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DIVIDEND SMOOTHING & IMPLICATIONS OF LINTNER's MODEL: AN EMPIRICAL ANALYSIS OF INDIAN METAL SECTOR

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ABSTRACT

Dividend smoothing is the strategy used by the managers to avoid adverse reaction of market participant or shareholders while setting dividend level. John Lintner (1956), in his study on dividend policy found that managers target a long-term dividend payout ratio and concluded that dividends are sticky, connected to long-term sustainable earnings, paid by mature firms, and are smoothed from year to year. This study is an effort to find the applicability of dividend smoothing in BSE Metal Sector firms.

This paper utilizes time series cross sectional panel data analysis to examine dividend payout policies of 51 A& B listed companies in BSE Metal Sector. The empirical analysis of 782firm year observations for the period of fifteen years reveals that dividend smoothing prevails in Indian Auto Sector. The study reveals dividend policies of the firms depend strongly on lagged dividend and profit after tax with robust statistical significance of coefficients. The high target payout ratio coupled with high speed of adjustments (SOA), shows presence of dividend smoothing and hence, empirical analysis conducted strongly supports and further confirms Lintener's (1956) findings.

KEYWORDS: *Dividend Smoothing, Lintner Model, Metal Sector, Panel Data, Target Payout, Adjustment Factor.*
***JEL** Classification: G2, G3*

Introduction

Dividend smoothing can be described as strategy used by the managers to avoid adverse reaction of market participant or shareholders while setting dividend level. Lintner model incorporates the dominant determinants of corporate dividend decisions and considered as pillar and strong foundation for later research on dividend smoothing. John Lintner (1956) in his survey of corporate Chief Executive Officers and Chief Financial Officers found that dividend policy is an important variable as managers believe stable dividends reduces negative investors' reactions. The determination of dividend policy indicates the levels of retained earnings and savings are dividend decision byproducts. According to Lintner, shareholders prefer smoothened dividend income and hence firms are primarily concerned with stability of dividends. Managers believe that the market puts a premium on firms with stable dividend policy. Lintner observation indicates earnings were most important determinants of any change in dividends. Lintner also reported that majority of managers develop long-term payout ratio targets and use periodical partial adjustments to reach target levels. Lintner argued that avoidance of erratic changes in dividend policy is crucial to firms. Lintner developed Partial adjustment model specifying dividend smoothening by managers. He presumed changes in the dividend payment are related to the earnings, speed of adjustment and target payout ratio.

This study is an effort to find the truth behind these arguments and to demonstrate application of Classic Lintner Model for Indian capital market, in specifically, applicability of dividend smoothing in BSE Metal Sectoral firms. The Section I, presents theoretical background and literature review. Section II describes the data and methodology. In Section III, we examine empirical results of the relation between

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dividend policy, the dependent variable and independent variable, lagged dividend and Income1, Income2 of BSE metal sector firms measured in terms of Panel data analysis, speed of adjustment and target payout ratio. Section IV concludes the paper.

Literature Review

John Lintner (1956), in his study on dividend policy found that managers target a long-term dividend payout ratio and concluded that dividends are sticky, connected to long-term sustainable earnings, paid by mature firms, and are smoothed from year to year. As per him, investors considering change in the net earning is sole factor behind change in the dividend policy is the reason for managers to target net earnings in the payout ratio. Management avoids erratic changes and follows conservative dividend policy as the stockholders prefer stable dividend over volatile payments. His findings have been further confirmed with more recent empirical evidence examining association of dividend with net profits, cash flow and other variables by Fama and Babiak (1968), De Angelo H & De Angelo L (1990), Baker and Powell (2000), Brav et al. (2005), etc. Knyazeva (2008) found that weekly governed managers exhibit more dividend smoothing and less likely to cut dividends. Empirical study conducted by Michaely et al (2002) exhibits that the market punishes dividends reduction way more severely than the dividend increase. Brav et al (2005) argue over reaction of the market for dividend cuts is the reason is to why dividends are sticky. On the other hand, Ogden et al. (2002) argue that since a firm's financing needs vary over time, so should its dividends.

Research Methodology

- **Sample and data Source:** The study constitutes BSE Metal Sector Index chosen as the sample. Specifically, the study is conducted for 51 metal sector firms chosen as a sample in the metal sector and 3 were dropped for non-availability of data bringing sample size to 49 firms. The reference period for the present study is from the year 2001 to 2016, i.e., period of 15 years. However, due to information constraints the sample size differed in few years, throughout out the sampling period. Prowess database maintained by Centre for Monitoring Indian Economy (CMIE) is the prime source of data for the study purpose. The filtering criterion which has been used in selecting the stocks includes firstly, consistency with the dividend payment history for the study period 2000-2016 for the minimum of 4 years. The second filtering criterion used for the selection is that the market-capitalization of these companies should be more than ten crores. The third filtering criterion is that the scrip must be traded continuously without any interruption during the above mentioned period. The total good firm year observations considered for the study is 782**.**

- **Model Development:** Basic Lintner model is used for investigating the dividend payment behavior of BSE Metal Sector firms. The following are the model equations used in the study.

