

Application of Dividend Models in Indian Capital Goods Sector

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Abstract

The present paper is an attempt to examine the determinants of dividend policy of Indian capital goods companies for duration of 13 years from 2001-02 to 2013-14. The sample contains all eligible 26 capital goods firms listed in BSE-500 index who have paid dividend for at least 10 years out of 13 financial year from 2001-02 to 2013-14. The well-known multiple regression-based dividend models namely Lintner's (1956) dividend model, Britain's (1956) cash flow model as well as its variant in form of explicit depreciation model, Darling's (1957) model and Dobrovolsky's (1951) model is used to test the relationship among study variables. The empirical results suggest that current year profits after tax and lagged dividends are the most important factors that affect positively to the current dividend policy of the companies. Furthermore, Britain's cash flow model gives the similar results as obtained by the Lintner's model which holds the current year cash flow as the significant factor concerning the dividend behaviour of select firms under study. However, Britain's explicit depreciation model, Darling's model and Dobrovolsky's model have not been found to be a good fit as the explanatory variables do not have much impact on the current year dividend payments of the company. Overall the Lintner's dividend model is found to be most appropriate in case of capital goods firms in India

Keyword: Dividend Policy, Lintner's Dividend Model, Britain's Dividend Model, Darling's Dividend Model, Dobrovolsky's Dividend Model, Indian Capital Goods Firms

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1. INTRODUCTION

The growth of industries and corporate sector is very crucial for the economic development of a country. Many corporate decisions affect directly or indirectly the development of an economy. The major corporate decisions are financing decision, investment decision and dividend decision. The business generates cash inflows to the firm that is commonly known as profits which are used for paying dividends to the shareholders. Dividends are those periodic cash/kind payments which are made by a business unit to its shareholders as an earning on their investment. Beginning with a study by Lintner's dividend model (1956), the corporate dividend payout behavior and policy has puzzled financial researchers for at least past sixty years. Lintner (1956) indicated that financial managers tend to set dividend policy with a target long-term payout ratio firmly in mind, that financial managers may "smooth" cash dividends relative to corporate earnings over time, and that cash dividends are more likely to be paid by mature firms with long-term sustainable earnings. Black (1976) states that the harder we look at the dividend picture, the more it seems like a puzzle, with pieces that just do not fit together. Dividend decision of a company is a fundamental issue because of its significant impact on investment and financing decisions. If a firm decides not to pay or pays fewer dividends, the firm will have more internal earnings, thus reducing its reliance on external earnings. On the other hand, if a firm pays high dividends, it will result in less internal earnings, thus increasing firm's dependence on debt or other external financing. This implies that the decision to raise funds is directly associated with dividend policy. Subsequently, as dividend policy influences the capital structure of a firm, it will also have an impact on the investment decision and cost of capital of the company. Since the publication of Lintner's (1956) survey results, numerous researchers have put forth a variety of alternative explanations for observed corporate cash dividend policies. The very first study on determinants of dividend policy is traced to Lintner's (1956) which has been a benchmark in many industries until now as many subsequent researches by Fama & Babiak (1968), Rao &

Sarma (1971), Fama (1974), Swamy & Rao (1975), Garg et al. (1996), Bodla et al. (2007) have also confirmed the goodness of the model in various sectors. Many other dividend models such as the Britain's (1966) model, the Darling's (1957) model and Dobrovolsky's (1951) model have also presented the significant empirical evidence throughout the world.

Capital goods companies are known as the backbone of Indian economy and this sector plays a very significant role in the growth and development of the country. As far as the dividend behaviour of companies are concerned, there is an extensive empirical investigation devoted to corporate dividend policy, but very few dividend studies focus on capital goods sector, so, a need for research in said sector on the important topic of dividend behaviour is identified. In the present study, the question is asked about whether the well known regression model related to dividend such as Lintner's (1956) model, Britain's (1966) model, Darling's (1957) model and Dobrovolsky's (1951) model sufficiently explains the dividend paying behaviour of Indian capital goods sector. The present research paper is organised as follows: the next section gives an overview of literature review. Section 3 explains the research methodology as used in the study. Section 4 contains data analysis and results whereas conclusion is given in section 5.

2. LITERATURE REVIEW

In order to facilitate the foundation for undertaking the present study, a brief literature survey has been carried out on the dividend policy. Following are the few prominent studies:

The first empirical study of dividend policy was conducted by Lintner (1956), popularly known as Lintner's dividend model. In his study, he conducted an interview of managers from 28 selected U.S. companies and revealed that firms set long-term target dividend payout ratios and put more emphasis on dividend changes than on absolute dividend levels. The study reported that dividend decisions are made conservatively due to reluctance in the part of management to cut dividends. He developed a partial-adjustment

