a	b1	b2	b3	a	b1	b2	b3
Number of factories	0.943	11.635	-0.012	0.022	0.049	459.029	-2.318	3.862	18.910	0.000	0.026	0.000	0.000
Fixed capital	0.946	17.744	-0.029	0.052	0.107	328.713	-2.509	4.294	19.444	0.000	0.017	0.000	0.000
Working capital	0.871	16.687	-0.031	0.033	0.085	233.094	-2.075	2.061	11.701	0.000	0.045	0.047	0.000
Invested capital	0.950	18.137	-0.029	0.044	0.103	360.157	-2.752	3.846	20.103	0.000	0.009	0.000	0.000
Depreciation	0.896	15.201	-0.035	0.048	0.104	199.949	-2.182	2.798	13.394	0.000	0.036	0.008	0.000

Source: Extracted from Annual survey of industries, the coefficient b1, b2 and b3 are indicates the sub-periods.

The number of factories regression coefficient value of b1 was negative as -0.012 which shows an negative decelerated growth rate of -1.24 during that period between 1981-82 to 1990-91 of pre-reform period was marginally declined, but in the second sub-period of post reform period the growth rates was accelerated to 2.21 percentage per annum and in the third sub-period it was doubled which was about 4.87 percentage per annum during the transformation period between 2001-02 to 2019-20.The fixed capital, working capital, invested capital and depreciation at constant price have played a significant contribution to the Indian manufacturing industries shows that during the first sub-period between 1981-82 to 1990-91, the regression coefficient of b1 for all the referred capital structure industrial characteristics, was negative as -0.029, -0.031, -0.029 and -0.035 found statistically significant, which shows an negative decelerated growth trend of -2.86, -3.14,-2.93 and -3.51 percentage per annum. only after the implementation of economic reform in 1991 have turned the industrial characteristics growth to positive with the accelerated growth trend, which have impacted on the 2nd and following to the 3rd sub-period growth rate. In the transformation period between 2001-02 to 2019-20 the fixed capital at constant price was doubled from 5.22 percent to 10.67 percent per annum. Despite, the working capital at constant price were increased from 3.32 percent to 8.52 percent. As same as the fixed capital, both the invested capital and depreciation at constant price growth rate also tremendously increased about 10.29 and 10.35

percentage per annum shows that all the above industrial characteristics regression coefficients are statistically significant at 5 percent level.

Source: Extracted from the Annual survey of industries, A and D indicates the Accelerated and Decelerated growth rates

Table 1.4 Sub- period growth rate of principal characteristics in capital structure of Indian manufacturing industries during 1981-82 to 2019-20

Sl.No	Industrial characteristics	Overall period (1981-82 to 2019-20)	Pre- reform period (1981-82 to 1990-91)	Post reform period (1991-92 to 2000-01)	Transformation period (2001-02 to 2019-20)
1	Number of factories	2.59 (A)	-1.24 (D)	2.21 (A)	4.87 (A)
2	Fixed capital	5.75 A)	-2.86 (D)	5.22 (A)	10.67 (A)
3	Working capital	4.58 A)	-3.14 (D)	3.32 (A)	8.52 (A)
4	Invested capital	5.59 A)	-2.93 (D)	4.36 (A)	10.29 (A)
5	Depreciation	5.98 (A)	-3.51 (D)	4.79 (A)	10.35 (A)

