Spatial-temporal Dividend Appropriations by Indian Engineering Industry

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Abstract:
This paper attempts to actualize the trends and implications of the profit appropriation and dividend payoff decisions in the context of Indian Engineering Industry. By analyzing the unit-level data of the engineering units divides across five select sectors, the objective is to provide a spatial-temporal analysis as to how this heavily capital intensive industry has appropriated their profits over the period. The analysis of the financial behaviour of the engineering firms over the pre-liberalization (before reforms) and post-liberalization periods provides an interesting financial perspective. We find extensive support for the theories of Market Signaling, Dividend Irrelevance, the Pecking Order and for Dividend Smoothening in India. Our findings suggest the varying pattern of dividend payout across inter and intra-sectoral cross-section within Engineering Industry in India during the study periods.

I. INTRODUCTION

The decisions about profit and dividend appropriations are not only important for the firm or the industry they belong to but they have implications on the economy [1]. Such decisions in addition to having long-standing effects are also vital for they have to be taken consciously, constantly. Since dividends are to be appropriated from the profits (net earnings) the magnitude of dividends distributed is inversely related to the earnings retained, usually used for self-funding the future growth requirements of the firm. The study of profit sand dividend appropriations are thus important from the perspective of enhancing the stakeholders value, and well documented in the financial literature by [2]-[5] in the most recent years.

This study presents the relevance and implications of the profit appropriation and dividend decisions in the context of the Indian Engineering industry. Profit and dividend-related studies might have received ample attention in the existing literature of engineering finance, but its context to the most capital-intensive and technology-oriented industry like that of engineering is found to be abysmally missing.

Since it is empirically proved that the industry-type to which a firm specifically belongs to, and the specific business division in which it operates have a homogeneity of financial decisions in spirit of studies like that of [6]-[9] we attempt to seek these sectoral differences for the Engineering industry in India. This is the second novelty. Also since the earlier studies on the relation between the profit and dividends within a particular industryare mostly focused in the developed market context the work like this, analyzing the behaviour of profits and payout of dividends over a larger time-frame within the engineering industry in a developing economy like India are an extreme rarity. We try to fill the gaps.

We find evidence that the specific sectors within the Indian engineering industry have common financial characteristics with regards to profit appropriations and dividends, and such financial decisions remain fairly consistent over the time

period. The object of our study is to analyze the trends in profit and dividend payment decision pattern of the Indian engineering industry, across its select divergent sectors over a longer time-frame. Specifically, the engineering industry in India is further analyzed at the micro-level by categorizing them into five sectors to identify the differences in patterns of their profit and dividend distributions.

The focus is on providing an extensive tempo-spatial trend analysis on how this heavily capital intensive firms across major sectors within engineering industry in the Indian corporate sector has appropriated itsearnings over 1960-61 through 1999-2000 periods. Further, we attempt to find whether engineering firms in India issue more of equity dividends than preference dividends and answers the following research questions; whether there are variations in the profit appropriation and dividend decisions in the Indian engineering industry and its sectors before and after economic-liberalizations in India? Whether the engineering industry smoothen their dividend payouts with their profits? and whether the profit appropriation and dividend payment decisions of Indian engineering industry are in tune with the theories of Dividend Relevance, Pecking Order and in accordance the literature on Dividend Smoothening in finance.

The paper is divided in total of 5 sections and as follows: Following Section I, the second sectionpresents the empirical theory and the literatureon the theme. The third section describes the data and specifies the models. The fourth section presents the analysis of the findings and the final section concludes the work.

II. THEORY & LITERATURE

It is found from the literature that 'Industry affiliation' does matter for making dividend payment-related decisions in the context of India [10]. The key explanation to these phenomena emerges from the support of Dividend Relevance theory arguments documented in most-celebrated financial literature related to the subject [11]-[13]. Fundamental to the dividend-relevance proposition

is theexplanation that; investors elude risksas they are generally risk-averse. This conscious choice makes them attach more preference to current dividends (that the 'bird in the hand') is better (than 'the one in the bush') than future dividends, which means to say that the capital gains or the benefits that will accrue from self-financing the firm will accrue through internal funds hold little relevance compared to the current benefits.