model to depict the dividend decision process that explained 85 per cent of year-to-year dividend variation. Mazumdar (1959), in his attempt to find out the corporate dividend behaviour, tested the Dobrovolsky's (1951) model and found out that current profits, previous year dividends and the current requirement were important factors for deciding current year dividend payment to shareholders. Britain (1966) conducted a study on the dividend behaviour of various major industries during 1919-1960. Results of his study indicated that the cash flow as a determinant to dividend policy explains in a better way than profits net of taxes. His study thus, opposes the finding of the Lintner's dividend model stating cash flow as reflecting true earnings. Rao & Sharma (1971) estimated the Lintner's dividend model on the data pertaining to all public and private sector companies with four major industrial sectors such as agriculture and allied sector, mining and quarrying sector, processing and manufacturing of metals and chemicals and their products sector during 1956 to 1966. Their study tested the three variants of Lintner's regression equations: first, with net profit after tax and previous year dividend as explanatory variables; second, with net cash flows instead of using net profits; and third, with depreciation entered as a separate explanatory variable. The results revealed that Lintner's model is adequate enough to explain the dividend behaviour of Indian corporations. The other variable i.e. the cash flow is found to be a more appropriate estimate of the competence variable for industries such as cotton textiles, iron and steel, paper, electricity generation and supply, whereas depreciation is found to be more significant factor in the case of jute textiles and engineering industries. Swamy & Rao (1975) estimated the Lintner's dividend model along with substitute specification of the variable net profit i.e., net profits after tax and cash flow, investment expenditure and external finance. The study was in line with Lintner's dividend model by finding net profits as the most significant variable and seems to provide adequate explanation of dividend behaviour. The study further reported the investment expenditures having significant positive coefficient, whereas the external finance

has been found having a significant negative relationship. However, the magnitude of the impact of these two variables is very small. Bhat & Pandey (1994) conducted a study over 28 Indian corporate finance managers during 1986 to 1991 to find whether they prefer to follow stable dividends policy. The study revealed current earnings, pattern of past dividends, expected future earnings, increasing equity base and liquidity as the most significant determinants of dividend behaviour of Indian corporate sector. Garg et al. (1996) examined the application of various models such as Lintner's model (1956), Britain's model (1966), Darling's model (1957) and Dobrovolsky's model (1951) on the data of 44 Indian joint stock textile companies and found that Lintner's Model of dividend behavior is the best fit than any other model. The study further revealed that the most significant determinant of dividend decision in the textile industry in India turned out to be sustained growth in earnings of the companies. The similar results were also revealed by the studies conducted by Fama & Babiak (1968) and Fama (1974). Reddy (2004) in his attempt to examine the dividend payout behaviour of NSE and BSE list Indian firms over the period 1990-2001, found that dividend changes are influenced more by current and lagged earnings rather than by estimated future earnings. Oza (2004) conducted a study on dividend behaviour of 30 non-financial Indian companies and found that M&M Model (1961) is not followed in India and he found current year's earnings, past dividend, expected future earnings, liquidity and capital expenditure as the most dominant variables affecting dividend policy of Indian firms. Hence, the study also confirms the applicability of Lintner's model in the context of Indian corporate. The similar results are confirmed by study made by Bhayani (2008) on the dividend policy behaviour of BSE 30 companies of India for the period of 1996-97 to 2004-05. Anand (2002) conducted a survey on 81 CFOs (Chief Financial Officers) of Indian BT-500 companies to find out the dividend behaviour and revealed that the results are in line with the findings of Lintner's (1956) model as 81.50 per cent of the respondents strongly agree/agree about long-run target dividend payout ratio. Approximately 85 per cent

of the respondents strongly agree that dividend changes due to change in long-run earnings. A very small part i.e. 46.95 per cent of the respondents favours that the dividend policy is a residual decision which is decided after meeting desired investment needs. Narasimhan & Vijayalakshmi (2002) analyzed the effect of ownership structure on dividend payout decision of 186 Indian manufacturing firms for duration of four years from 1997 to 2001 and found that promoter's holding has no influence on average dividend payout decision. George & Kumudha (2006) also investigated about the dividend policy of Hindustan Construction Company by estimating the Lintner's model exclusively. The study clearly supported the goodness of fit of the model by finding out that current year's dividend has positive relation with previous year dividend and current years earning. Bodla et al. (2007) attempted to re-examine the applicability of Lintner's (1956) dividend model in banking sector in India by taking a sample of 33 Indian stock exchanges listed banks. Using cross-sectional analysis on the dividend data from the year 1996 to 2006, it was found that results are in line to the Lintner's model. The study also supported that major determinants of current dividend are lagged dividend and the current earnings. Kanwal & Kapoor (2008), Pourheydari (2009), Al-Kuwari (2009), Huda & Farah (2011), Yiadom & Agyei (2011) and Al-Shabibi & Ramesh (2011) analyzed the influence of profitability over dividend policy and found the positive relationship between these two whereby a study conducted by Gill et al. (2010) reported negative relationship between profitability and dividend policy. Bawa & Kaur (2012) also investigated about the dividend policy of Indian MSMEs (Micro, Small and Medium Enterprises) during 2006-2010 and found that Lintner's dividend model is best fit in case of Indian Manufacturing MSME's. Gupta et al. (2013) conducted a similar study to examine the validity of known dividend models in Indian companies and found that out of all the models, Lintner's model does have a best fit in the context of Indian corporate. Christopher & Khoury (2014) investigated the impact of various factors on the dividend decision of Lebanese banks listed on the