The table 1.4 elucidates the significant shifts in growth patterns across the capital structure of industrial characteristics, highlighting in the pre reform period the number of factories shows an least negative decelerated growth rate of -1.24 percentage per annum and the capital structured industrial characteristics also shows an decelerated growth rate, due to the structural weaknesses of a highly regulated system characterized by industrial licensing, limited access to credit, and restricted market orientation (Ahluwalia, 1991)[1].Whereas, during the post reform and transformation periods there is an acceleration in fixed and invested capital at constant price which underscores a move towards capital intensiveness. The 1991 economic reforms acted as a structural break, easing licensing requirements, reducing entry barriers, and encouraging foreign direct investment (FDI). These reforms provided industries with broader access to external financing, advanced technologies and strengthening investment capacity (Iyer, 2011; Sharma, 2013)[7&15], which have seen in the above table that all the industrial characteristics are turn around into accelerated growth rate in that the number of factories and working capital was least growth rate among the capital structure which was about 2.21 and 3.32 percentage per annum, particularly fixed, invested capital and depreciation, suggesting an improving capital base and greater capital-intensive production during the second sub-period between 1991-92 to 2000-01. Furthermore, in the transformation period between 2001-02 to 2019-20 all the industrial characteristics witnessed, the doubled percentage per annum particularly fixed capital, invested capital and depreciation shows a highest accelerated growth rate of 10.67, 10.29 and 10.35 percentage per annum. This reflects the cumulative effect of liberalization, globalization and government initiatives such as *Make in India* and the National Infrastructure Pipeline, which bolstered the sector's financial strength and integration with global value chains (Jain, 2015; Reddy & Sasidharan, 2023)[8&14]. The improvement in working capital also highlights better liquidity management, allowing industries to sustain competitiveness in a liberalized economy.

CONSLUSION

This study examined the capital structure of Indian manufacturing industries over the period 1981–82 to 2019-20, a timeline that encapsulates both the rigid pre-liberalization era reforms have driven into the post-liberalization phase. The analysis based on Annual Survey of Industries (ASI) data, demonstrates that India's manufacturing sector has transitioned from being labour-intensive and inward-looking to increasingly capital-intensive and globally competitive. This shift has been accompanied by significant changes in financing needs and external capital playing a greater role in sustaining industrial expansion. While productivity and output have grown strongly, employment gains remain limited, pointing to gaps in inclusive growth. Policy reforms, technological change and globalization have played a key role in shaping industrial structure by capital and expanded their operations. The study adds value by linking industrial growth with financial structures, showing that a sustainable capital structure is crucial for long-term competitiveness. Policymakers can use these insights to design better credit, investment policies to the manufacturing sectors can apply them to make informed financing choices in an increasingly competitive environment.

6.0 LIMITATION OF THE STUDY

This study provides a valuable insight into the capital structure of Indian manufacturing industries over the period between 1981–82 to 2019–20, certain limitations must be acknowledged. First, the analysis relies primarily on data from the Annual Survey of Industries (ASI). which comprehensive excludes the unorganized and informal sector that constitutes a significant share of India's manufacturing activity. As a result, the findings may not fully capture the financing patterns of small and medium enterprises (SMEs) and informal sectors, which often face different capital structure challenges compared to large-scale industries. Second, the study focuses on aggregate trends and selected principal characteristics at the national, which may mask sector-level variations in financing behaviour across different regions, ownership structures and sub-industries. Third, the long study period encompasses major structural changes in the economy, but due to data limitations certain variables such as industrial-specific governance practices, market competition intensity and access to global capital markets could not be explicitly incorporated. Finally, the study identifies patterns and implications of capital structure in the manufacturing sector, it does not establish causal relationships, leaving scope for more advanced econometric or industrial -level analyses in future research.

7.0 SCOPE OF THE STUDY

The present study opens several avenues for future research on the capital structure of Indian manufacturing industries. First, given that this analysis relies on aggregated data from the Annual Survey of Industries (ASI), future studies could utilize industry-level or panel data to capture heterogeneity in financing behaviour across industries, ownership forms (public, private, and joint ventures), and regional clusters. Secondly, this study focuses on the period between 1981–82 to 2019–20, subsequent research could extend the analysis to cover the post-2020 period, which has been shaped by the COVID-19 pandemic, supply chain disruptions, and new policy initiatives under *Atmanirbhar Bharat* and Production Linked Incentive (PLI) schemes. Third, comparative studies across states or between India and other emerging economies would provide richer insights into how institutional frameworks, credit markets, and policy regimes influence capital structure decisions. Finaly, integrating additional variables such as corporate governance practices, financial constraints faced by SMEs and access to international capital markets would strengthen the explanatory power of capital structure models.

Conflict of Interest

The author declares that there are no conflicts of interest with respect to the publication of this research paper. Thus, the study was conducted independently and has not received any financial support from public, commercial and nonprofit organization.

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