The further advantage of dividend distribution is that it makes the firm attractive to the stakeholders, and conveys a signal that firm is performing better, the tenet of Dividend Signaling hypothesis. The Signaling theory proposes that there is a positiverelation between the firm's dividend payoff and the traded value of a given firm. This goes to add the understanding that generous dividend declaring decision could enhance or at least support the market value of its shares and its general reputation as such. Simply stated declaring timely dividends are more preferred by the shareholders to retained earnings used for self-funding, as the later might or not materialize as dividendsin the future, empirically documented by [14].

Since divergent sectors within the engineering industry is subject to the same tax and operating structures; we hypothesize that no major relevance is attributed to the dividend clientele arguments as documented by [15]-[18]. Similarly within select division (sector) in engineering industry, the information asymmetry arguments of [19] and [20]also may not hold true. The only factor that could lead engineering firms to pass on dividends could be attributed is to signal the markets, inspirit of the Market Signaling hypothesis accorded by [21] and [22].

III. DATA SOURCES AND REGRESSION SPECIFICATION

To proceed with our analysis the published data from the Reserve Bank of India (RBI) is used from two different datasets, firstly the 'Published Data Compendium by the RBI on the Private Corporate Business Sector in India (for All

Industries)' and secondly, 'Published Compendium on 'Selected Financial Statistics on Public Limited Companies (for Selected Industries)'.

The data-period is primarily classified into pre-liberalization period: 1961-92 and 1976-92 and the post- liberalization period as 1993-03 and 1993-00 respectively. The data periods after the year 2000 are consciously excluded to isolate the data from the 'further (second-generation) liberalization' periods. We use data on total cash dividends paid, including the interim dividends. The Engineering Industry for the purpose of this study is classified into five different and mutually exclusive product-market specific sectors namely, the 'Electricity-Generation/Supply' sector, 'Electric-Machinery', 'Metal-Production', 'Foundries' and 'Machinery, other than Transport and Electricals sector'.

The variable Earnings Size (EARSZ) is total of Net Profit after Taxes (NPAT)after accounting for preference dividends, and used as a measure to appropriate equity dividends while the Net Profits after Taxes is used as the earnings measure for appropriating preference dividends. Equity Dividend Payout Ratio (EDPR) and Preference Dividend Payout Ratio (PDPR) are calculated by dividing the Equity Dividend (EQDV) and Preference Dividend (PRDV) declared at year-end, with the denominators, EARSZ and NPAT respectively. Similarly the Equity Return (EQRT) and Preference Return (PRRT) is thevalue of dividends divided by the book value of the firm's share capital in rupees. The book value is the total value of bonus shares issuedin rupees and those shares issued for consideration other than cash.

Descriptiveanalytical tools are used for analyzing the spatial-temporal data. We analyze the annual five-yearly sub-period averages to depict their varying patterns of the dividend variable in the pre/post-liberalization and the full-period.

The 'Instantaneous Growth model', 'Compounded Annual Growth model'(CAGR) and the 'Linear-Trend model' is used for doing the necessary computations for the full-period, and for the pre and post-liberalization periods for further analysis.

The Instantaneous Growth computes the CAGR as

$$\log Y_t = \beta_1 + \beta_2 t + u_t \dots\dots\dots\dots\dots\dots (1)$$

In the above equation, $t$denotes time period and the constant percentage over the full period is computed bymultiplying 100 with β_2.

The CAGR is calculated by
Multiplying 1 with $(\log\beta_2 - 1)$ …………(2)
Where$Y$ is $(\beta_1 + \beta_2 t + u_t)$ …………(3)

The linear-trend for the full-period and the pre-liberalization and the post–liberalization periods, is calculated using period-dummies inthe linear trend equations respectively.