Beirut Stock Exchange during 2005 to 2011 and found that the dividend policies are positively associated by the firm size, risk and past year's dividends, but are negatively affected by the opportunity growth and profitability. Almeida et al. (2015) examined the determinants of dividend policy of Portuguese capital market between 1997 to 2011 by taking a sample of 12 non-financial Euronext Lisbon listed companies. Using multiple regression analysis, the results revealed the earning stability, the market value of the firm, lagged dividend and the business dimension as primary determinants influencing positively to the amount of dividend distributed by the company. However, the study also supported that growth opportunities influence negatively to the dividend policy of select sample. Soondur et al. (2016) examined the determinants of dividend policy by applying regression analysis on a sample of 30 companies listed on the stock exchange of Mauritius. The fixed and the random effect model were applied to identify the effects of earnings per share, net income, retained earnings, cash and debt to equity ratio on the dividend policy of select sample. The findings of the study reported that there is a significant negative relationship between company's dividend policy and their retained earnings. Furthermore, the results indicated that there is no meaningful association between the dividend policy and a company's cash and debt to equity ratio. Khan & Ahmad (2017) conducted a study to determine the impact of profitability, growth opportunities, risk, liquidity, firm size, leverage, taxation and audit type on dividend payout behaviour of Pakistan stock exchange listed pharmaceutical companies for a duration of five years from 2009 to 2014. The study revealed audit type, liquidity, growth opportunities and profitability are the key determinants of dividend payout behaviour of pharmaceutical companies in Pakistan. Anjana & Balasubramanian (2017) conducted a study to find out the dividend behaviour of select NSE listed 50 companies for the period of 2011 to 2015 and found that financial performance of company put a significant positive influence on dividend payout decisions. Companies with high profits have the ability to pay dividends more than less profitable companies.

Ganesh & Suresh (2018) analyzed the pattern of dividend payout ratio of National stock exchange listed 30 Indian companies segregated as small, mid and large cap during 2014 to 2016. Using corporate tax, profitability, sales growth, debt to equity ratio and cash flow as independent variables, their study identified that dividend payout ratio is the function of profitability, sales growth & tax for the selected sample. After studying the related reviews, it is found that areas still exist where results are contrary across researches as some factors are positively related in one context but the same factor is found negative or no relationship with dividend policy in some other context. Further in India there is a lack of research in capital goods sector with regard to comparison between various sectors. So, this paper tries to fill this research gap and focuses on analyzing the determinants of dividend policy in Indian capital goods sector in respect of equity shares.

3. RESEARCH METHODOLOGY

The present empirical investigation has been done by taking a sample of capital goods companies, out of listed companies in the BSE-500 index at Bombay Stock Exchange. Only those companies which have paid dividend for at least 10 years out of 13 financial years from 2001-02 to 2013-14 has been selected to form the sample. Out of total 39 companies, 22 companies complied with this restriction, hence form a final sample for the present study. The study has been covering a period of 13 financial years from 2001-02 to 2013-14. The data for the duration of the study has been sourced from Prowess database of Centre for Monitoring Indian Economy (CMIE), money control website and annual reports of respective companies.

The complete list of companies is given in Table I.

Table I: List of Sample Companies from Capital Goods Sector

S. No.	Name of Company	S. No.	Name of Company
1	A B B India Ltd.	12	Havells India Ltd.
2	Alstom India Ltd.	13	Honeywell Automation India Ltd.
3	Alstom T & D India Ltd.	14	Isgec Heavy Engg. Ltd.
4	Astra Microwave Products Ltd.	15	Jindal Saw Ltd.
5	B E M L Ltd.	16	Kalpataru Power Transmission Ltd.
6	Bharat Electronics Ltd.	17	Larsen & Toubro Ltd.
7	Bharat Heavy Electricals Ltd.	18	Nesco Ltd.
8	Carborundum Universal Ltd.	19	Sadbhav Engineering Ltd.
9	Crompton Greaves Ltd.	20	Siemens Ltd.
10	F A G Bearings India Ltd.	21	Solar Industries India Ltd.
11	Grindwell Norton Ltd.	22	Thermax Ltd.

The well known dividend models such as Lintner's (1956) model, Britain's (1966) model, Darling's (1957) model and Dobrovolsky's (1951) model have been tested as applied in its original form in order to achieve the set objective. The multiple linear regression is used to explain the relationship between one continuous dependent variable and two or more independent variables.

3.1 Objective of the Study

In India, primarily, the studies relating to determinants of dividend payout focus on large manufacturing sector and none of the studies focus on capital goods in India. So, this paper tries to fill this research gap and focuses on analyzing the determinants of dividend policy in Indian capital goods sector in respect of equity shares. The primary objective of this study is to empirically test the applicability and validity of various well known dividend models such as Lintner's (1956) model, Britain's (1966) model, Darling's (1957) model and Dobrovolsky's (1951) model in their original form for finding the determinants of dividend behaviour in Indian capital goods sector.

3.2 Framework of the Study – Dividend Models

The following section gives a brief enumeration of the various well known dividend models as discussed above;

(a) John Lintner's Dividend Model

Lintner's dividend model is a basic model that incorporates the foremost factors affecting the corporate dividend decisions. He found that earnings were most important determinants of any change in dividends. The level of current year's earnings is almost invariably the initiation point of management considerations of whether dividend should be changed in any given period. Lintner also reported that majority of managers develop long-term payout ratio targets and use periodical partial adjustments to reach target levels. It means that there is also an impact of past year earnings over the dividend paid in current year. His hypothesis implies that dividend payout in current year is a function of net current year profits after tax and dividend paid in previous year i.e. lagged dividend. Based on his study, his model can further

be simplified in form of a multiple regression equation which is as follows:-

$$Dt = a + \beta_1 Pt + \beta_2 Dt-1 + Ut \dots \dots \dots (1)$$

where: a = Constant term;

Dt and Dt-1 = Total equity dividend in period 't' and 't-1' respectively;

Pt = Net current year profits after tax in period 't'; and

Ut = Error term.