The dummy D_i is 1 to denote pre-liberalizationandis 0 to indicate the post-liberalization period and t is the time period,

$$Y_i = \alpha_1 + \alpha_2 D_{2i} + \beta_2 t + u_i \dots\dots\dots\dots\dots..(4)$$

If we assume that value of $E(u_i) = 0$, we are able to obtain the twomean functions for the pre-liberalization and post-liberalization periods separately, as

for the pre-liberalization period
$$E(Y_i|X_i,D_i{=}1)=\alpha_1 + \alpha_2 + \beta_1 X_i \dots\dots(5)$$

and for the post-liberalization period as
$$E(Y_i|X_i,D_i{=}0)=\alpha_1 + \beta_1 X_i \dots\dots\dots.(6)$$

IV. FINDINGS AND DISCUSSION

The results are analyzed in three parts. The time-series and cross-sectional trends in rupee value nominal dividend and dividend return are analyzed first, followed by the presentation of trends in earnings and relative payouts, and finally we present the test for the structural stability of our preferred equation.

A. Trends in Nominal Dividends and Dividend Return

The yearly sub-period averages of the nominal rupee value dividend payoff and the computed equity and preference dividend return in percentages across selected five sectors in the engineering industry for the 1976-00 periods are presented in Table 1.

Table 1 Average Rupee Value of Dividend Distribution and Return in Indian Engineering Industry during 1976-2000 Periods

Engineering Industry Cross-section	Rupee Value of Equity &*Preference* Dividend					Equity & *Preference* Dividend Return				
Period	**1976-1980**	**1981-1985**	**1986-1990**	**1991-1995**	**1996-2000**	**1976-1980**	**1981-1985**	**1986-1990**	**1991-1995**	**1996-2000**
Generation of Electricity	395.10	861.85	1358.94	4235.95	16474.96	12.08	15.00	15.95	17.94	22.04
	56.80	*78.96*	*57.10*	*44.97*	*905.80*	*8.18*	*7.93*	*7.10*	*4.08*	*7.17*
Production of Electric Machinery	1703.10	2971.01	3822.13	9793.07	20508.81	10.95	14.12	10.98	12.84	15.04
	81.10	*73.15*	*47.91*	*61.01*	*435.96*	*9.35*	*9.07*	*6.88*	*6.10*	*4.03*
Production of Metals	551.60	921.87	1688.13	3588.13	6273.02	6.99	7.99	11.05	13.06	11.05
	35.20	*44.96*	*55.93*	*17.13*	*164.85*	*5.93*	*7.06*	*10.01*	*3.96*	*4.01*
Engg. Foundries	361.20	598.85	1577.17	9837.02	8794.07	7.01	9.11	11.02	15.93	7.18
	34.70	*24.11*	*45.05*	*44.05*	*317.80*	*7.04*	*5.12*	*9.06*	*5.06*	*5.99*
Other Heavy Engg. Machinery	1749.10	3280.86	5552.91	12130.92	20495.96	11.96	15.08	13.99	20.02	22.12
	112.80	*85.98*	*61.07*	*36.16*	*51.05*	*8.96*	*6.90*	*8.07*	*8.92*	*3.13*

Source: Computed by Authors fromRBI Bulletins, Various Issues.

Across the five engineering industry sectors, the yearly averages of dividends are computed for every five-yearly periods commencing from the year 1976 to year 2000.

We find that the total average equity and preference dividends in rupees for the entire engineering industry across all 5 sectors in the first sub-period (1976-80) is the lowest, and it picks up later to record highest value in the last five-year (1996-00). The five-yearly figures for 1991 to 95 and 1996 to 00 register a higher rate of growth relative to the other periods. These resultsgive us a clear indication that the dividend payments in nominal values for the five select engineering sectors have risenconsiderably in the study-period.

The dividend returns on equity shares have also increased over the years across for all select sectors except for the 'Foundries' sector. The trend for equity return compared to return on preference shares found to be contrary to each other. While our equity divined return has increased in case of 4 out of 5 sectors in the engineering industry, the dividend returnson preference-share shows a decreasing trend. The decrease in preference return is highly significant in case of 'Other-Machinery' and 'Electric-Machinery' sectors, compared to the other three sectors in the Indian engineering industry.

B. Trends in Earnings and Payouts

The yearly averages of the nominal rupee earnings available for declaration as dividends and the payout ratiofor the through 1976-00 periods are tabulated in the following table (2).