The rationale of net current year profits after tax (Pt), as a factor of dividend policy, is that it represents the earning capacity of the company to pay dividend in a particular year. Lagged dividend (Dt-1) as an explanatory variable represents a possible reluctance on the part of management to reduce the dividend already declared in previous years.

(b) John Britain's Dividend Model

John Britain has given an alternative hypothesis by using the cash flow version of Lintner's model. He suggested that cash flow i.e. net current year's profits after tax plus depreciation is a better measure of a company's capacity to pay dividends. The payment of dividend is generally regarded as a charge prior to depreciation and that is why it should be related to earnings gross of depreciation. Besides, as accounting practices and methods about depreciation treatment keep on changing, so in such case the net current year profit would not be able to reflect the true movements of earnings which are the decisive basis of ability to pay dividend. This hypothesis containing Britain's cash flow dividend model can be algebraically expressed as:

$$Dt = a + \beta_1 Ct + \beta_2 Dt-1 + Ut \dots \dots (2)$$

where: a = Constant term;

Dt and Dt-1 = Total equity dividend in period 't' and 't-1' respectively;

Ct = Cash flow in period 't'; and

Ut = Error term.

In his attempt to further explain the dividend behaviour, Britain also used depreciation (At), as a

separate explanatory variable along with net current year profits after tax and lagged dividend. It can be said that it is eventually an extended version of Lintner's dividend model with an extra variable depreciation. So following is his another regression equation for Britain's explicit depreciation model:-

$$D_t = a + \beta_1 P_t + \beta_2 D_{t-1} + \beta_3 A_t + U_t \dots \dots \dots (3)$$

where: a = Constant term;

D_t and D_{t-1} = Total equity dividend in period 't' and 't-1' respectively;

P_t = Net current year profits after tax in period 't';

A_t = Depreciation for the period 't'; and

U_t = Error term.

(c) P.G. Darling's Dividend Model

Paul G. Darling supports that Lintner's dividend model has improved the justification about dividend decision. Darling has attempted to give it a more comprehensive approach for looking at dividend payout decisions. He has used past year profits i.e. lagged profit in place of past year dividend i.e. lagged dividend. He argues that explanatory variable lagged dividend (D_{t-1}) as used by Lintner's model put no direct impact on the dividend decision-making process. He concludes that the function based upon lagged dividend may prove to be useful for making prediction in short-run but lagged profits would provide better prediction and explanation to the current level of dividend. He has also introduced some more independent explanatory variables like depreciation and amortization recoveries, which represents the source of funds and change in sales over the past two years, which represents the working capital requirement.

This dividend model can be expressed as follows:

$$D_t = a + \beta_1 P_t + \beta_2 P_{t-1} + \beta_3 A_t + \beta_4 \Delta St_{-2} + U_t \dots \dots (4)$$

where: a = Constant term;

D_t = Total equity dividend in period 't';

P_t and P_{t-1} = Net current year profits after tax in period 't' and period 't-1' respectively;

A_t = Amount of depreciation and amortization recoveries for the period 't';

ΔSt_{-2} = Change in sales in period 't' over the previous two years; and

U_t = Error term.

(d) S.P. Dobrovolsky's Dividend Model

According to the study conducted by S.P. Dobrovolsky over manufacturing corporation during a wide span of time i.e. 1915-1943, he observed that the amount of retained earnings largely depends upon the profitability of the firm, stability of dividend payout policy and the rate by which operating assets in a firm is expanding. It is evident that with a given level of earnings, increase in retained earnings means less dividend payout in the matching amount and vice-versa. Thus, it can be concluded that dividend decision would also be affected by the same determinants which affect the retained income. The operating assets expansion is also an important variable which requires huge amount of funds to be invested into it. According to Dobrovolsky, firms hesitate to change their dividend policy quickly, so the lagged dividend can be taken as a rough measure of the variables for the current year. His study purported that dividend is negatively associated with operating assets expansion as determined by the growth of operating assets including net current earnings after tax and lagged dividend as other independent explanatory variables. This model used the variables as rates rather than having an absolute amount. The use of rates instead of absolute amount also gives a justification to remove firm size differences.

As per the Dobrovolsky model, the dividend function can be presented in terms of regression equation which is as follows:-

$$D^t = a + \beta_1 Y^t + \beta_2 D^{t-1} + \beta_3 E^t + U_t \dots \dots (5)$$

where: a = Constant term;

D^t = Total amount of equity dividend in period 't' as a percentage of average net worth in period 't';

Y^t = Net current year earnings after tax in period 't' as a percentage of average net worth in period 't';

D^{t-1} = Total amount of equity dividend in period 't-1' as a percentage of average net worth in period 't-1';

E_t = Operating asset expansion in period 't' as a percentage of operating asset expansion in the beginning of the year; and

U_t = Error term.

In the present study, all the above discussed four models have been estimated in its original form to find out comprehensive results.

3.3 Hypotheses of the Study

Based upon the above discussed well known dividend models, the following hypothesis have been framed and tested in the present study:

H1: Current year dividend payment is positively related to net current year profits after tax and last year dividend payment i.e. lagged dividend.

H2: Current year dividend payment is positively related to current year cash flows and last year dividend i.e. lagged dividend.

H3: Current year dividend payment is positively related to net current year profits after tax, last year

dividend payment i.e. lagged dividend and depreciation.

H4: Current year dividend payment is positively related to net current year profits after tax, last year profits after tax i.e. lagged profits, depreciation and negatively related to change in sales over the previous two years.

H5: Current year dividend payment as percentage of average net worth is positively related to net current earnings after tax as percentage of average net worth, total amount of equity dividend as percentage of average net worth and negatively associated with operating asset expansion as percentage of operating asset in the beginning of the year.

3.4 Measurement of Variables

The following table describes the various variables and their measurement for the application of multiple linear regression analysis:

Table 2: List of Variables

S.No.	Variable	Description and Measurement of the Variable
1	Current Year Dividends (D_t)	Total cash dividends (interim, final and any other special dividend) declared in a financial year.
2	Current Year Profits (P_t)	Company's total net earnings in a particular financial year.
3	Lagged Dividends (D_{t-1})	Cash dividends paid by the company one year prior to the current year.
4	Depreciation (A_t)	Accounting method of distributing the cost of a fixed asset over its useful life.
5	Cash Flow (C_t)	Total amount of money being transferred into and out of a business, especially as affecting liquidity.
6	Change in Sales ($\Delta S_{t,2}$)	Change in sales over the past two years.
7	Average Net Worth (NW_t)	Value of all non-financial and financial assets owned by a firm after subtracting the value of all its outstanding liabilities.
8	Operating Assets Expansion (OE_t)	Difference between opening and closing balances of those assets which are required for the operations of a business.

4. RESULTS

Table III exhibits the regression results of Lintner's dividend model. It shows that the coefficient of both the explanatory variables i.e. net current year earnings after tax (P_t) and lagged dividend (D_{t-1}) have expected positive sign in 15 out of 22 companies. Coefficient of both the variables has been found statistically significant in 06 companies out of 15 companies. Either of the variables is statistically significant in 08 companies out of rest 09 companies. Individually, the first variable i.e. current year earnings after tax has been found statistically significant in only one company whereas the second variable i.e. lagged dividend is found statistically significant in all the remaining 09 companies. The above estimates give a clear idea about the more importance of lagged dividend variable which supports the

argument of maintaining the level of dividend every year. Coefficient of determination adjusted for degree of freedom (adjusted R^2) is more than 0.783 where both the variables are significant, which is an indication of the significantly high explanatory power of the model equation regarding dividend decision in select companies. The constant term 'a' has been found to have positive sign in 12 companies out of 15 companies where both the explanatory variables are having appropriate sign, which clearly indicates that companies are generally reluctant to cut the dividend; rather they like to raise it every year. On the basis of above discussion, the hypothesis H1 is accepted that current year profits after tax and lagged dividend bears a significant positive impact on the dividend policy of select sample. Overall the model gives a good fit in the capital good industry of Indian corporate sector.

Table 3: Regression Output of Lintner's Dividend Model
 $D_t = a + \beta_1 P_t + \beta_2 D_{t-1} + U_t$ (2001-02 to 2013-14)

Name of Company	Constant	β_1	β_2	F Value	R^2	Adjusted R^2
A B B India Ltd.	80.639	.899*	-0.002	17.796*	0.798	0.753
Alstom India Ltd.	144.659	0.206	.259*	23.585*	0.84	0.804
Alstom T & D India Ltd.	39.611	.652*	.075**	74.583*	0.943	0.93
Astra Microwave Products Ltd.	4.898	-0.038	.159*	26.681*	0.856	0.824
B E M L Ltd.	67.806	0.253	.130*	41.395*	0.902	0.88
Bharat Electronics Ltd.	122.481**	0.108	.167*	424.975*	0.99	0.987
Bharat Heavy Electricals Ltd.	180.945	-0.262	.285*	154.311*	0.972	0.965
Carborundum Universal Ltd.	52.837	0.017	.199*	7.635*	0.629	0.547
Crompton Greaves Ltd.	127.996	0.015	.145*	27.143*	0.858	0.826
F A G Bearings India Ltd.	63.154**	-0.363	.054*	7.802*	0.634	0.553
Grindwell Norton Ltd.	30.545**	0.108	.302*	215.367*	0.98	0.975
Havells India Ltd.	-91.369	1.171**	0.115	42.15*	0.904	0.882
Honeywell Automation India Ltd.	59.532	-0.078	0.026	0.756*	0.144	-0.046
Isgec Heavy Engg. Ltd.	6.13	-0.226	.114*	44.023*	0.907	0.878
Jindal Saw Ltd.	93.081*	.500*	.001*	20.822*	0.822	0.783
Kalpataru Power Transmission Ltd.	21.928	.457*	.068*	128.777*	0.966	0.959
Larsen & Toubro Ltd.	331.893	.816*	.059**	326.878*	0.986	0.983
Nesco Ltd.	-3.333	0.574	.041**	31.289*	0.874	0.846
Sadbhav Engineering Ltd.	6.261	.600**	.034**	57.615*	0.928	0.911
Siemens Ltd.	-11.796	.856*	.067*	114.343*	0.932	0.954
Solar Industries India Ltd.	7.093	0.713	0.097	181.008*	0.776	0.97
Thermax Ltd.	277.918*	-0.315	.951*	25.208*	0.849	0.815

Table IV exhibits the regression results of Britain's cash flow model. This model gives the similar results as given by Lintner's model. It shows that the coefficient of both the explanatory variables i.e. current year cash flow (C_t) and lagged dividend (D_{t-1}) have expected positive sign in 13 out of 22 companies. Coefficient of both the variables has been found statistically significant in

05 companies out of 13 companies. Either of the variables is statistically significant in 07 companies out of rest 08 companies. Individually, the first variable i.e. current year cash flow is found to be significant in 01 company and second variable lagged dividend is found to be significant in 06 companies.