Table 2 Average Rupee Earnings Measure for Equity and *Preference* Dividend and Dividend Payout in Indian Engineering Industry during 1976-2000 Periods

Period	Earnings Size & PAT					Dividend Payout on Equity & Preference Shares				
Engineering Industry Cross-section	**1976-1980**	**1981-1985**	**1986-1990**	**1991-1995**	**1996-2000**	**1976-1980**	**1981-1985**	**1986-1990**	**1991-1995**	**1996-2000**
Generation of Electricity	1118.98	4062.11	7456.86	18552.19	54877.93	36.10	24.96	18.98	22.05	32.18
	1177.90	*4142.07*	*7514.26*	*18579.05*	*55785.03*	*5.06*	*3.02*	*0.83*	*0.21*	*1.53*
Production of Electric Machinery	3406.00	7006.10	5568.09	24987.96	53732.06	54.00	44.94	70.92	49.25	40.03
	3486.11	*7079.01*	*5616.10*	*25049.00*	*54167.89*	*3.18*	*0.98*	*1.02*	*0.45*	*0.94*
Production of Metals	797.88	1325.03	3728.99	7448.05	7335.02	535.02	64.03	52.05	57.87	120.19
	832.97	*1371.10*	*3786.02*	*7463.18*	*7498.99*	*83.07*	*2.93*	*2.18*	*0.37*	*9.04*
Engg. Foundries	688.98	1406.16	3928.13	26515.11	-22858.97	118.93	81.03	46.27	59.11	34.13
	724.10	*1428.98*	*3973.08*	*26559.16*	*-22542.92*	*12.07*	*3.19*	*2.03*	*0.40*	*0.65*
Other Heavy Engg. Machinery	4565.00	8578.12	8014.03	40541.11	49017.11	37.95	38.99	77.07	32.18	63.16
	4677.90	*8665.15*	*8072.00*	*40577.91*	*49056.47*	*3.02*	*0.97*	*1.05*	*0.14*	*0.09*

Notes: The top row represents Earnings Size andDividend Payout on Equity Shares and the lower row denotes PAT and Dividend Payout on Preference Shares. **Source:** See Source in Table 1

The average earnings of our five select sectors in the Indian engineering industry and available to equity holders and preference holders (EARSZ and NPAT) consistently increase from the first five-year period (1991-95) to reach at their largest levels in the latest 5-year period, 1996-00 with the highest growth in the earnings registered in the sub-period 1991-95. It is found that the 'Foundries' have suffered massive losses, and the 'Metals' sector recorded more or less constant earnings in the recent periods (1991-00), while all remainder three sectors record a tremendous increase in their rupee value of earnings over time. A momentous increase in the earnings in case of the 'Electricity' and 'Electric-Machinery' sector is noticed in the most recent periods of 1996-00 compared to the immediately preceding 5-year period.

The 'Metals' and the 'Foundries' sector in the engineering industry on the other hand faced the problem of increasing non-profitability and un-competitiveness, and are demonstrated by the drastically diminishing EARSZ and NPAT variables denoting the earnings available for distribution as dividends for the equity and preference share holders respectively. Among the two sectors discussed above the 'Foundry' sector carries a negative sign in the last quinquenniums. This sector also remains as a lone exception, in reporting more relative losses in the post-liberalization period in comparison to the (former)pre-liberalization period.This evidence suggests that the engineering industry as a whole in the country prefers to smooth (follow) dividends to their earnings over time and in accordance to choice

of their shareholders, supporting the findings of Dividend Smoothening theory.

The 'Metal Production' and the 'Foundries' sectors in our Indian engineering industry cross-section have significantly higher payouts in the 1979-80 periods but have registered a slope until the last sub-period, 1996-00 owing to deterioration of their earnings documented above. In the study period, the 'Metals' record the largest while 'Electricity' industry, the lowest dividend payout respectively whereas, the 'Other-Machinery' and the 'Metals' sector have the largest percent payout both in the pre, and post-liberalization periods

respectively. The 'Electricity-generation/Supply' sector is found to have the lowest dividend payout, both in the pre-liberalization, as well as in the post-liberalization periods.

Table 3 and 4presents the dynamic ranking (highest to lowest) based on absolute growth values and CAGR of the rupee value of nominaldividends paid and dividend returns on equity and preference shares. These tables also highlight the significant inter-period differences in the arrangement in the ranks as 'largest' (ranked as '5') and 'smallest' payers (ranked as '1').

Table 3 Dynamic Ranking of 1=Highest to 5=Lowest Dividend Payments based on Absolute & Compounded Growth Rates of Rupee Value of Dividend Payment and Dividend Returns in Indian Engineering Industry during 1976-2000 Periods

Industry	Equity Share Dividend						Preference Share Dividend						Return on Equity Shares						Return on Preference Shares					
	AI	AII	AIII	GI	GII	GIII	AI	AII	AIII	GI	GII	GIII	AI	AII	AIII	GI	GII	GIII	AI	AII	AIII	GI	GII	GIII
Generation of Electricity	3	4	4	2	2	3	4	2	2	2	2	2	2	1	2	4	4	3	2	4	4	3	4	2
Production of Electric Machinery	3	1	3	4	3	2	1	3	1	5	3	4	4	2	4	4	3	5	2	3	2	4	2	5
Production of Metals	2	4	4	5	3	4	5	5	4	2	1	5	3	5	3	1	3	4	5	4	5	2	1	4
Engg. Foundries	4	5	5	2	4	3	4	4	2	3	2	3	4	4	4	2	4	5	4	4	3	4	2	3
Other Heavy Engg. Machinery	2	2	2	1	2	3	2	4	5	4	4	4	3	2	3	5	2	2	1	2	2	1	3	2

Note: **A**is Absolute Growth and **G**is CAGR while I, II, and III is the Pre-reform, Post-reform and Full-period . **Source:** See Source in Table 1

The 'Other-Machinery' sector pays the largest rupee value of equity dividend in the pre and post-liberalization, and the entire study-period 1976-00, while 'Electric-Machinery' and 'Foundries' pays the smallest. When it comes to payment of preference dividends, the 'Electricity' sector has paid the largest rupee value while 'Metals' sectors the smallest. There are significant variations too in arrangement of ranks in the pre and post liberalization periods.

The 'Electric-Machinery' sector has more or less maintained the same relative rank compared to other 4 sectors with reference to preference dividend payments. The 'Electricity' sector is found to be

declaring the highest equity return to its shareholders and the 'Foundries' sector the smallest. The 'Electricity' sector has maintained similar relative ranks when measured in terms of equity returns across the pre and post-liberalizations period. In terms of preference returns however, the 'Other-Machinery' sector performed well. The firms in the 'Foundries' and 'Metals' sector have distributed poor returns to the preference-share holders.It is also seen that that the firms in the 'Electricity' and 'Foundries' sectors have improved their relative positions as 'largest' dividend-payers in pre-liberalization period, compared to post-liberalization period respectively.

Table 4 Dynamic Ranking of 1=Highest to 5=Lowest Dividend Payments based on Absolute & Compounded Growth Rates of Rupee Value of Earnings measure and Dividend Payouts in Indian Engineering Industry during 1976-2000 Periods

Engineering	Earnings Size	Nominal PAT	Equity Share Dividend Payout	Preference Share Dividend Payout

Industry Cross-section	AI	AII	AIII	GI	GII	GIII	AI	AII	AIII	GI	GII	GIII	AI	AII	AIII	GI	GII	GIII	AI	AII	AIII	GI	GII	GIII
Generation of Electricity	2	4	3	2	2	2	2	4	3	4	2	2	4	5	4	5	2	3	4	2	4	2	4	1
Production of Electric Machinery	3	1	2	4	3	1	2	3	3	4	3	1	4	3	2	3	3	1	3	4	3	2	3	1
Production of Metals	4	5	5	3	5	4	4	5	3	2	3	3	2	2	2	4	2	3	2	1	2	4	2	3
Engg. Foundries	3	4	4	2	4	4	5	4	4	3	4	4	1	2	1	2	4	4	1	5	3	5	2	4
Other Heavy Engg. Machinery	2	2	4	3	4	4	3	2	1	3	4	4	5	3	5	2	1	2	4	4	4	3	1	2