Table 4: Regression output of Britain Cash Flow Dividend Model

$$\text{Equation: } D_t = a + \beta_1 C_t + \beta_2 D_{t-1} + U_t$$

(2001-02 to 2013-14)

Name of Company	Constant	β_1	β_2	F Value	R^2	Adjusted R^2
A B B India Ltd.	77.153	.894*	0	17.756	0.798	0.753
Alstom India Ltd.	161.559	0.181	.203*	20.062*	0.817	0.776
Alstom T & D India Ltd.	29.482	.456**	.091**	75.492*	0.944	0.931
Astra Microwave Products Ltd.	-0.256	-0.18	.148*	39.201*	0.897	0.874
B E M L Ltd.	23.56	0.203	.144*	36.755*	0.891	0.867
Bharat Electronics Ltd.	57.023	0.058	.165*	467.645*	0.99	0.988
Bharat Heavy Electricals Ltd.	-306.486	-.497**	.313*	157.994*	0.972	0.966
Carborundum Universal Ltd.	56.813	-0.098	.161*	7.587	0.628	0.545
Crompton Greaves Ltd.	77.991	-0.028	.143*	28.03	0.862	0.831
F A G Bearings India Ltd.	57.371*	-0.38	.050*	7.318	0.619	0.535
Grindwell Norton Ltd.	20.412**	0.021	.283*	572.821*	0.992	0.99
Havells India Ltd.	-89.968	1.156**	0.103	41.996*	0.903	0.882
Honeywell Automation India Ltd.	56.808	-0.088	0.026	0.91	0.168	-0.017
Isgec Heavy Engg. Ltd.	7.617	-.365**	.084*	36.666*	0.891	0.866
Jindal Saw Ltd.	93.801*	.410**	.013**	25.389*	0.849	0.816
Kalpataru Power Transmission Ltd.	24.33	0.343	.064*	108.809*	0.96	0.951
Larsen & Toubro Ltd.	345.703	.773*	.059**	328.973*	0.987	0.984
Nesco Ltd.	-4.011	0.496	.042**	34.055*	0.883	0.857
Sadbhav Engineering Ltd.	2.184	.472**	.037**	69.055*	0.939	0.925
Siemens Ltd.	-30.831	.772*	.074*	133.112*	0.967	0.96
Solar Industries India Ltd.	3.942	0.489	0.135	190.766*	0.977	0.972
Thermax Ltd.	273.751*	-0.381	.237*	25.605*	0.851	0.817

Coefficient of determination adjusted for degree of freedom (adjusted R^2) is more than 0.816 where both the variables are significant, which means that more than 81 per cent behaviour is explained by this model. The constant term 'a' has been found to have positive sign in 10 companies out of 13 companies which clearly indicates that companies

are generally reluctant to cut the dividend; rather they like to raise it every year. Overall as per the above discussion the hypothesis H2 i.e. current year dividend payment is positively related to current year cash flows and last year dividend proves to be true up to some extent.

Table V exhibits the regression results of Britain's another dividend model which explicitly includes depreciation (A_t) as an extra explanatory variable along with current year profit after tax (P_t) and lagged dividend (D_{t-1}). The regression output table shows that the coefficient of all the explanatory have expected positive sign in 08 out of 22 companies. However, coefficient of all the variables is not found statistically significant in any company out of these 08 companies. Individually, the first variable i.e. current year profit after tax is found to be significant in 02 companies and second variable lagged dividend is found to be significant in 06 companies out of select sample. The third variable depreciation as

used explicitly in this model is not found statistically significant in any of these 08 companies. Coefficient of determination adjusted for degree of freedom (adjusted R^2) is more than 0.839 where all the variables have appropriate sign, which means that more than 83 per cent behaviour is explained by this model. The constant term 'a' has been found to have positive sign in 04 companies out of 08 companies which clearly restricts to assume the maintaining of the level of dividend each year. Overall as per the present study the variant of Britain's explicit depreciation model does not seem to be good fit in the capital goods sector companies of India.

Table 5: Regression Output of Britain's Explicit Depreciation Model

$$\text{Equation: } D_t = a + \beta_1 P_t + \beta_2 D_{t-1} + \beta_3 A_t + U_t \\ (2001-02 \text{ to } 2013-14)$$