Note: A is Absolute Growth and **G** is CAGR while I, II, and III is the Pre-reform, Post-reform and Full-period.
Source: See Source in Table 1

Table 4 predominantly explains the reasons why some sectors prefer to pay higher than others. The 'Electricity' sector paid higher rupee value of dividends owing to their relatively higher size of earnings. Conversely this also explains why the 'Foundries' and 'Metals' distributed lower dividends. The earning size therefore explains the tendency to pay larger dividends, in tune with their ability to pay. The Market Signaling hypothesis/theory is therefore validated for the Indian Engineering Industry.

The increasing size of our variable EARSZ measures the earnings that can be distributed as dividends to equity holders forsome sectors in the capital-intensive engineering industryand helpsit to significantly improve their ranks as largest dividend payers in the pre and the post-liberalization period. It is found that the traditional engineering sector like the 'Foundries' is losing its relative importance as it drops its position as a 'stable earner' in the post-liberalization period compared to the pre-liberalization periods.

Though the nominal value of rupee dividend constantly increase over the period of time, the dividend payments relative to the earnings, measured by the dividend payout ratio are found to be decreasing. Over the entire study-period, except for the third one 1986-90 the tendency of dividend decrease is seen in at least four out of the 5 select sectors in the engineering industry.

We find a lot of inter-industry differences in the composition in the ranks with regards to largest and smallest dividend payout percentages across our cross-section. Our results show that different exogenous, and most often and sector-specific factors determine dividend decisions. The firms affiliated to 'Electricity-Generation/Supply' sector pay relatively smaller portion of their earnings as equity dividends while dividend payouts of sectors like 'Other-Machinery' and 'Electricity-Generation/Supply' don't follow their respective earnings. Thus it can be safely assumed that relatively highly capital intensive sectors and those having higher growth avenues, display their choice to internally finance their growth requirements rather than borrowing from outside. These findings support applicability of Peckingorder theory/hypothesis in Indian Engineering industry.

C. The Test of Structural Stability of Growth Equation

To test for structural stability of regression model break due economic liberalizations we use dummy variables 1 and 0 to separate the pre-economic liberalization (pre-1992) from the post-economic liberalization (post 1993) periods. This technique of equation using dummy variable is an alternative to using Chow Test and helps to exactly highlight whether theplausible source(s) of difference is in the intercept or the slope i.e. whether the slope, or the intercept, or both differ in the two (pre and post-liberalization) periods.

$$\log Y_i = \alpha_1 + \alpha_2 D_i + \beta_1 X_i + \beta_2 (D_i X_i) + u_i \ldots \ldots (7)$$

D_1 is equal to 1 for all observations in the pre-liberalization period and takes the value of 0to represent the post-liberalization period. Here α_2 is the intercept and β_2 the slope. The difference show

if the slope in the pre-liberalization period significantly changes in the post-liberalization period. The dummy variable DX_i is in the multiplicative form and enables us to differentiate between the slopes of two periods.

Assuming that $E(u_i) = 0$, we obtain

$$E(Y_i|D_i=1, X_i)=(\alpha_1 + \alpha_2) + (\beta_1 + \beta_2)X_i \quad \dots\dots\dots.(8)$$

The mean regression functions for pre-liberalization and post-liberalization periods therefore is

$$E(Y_i|D_i=0, X_i)=\alpha_1 + \beta_1 X_i \quad \dots\dots\dots\dots (9)$$

Table 5 (in appendix) shows the growth rates of dividend payout, earnings, and dividend return and dividend payout ratios. If the differential intercept is tested as significant and the slope is found to be insignificant we believe that both regression functions differ in the intercept only and therefore denoted as Parallel (PARL) Regressions. If the intercept and slope coefficient is significant then equation is said to be as Coincident (COIN) and if the differential intercept coefficient is statistically insignificant but slope is statistically significant, both regressions are Concurrent (CON).

We check for significance at 0.05 percent levels. It is found that no regression equations for our five select sectors were found to be either 'PARL' or to be 'CON'.