Name of Company	Constant	β_1	β_2	β_3	F Value	R^2	Adjusted R^2
A B B India Ltd.	205.157*	-0.365	.039*	.615*	51.357*	0.951	0.932
Alstom India Ltd.	65.839	.477**	.534*	-1.229	24.718*	0.903	0.866
Alstom T & D India Ltd.	33.012	0.533	.087**	0.052	45.802*	0.945	0.924
Astra Microwave Products Ltd.	-0.257	-0.18	.148*	0.148	23.23*	0.897	0.858
B E M L Ltd.	86.362	0.28	.123*	-0.06	24.82*	0.903	0.867
Bharat Electronics Ltd.	12.46	0.03	.162*	0.281	282.995*	0.991	0.987
Bharat Heavy Electricals Ltd.	-105.811	-402	.303*	0.178	96.94*	0.973	0.963
Carborundum Universal Ltd.	53.383	-0.041	.184**	0.078	4.656	0.636	0.499
Crompton Greaves Ltd.	36.714	-0.06	.140*	0.263	16.756	0.863	0.811
F A G Bearings India Ltd.	64.204**	-0.357	.055**	-0.009	4.631*	0.635	0.498
Grindwell Norton Ltd.	15.883	-0.02	.279*	.440*	435.736*	0.994	0.992
Havells India Ltd.	-92.785	1.25	0.157	-0.402	25.135*	0.904	0.868
Honeywell Automation India Ltd.	6.235	-0.448	-0.033	1.073*	5.231	0.662	0.536
Isgec Heavy Engg. Ltd.	6.004	-0.307	.105*	0.035	30.988*	0.921	0.891
Jindal Saw Ltd.	94.020*	0.229	.015*	0.05	20.17*	0.883	0.839
Kalpataru Power Transmission Ltd.	21.933	.456**	.068*	0	76.312*	0.966	0.954
Larsen & Toubro Ltd.	342.846	.781*	0.059	0.046	195.055*	0.987	0.981
Nesco Ltd.	-5.483	0.235	.038**	0.291	26.499*	0.909	0.874
Sadbhav Engineering Ltd.	-2.476	0.395	.033**	0.084	45.342*	0.944	0.924
Siemens Ltd.	-58.923	.519**	.088*	0.307	101.811*	0.974	0.965
Solar Industries India Ltd.	-3.263	0.376	0.055	0.946	138.427*	0.981	0.974
Thermax Ltd.	275.300*	-0.361	.244*	0.148	15.313	0.852	0.796

Table VI explains the regression results of Darling dividend model. This table reveals that it is only in 02 out of 22 companies that the coefficients of all the explanatory variables have expected relation. The regression coefficients of all the explanatory variables are not significant in any of these 02 companies. The results further reveals that first three variables i.e. current year profit after tax (Pt), past year profit (Pt-1) and depreciation (At) have been statistically significant in only one company whereas the fourth variable change in sales (ΔS_{t-2}) is not found statistically significant in any company. Coefficient of determination adjusted

for degree of freedom (adjusted R²) is more than 0.959 where all the variables have expected sign, that means more than 95% behaviour is explained by this model in most of the companies. The constant term 'a' has been found to have positive sign in 01 company out of 02 companies which does not clearly supports the argument that generally companies are reluctant to cut the dividend; rather they like to raise it every year. Overall as per the present study, hypotheses H4 is rejected by stating that Darling's dividend model does not seem to be good fit in the capital goods sector companies of India.

Table 6: Regression Output of Darling's Dividend Model
Equation: $D_t = a + \beta_1 P_t + \beta_2 P_{t-1} + \beta_3 A_t + \beta_4 \Delta S_{t-2} + U_t$
(2001-02 to 2013-14)

Company	Constant	β_1	β_2	β_3	β_4	F Value	R ²	Adjusted R ²
A B B India Ltd.	157.898*	0.004	0.005	.461*	0.004	48.06	0.965	0.945
Alstom India Ltd.	152.773	0.449	0.006	-0.516	0.004	8.486	0.829	0.731
Alstom T & D India Ltd.	20.937	.219*	0.004	.133**	-.009*	84.649	0.98	0.968
Astra Microwave Products Ltd.	2.046	.112**	-0.003	0.12	0.004	15.706	0.9	0.842
B E M L Ltd.	20.818	.124*	0.051	0.142	0.01	18.446	0.913	0.864
Bharat Electronics Ltd.	14.147	.172*	0.023	-0.028	0.013	235.854	0.993	0.988
Bharat Heavy Electricals Ltd.	-294.8	0.098	0.059	0.243	0.031	112.163	0.985	0.976
Carborundum Universal Ltd.	-25.436	.448**	0.191	-0.328	-0.09	5.573	0.761	0.624
Crompton Greaves Ltd.	202.014	0.106	0.052	-0.164	0	11.59	0.869	0.794
F A G Bearings India Ltd.	27.481	0.045	-0.031	0.126	0.005	2.576	0.595	0.364
Grindwell Norton Ltd.	15.382	.279*	-0.007	.445*	1.078	289.875	0.994	0.991
Havells India Ltd.	-123.652	0.294	-0.387	2.752	-0.012	12.555	0.878	0.808
Honeywell Automation India Ltd.	-10.509	0.003	-0.018	.918**	-0.004	2.086	0.544	0.283
Isgec Heavy Engg. Ltd.	5.97	.100*	-0.025	0.035	0	15.496	0.899	0.841
Jindal Saw Ltd.	99.129*	0.014	0.005	.078*	0.001	12.807	0.88	0.811
Kalpataru Power Transmission Ltd.	25.856	.087**	0.026	0.064	0	35.915	0.954	0.927
Larsen & Toubro Ltd.	1155.418	0.157	0.014	0.35	-0.01	65.146	0.974	0.959
Nesco Ltd.	-7.079	0.004	0.053	0.244	0.01	22.259	0.927	0.885
Sadbhav Engineering Ltd.	15.05	0.107	0.001	-0.066	-0.003	27.532	0.94	0.906
Siemens Ltd.	-92.819	.085*	.056**	.675*	-0.001	76.224	0.978	0.965
Solar Industries India Ltd.	-11.989	.226**	-0.127	1.041	0.005	146.492	0.988	0.981
Thermax Ltd.	218.625**	0.189	-0.074	0.484	0.001	9.353	0.842	0.752

Table VII explains the regression results of Dobrovolsky's dividend model. This table reveals that it is only in 04 out of 22 companies that the coefficients of all the explanatory variables have expected relation. The regression coefficients of all the explanatory variables are not significant in any of these 04 companies. The results further reveals that individually first variable i.e. net

current year profit after tax as percentage of average net worth (Y_t) is found significant in 01 company whereas the second variable i.e. equity dividend as percentage of average net worth (D_{t-1}), is found statistically significant in 03 companies out of those 04 companies where all the explanatory variables have expected relation.

Table7: Regression Output of Dobrovolsky's Dividend Model
Equation: $D'_t = a + \beta_1 Y'_t + \beta_2 D'_{t-1} + \beta_3 E'_t + U_t$
(2001-02 to 2013-14)

Name of Company	Constant	β_1	β_2	β_3	F Value	R ²	Adjusted R ²
A B B India Ltd.	-0.001	-0.02	1.098*	0.023	27.952*	0.913	0.88
Alstom India Ltd.	0.025	.319**	0.055	0.105	5.734	0.683	0.564
Alstom T & D India Ltd.	0.009	.149*	0.242	0.002	25.41*	0.905	0.869
Astra Microwave Products Ltd.	0.009	.134*	0.057	-0.002	13.355	0.834	0.771
B E M L Ltd.	0.005	.186*	0.008	0.006	49.649*	0.949	0.93
Bharat Electronics Ltd.	-0.002	.200*	0.053	0.01	38.595*	0.935	0.911
Bharat Heavy Electricals Ltd.	-0.011	.210*	0.233	0.036	59.322*	0.957	0.941
Carborundum Universal Ltd.	-0.001	.310**	-0.036	-0.017	3.298	0.553	0.385
Crompton Greaves Ltd.	0.01	0.217	-0.009	-0.103	2.78	0.51	0.327
F A G Bearings India Ltd.	-0.0002	0.007	1.011*	0.008	16.805	0.863	0.812
Grindwell Norton Ltd.	.026*	.273*	-0.046	0.027	95.67*	0.973	0.963
Havells India Ltd.	-0.001	0.048	1.436*	-0.029	4.49	0.627	0.488
Honeywell Automation India Ltd.	-0.005	0.084	.805*	-0.04	4.737	0.64	0.505
Isgec Heavy Engg. Ltd.	.006**	.112*	-.705*	.012**	23.326*	0.897	0.859
Jindal Saw Ltd.	-0.001	0.013	0.938	0.008	7.284	0.732	0.631
Kalpataru Power Transmission Ltd.	-0.006	0.102	0.713	0.003	22.232*	0.893	0.853
Larsen & Toubro Ltd.	-0.016	0.153	.829**	-0.008	4.843	0.645	0.512
Nesco Ltd.	0.007	0.007	0.415	0.003	0.57	0.176	-0.133
Sadbhav Engineering Ltd.	0.001	0.036	0.523	0.012	3.122	0.539	0.367
Siemens Ltd.	.048**	0.035	-0.072	0.009	5.29	0.665	0.53
Solar Industries India Ltd.	0.012	-0.033	1.045*	0.005	6.434	0.707	0.597
Thermax Ltd.	0.028	0.221	-0.081	0.013	3.148	0.541	0.369

The last explanatory variable i.e. operating asset expansion as percentage of operating asset in the beginning (E_t) is not found statistically significant in any company. Coefficient of determination adjusted for degree of freedom (adjusted R^2) is more than 0.488 where all the variables have expected sign. The constant term 'a' has been found to have positive sign in 01 company out of 04 companies which does not clearly supports the argument that generally companies are reluctant to cut the dividend; rather they like to raise it every year. In all, hypotheses H5 is rejected as applicability of Dobrovolsky's dividend model does not seem to be good fit in the capital goods sector companies of India.

5. CONCLUSION

The dividend policy of any company refers to decisions relating to retention or distribution of profits as dividend. The company and all its stakeholders find it most significant decision as the corporate growth and the future prospects of the company are dependent over it. The present study is an attempt to find out the determinants of dividend behaviour by testing the applicability of various well known dividend models in capital goods sector of India. In the present study, Lintner's model has been found to be most appropriate in explaining the dividend behaviour in case of Indian capital goods industry. The current year profits after tax and lagged dividends have been found as the most important factors that affect the current dividend policy of the companies. Furthermore, Britain's first model which uses current year cash flows instead of current year earnings after tax gives the similar results as obtained by the Lintner's model. The model also proves to be good fit as the explanatory variables current year cash flows and last year dividends have a significant impact on the dividend policy of a company. Britain's second model has not been found to be a good fit as the independent variables i.e. current year profits after tax, lagged dividends and current year depreciation have not much impact on the current year dividend payments of the company. Furthermore, the present study also purports that

dividend model suggested by P.G. Darling and S.P. Dobrovolsky fail to explain the dividend behaviour of Indian capital goods sector as all the explanatory variables under these models put no or very insufficient impact over the dividend behaviour of selected sample. Overall, the present study reveals that current year profits after tax, lagged dividend and up to some extent current year cash flow affects the dividend payout decision of capital goods sector companies in India. On the practical dimension, the study also supports the argument that greater profitability enables the firms to easily afford to a higher amount of dividend payouts, which does not disturb its financial needs. Such information would help the firms to focus on the major factors which do have their impact on the payment of dividend and in creating appropriate strategies to improve the dividend payment and firm's overall performance.

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