Table 5 Growth Rates of Nominal Rupee Dividends, Return, Rupee Earnings Measure and Dividend Payout on Equity & Pr*eference* Shares in Indian Engineering Industry during 1976-2000 Periods

Type	Instantaneous Growth Rate			Linear Trend Growth Rate			CAGR			Regression Type
Period	1961-1992	1993-2000	1961-2000	1961-1992	1993-2000	1961-2000	1961-1992	1993-2000	1961-2000	
Generation of Electricity										
EQDIV	12.05	24.04	0.20	104.03	2368.96	711.19	13.02	27.18	10.06	**DIS**
PRDIV	-1.18	69.17	0.10	-0.86	266.07	35.15	-1.18	99.00	9.11	**DIS**
EQRET	4.01	-1.01	0.05	-	-	-	4.02	-1.03	3.03	**COIN**
PRRET	-2.11	-51.04	0.07	-	0.02	-	-2.01	-40.04	5.01	**DIS**
EARSZ	18.12	18.03	0.15	706.04	6790.12	2436.10	18.98	20.01	21.03	**COIN**
NPAT	18.01	17.05	0.20	113751.98	106697.11	2471.14	19.14	20.06	19.98	**COIN**
EDPR	-6.06	5.98	-0.03	-0.02	0.03	-	-4.02	6.97	-1.05	**CON**
PDPR	-19.04	-45.02	-	-	-	-	-17.06	-36.03	-031	**COIN**
Production of Electric Machinery										
EQDIV	8.99	14.01	0.15	298.98	2041.14	887.97	10.07	15.04	12.95	**COIN**
PRDIV	-3.03	53.07	0.04	-2.02	126.12	16.15	-3.03	70.11	3.02	**DIS**
EQRET	-0.71	-0.49	0.02	-	-	-	-0.71	-0.49	0.89	**COIN**
PRRET	-3.41	-6.01	-0.06	-	-	-	-3.29	-5.28	-5.31	**COIN**
EARSZ	7.41	15.01	0.20	434.07	3533.03	2316.91	8.02	16.03	13.99	**COIN**
NPAT	6.98	15.03	0.15	431.98	3660.034	2333.11	8.02	16.05	13.97	**COIN**
EDPR	2.01	-0.91	-0.03	0.02	-0.03	-	2.01	-0.79	-1.01	**COIN**

Production of Metals										
EQDIV	-10.01	37.02	-0.12	-	-	-	-10.01	47.18	-09.97	**DIS**
PRDIV	12.04	5.41	11.98	138.18	207.05	272.98	11.96	6.01	13.02	**COIN**
EQRET	0.09	67.02	0.59	0.19	37.02	5.03	0.15	95.06	0.71	**DIS**
PRRET	3.49	-10.02	2.08	-	-0.02	-	4.02	-9.11	2.20	**DIS r**
EARSZ	0.59	6.01	-2.01	-	-	-	0.59	6.03	-5.02	**COIN**
NPAT	19.88	-81.92	7.31	327.35	-2012.02	327.12	212.89	-56.03	8.01	**DIS**
EDPR	20.91	-81.93	8.15	327.16	-1975.05	330.90	24.23	-56.08	7.87	**DIS**
PDPR	-9.11	18.09	-3.29	-0.41	0.32	-0.14	-8.14	18.98	-3.04	**COIN**
EQDIV	-20.21	82.48	-15.41	-0.08	0.05	-0.04	-20.11	126.16	-14.02	**DIS**
Engineering Foundries and Workshops										
EQDIV	16.21	-19.13	17.01	210.97	-1452.87	508.56	16.88	-16.89	18.11	**DIS**
PRDIV	-0.20	61.03	8.13	0.91	32.98	11.12	-0.20	84.11	7.91	**DIS**
EQRET	5.06	-38.79	-0.59	-	-0.04	-	5.08	-31.97	-0.59	**DIS**
PRRET	-0.29	6.29	-3.48	-	-	-	-0.28	7.03	-2.51	**COIN**
EARSZ	22.75	-122.59	7.69	376.05	-18701.02	-580.11	24.14	-69.04	7.14	**DIS**
NPAT	21.16	-122.02	7.24	380.01	-18659.48	-569.17	22.97	-69.94	9.14	**DIS**
EDPR	-2.71	-39.42	-7.15	-0.11	-0.10	-0.05	-3.01	-31.96	-7.14	**DIS**
PDPR	-19.31	41.65	-16.25	-0.02	-	-	-17.12	51.24	-13.96	**DIS**
Other Heavy Engineering Machinery										
EQDIV	12.06	10.13	11.52	464.48	1639.87	929.91	11.98	09.91	14.55	**COIN**
PRDIV	3.49	2.99	3.13	-	0.02	0.03	3.07	3.41	2.98	**COIN**
EQRET	-0.10	-9.11	-4.11	-	-0.03	-	-0.08	-9.03	-4.14	**COIN**
PRRET	-5.21	-16.16	-10.08	-5.21	1.02	-4.04	-5.26	-15.04	-10.06	**COIN**
EARSZ	10.01	-6.11	12.16	1039.11	-1820.10	2330.15	10.11	-6.18	11.23	**PARL**
NPAT	8.69	-6.12	12.14	1039.14	-1820.13	2330.01	8.98	-6.14	13.15	**PARL**
EDPR	3.14	16.15	1.02	0.03	0.20	0.0$	3.17	17.33	1.14	**PARL**
PDPR	-16.23	76.98	-12.22	-	-	-	-13.96	120.01	-10.98	**DIS**

It is found that the regression equations for the 'Electricity-Generation/Supply', 'Electric-Machinery' and 'Other-Machinery' sectors for the pre and the post-liberalization periods are 'COIN'. This means to say both, the intercept and slope are insignificant. In case of the 'Metals' and 'Foundries' sector of engineering industry, the intercept and the slope coefficient is found to be statistically significant, indicating that the two regressions are 'Dissimilar' (DIS).

Our results indicate that in the post-liberalization periods compared to the former, the differences in mean differences of dividend variables for the Indian engineering industry are sizeable and significant. Overall result thus suggests that dividend behavioral patterns across the Inter-sector cross-

section within the Engineering Industry during the study periods are constantly changing over time.

Our empirical evidenceusing the unit-level data for engineering firms at a sectoral level provides aninsightful and interesting account on the differences in dividend policies and in their relation with earning variables. We corroborate the evidence of [23] on decreasing dividends and dividend smoothening over time in India suggesting that dividends may perhaps be irrelevant to shareholders now than in the past. By capturing the dividend behavior of five specific sectors within the engineering industry in India over a longer frame of time, we find evidence to the Market Signaling, Dividend Smoothening theory over the entire period, and Dividend Irrelevance and the Pecking Order theory of finance for the Indian engineering industry in India.

V. **CONCLUSION**

The spatial-temporal analysis of dividend in case of Indian engineering industry presents us some interesting results. The Indian engineering industry relatively pays larger equity dividends than preference dividends. We also find that the dividend return available to equity share holders is relatively higher than the preference dividend returns. The most interesting finding is that though the engineering industry prefers to smooth their dividends over earnings, the relative value of equity and preference dividend payments are found to be decreasing. This is inspite of the fact that the nominal rupee value of earnings is increasing across the industry over the period of time. The evidence of decreasing dividends among the engineering industry in India after the economic liberalizations and demonstrate increasing preference for internally financing their growth through reserves rather than squandering these bounties through dispersion as dividends.

It is found that the dividend policies follow diversepatterns across the select sectors and across time periods, we evaluate. The dividend payouts of sectors like 'Other-Machinery' and 'Electricity Generation/Supply' don't smooth their earnings as they are relatively more capital-intensive, and have larger avenues for internal growth thereby following the hypotheses of pecking-order theory of finance. These sectors display their preference for self-financing their growth rather than relying on outside sources.Our evidence broadly suggests that there may be a greater relevance of our results to the market Signaling theory of finance, Pecking Order hypothesis and the sectoral-effect of Indian Engineering Industry in India. Broadly, the results mean to say a lot about association between the unique type of engineering product manufactured/served and the typical behaviour of the Finance Managers therein, responding according to the sector-specific requirements of the engineering cross-section in India.

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