Lintner's Basic Model

D*t = **(TD/P)***Et …………………………………… (5.1)

Dt –D (t-1) = â + **SOA**{D*t -D(t-1)}+ μ_t……………………… (5.2)

D_t –D (t-1) = â + **SOA**{D*t -D(t-1)}+ μ_t ……………………………… (5.3)

D_t –D (t-1) = â + **SOA** {**(TD/P)** (Et) -D(t-1)}+ μ_t...................................... (5.4)

D_t = â + **(TD/P) SOA** Et + (1- **SOA**) D (t-1) + μ_t... (5.5)

Where,

D*t = Desired Dividend in the current year

Dt= Actual dividend payment in the current year

TD/P= Target Dividend Payout Ratio

E_t = Earnings per share in the current year

D_t-1= Lagged dividend (Dividend in the previous year)

SOA= Partial adjustment factor

â = Intercept related to dividend growth

μ= Standard Error term.

In Lintner Model two parameters embedded in the firm's dividend behavior, i.e. '**(SOA)***(**TD/P)**' and (1-k) are included in β1 and β2 (regression coefficients) respectively. These parameters are as follows:

- **Target Dividend Payout Ratio (TD/P):** Target payout ratio is a firm's long-run dividend-to earnings ratio. The company's dividend policy is targeted to pay out a certain percentage of earnings, but it pays a stated and stable dividend and adjusts dividend to the target as base line increases in earnings. The target payout ratio is computed using regression coefficients, i.e.

(TD/P)= β_1/ (1-β_2)

- **Adjustment factor (k) or Speed of Adjustment (SOA):** It considers the quantity (1-β2) as a safety factor that firm uses to avoid giving the dividend payment to a level which cannot be maintained in the later years.

(SOA)= 1 - β2

Simplified version of Multiple Regression Equation of Lintner Model

Dt =â + β_1Et + β_2 Dt-1 + μ ………………………. **(5.6)**

- **Statistical Tools Used in the Model:** A **regression** helps to assess up to what extent predictor variables account for variability in a dependent variable. In our study, it is used to check if predictor, Earnings or PAT and Lagged dividend (dividend of the previous year) account for variability in the dividend paid for the current year. Time series cross sectional Panel data analysis has been used for analyzing the data. Pooled (OLS), Fixed Effect Model (FEM) or Least Square Dummy Variable (LSDV), Random Effect Model (REM) model have been used to test significance dividend smoothing and applicability of Lintner model in Indian Metal Sector. Appropriate statistical test such as F test, Lagrange Multiplier (LM test) and Haussmann Test have been appliedto find the suitability of panel data models. Overall significance of the model is tested using ANOVA–F test for checking if the model holds good. Durbin Watson is used to test auto correlation. T-test and p- value is used to find statistical significance of the Lintner model.

Empirical Procedure and Results of Panel Data Analysis

The Time series cross sectional analysis in the empirical panel data procedure all the available yearly observations from 2001 to 2016 for all the firms as detailed in Exhibit 5A.1 of the Appendix. Also here the analysis is based on variants of Equations (5.1) to (5.8) using the alternative proxies to represent income, lagged dividend and firm size. There are two models used with two alternative measures of income (INCOME1 and INCOME 2) and lagged dividend for finding dividend smoothing along with Size as a control variable. Profit after tax (PAT), Total Income are considered as alternative variable to represent INCOME1, INCOME2 respectively. For each of the two variants of Equations (5.7) and (5.8), the PANEL command in R produces three regressions: the Pooled OLS model, the FIXED effects model and the RANDOM effects model. The first three models produce OLS estimates while the RANDOM effect model produces FGLS estimates. The basic model is of the form:

$Y_{i,t} = \hat{\mathbf{a}}_i + \Sigma\, \boldsymbol{\beta}_k X_{k,i,t} + \varepsilon_{i,t}$ 5.7

There are K regressors excluding the constant terms, $\hat{\mathbf{a}}_i$. The Pooled OLS model is based on the assumption that both slopes and intercept coefficients are the same across firms and time. Under this assumption OLS provides consistent and efficient estimates of α and β_k, and Equation (5.7) becomes:

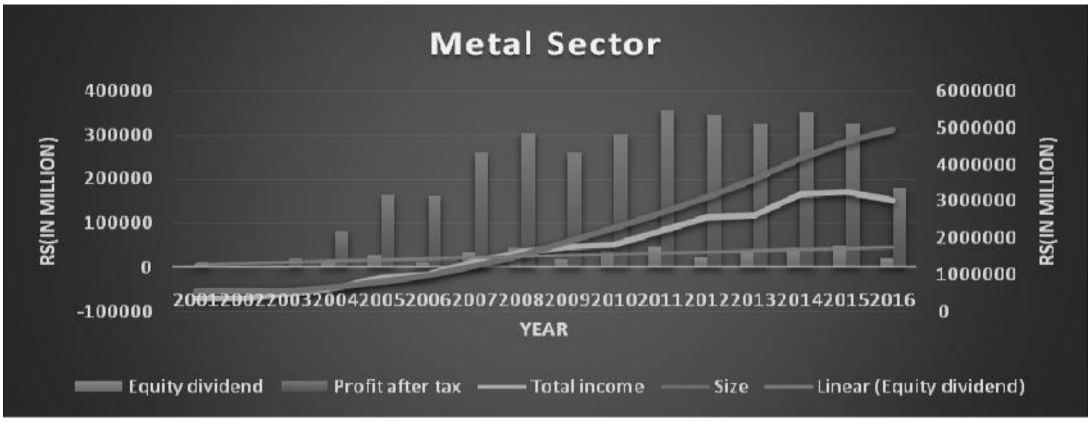
$Y_{i,t} = \hat{\mathbf{a}}_i + \Sigma\, \boldsymbol{\beta}_k X_{k,i,t} + \varepsilon_{i,t}$ 5.8

The FIXED or least square dummy variable (LSDV) and RANDOM or error component (ECM) effects models relax the assumption that the intercept coefficients are constant across firms. The RANDOM effects model takes $\hat{\mathbf{a}}_i$ to be firm-specific disturbance terms that are constant across time for each firm while The FIXED effects model takes $\hat{\mathbf{a}}_{i\ i}$ to be firm specific constant terms. Thus the FIXED effects model allows for different intercepts for each individual firm. The empirical procedure is to subtract the individual firm mean from each variable and run the regression on this converted data and as the firm-specific effects are assumed constant over time, by subtracting the individual means for each variable, the firm-specific effects are removed.

The residuals obtained from Equation (5.8) are the mean residuals for each firm. They are therefore equivalent to the individual effects, $\hat{\mathbf{a}}_i$ in the FIXED (LSDV) effects model and represent the deviation of firm $_i$ from the constant, **â.**

- **Dividend Payout Pattern:** The dividend payout pattern of Indian metal sectorfor the period 2001 to 2016along with profit after tax (PAT), total income paid by the firms and the total firm size in terms of total assets are being depicted in the below figure.

Graph 1: Dividend, PAT, Total income and Size in metal sector of India For the period 2001-2016



Source: Prowess data, compiled by author.

The above graph depicts the trends prevailing in Indian metal sector. Though the total income of the sector is showing the upward trend, the profit after tax of the sector is fluctuating throughout the period from 2001 to 2016. If the net earnings after tax are stable it would induce a management to choose a higher adjustment coefficient. But if net earnings are subject to wide fluctuations, a desire to have stable dividend would lead to choosing lower adjustment coefficient. It may be stated that the principal determinant of dividend policy is profitability. The gridline of linear equity dividend indicates more stability compared to the profit after tax. Size of the metal sector and total income is showing increasing trend but return after tax is fluctuating during the stated period. Thus, even though net earnings are volatile for the period, the equity dividend payout policy is seen to be conservative, sticky and smoothed for the sector. Below statistical inferences can further validate the significance of the Lintner model and the speed of adjustment prevailing and the target payout ratio for the sector.Dividend smoothing has been increasing over the past 16 years as depicted in the figure.

Exhibit1. Panel Data Results of Pooled (OLS), REM & FEM Model In Metal Sector for the Period of 2000-2016 (MODEL –I)

	Pooled (OLS) Model			Random Effect Model (ECM)			Fixed Effect (LSDV) Model		
	Estimate	**Std. Error**	**t-value**	**Estimate**	**Std. Error**	**t-value**	**Estimate**	**Std. Error**	**t-value**
Constant	-386.26	241.14	-1.60	-407.00	249.22	-1.63			
Income1	0.46	0.02	23.20***	0.46	0.02	23.11***	0.50	0.02	21.64***
L.Divd	0.41	0.03	16.40***	0.41	0.03	16.23***	0.34	0.03	13.01***
Size	-0.01	0.00	-4.14***	-0.01	0.00	-3.88***	0.01	0.00	2.04*
R-Sqr	0.738			0.733			0.663		
Adj. R Sqr	0.737			0.732			0.639		
ANOVA -F	F(3,780): 731.473(.000)			F(3,780):714.318(.000)			F(3,732): 479.832(.000)		
DW Test	1.8013			1.8035			1.8487		
Panel Tests	F(48,732) = 2.6816(0.000)			LM TEST: $\chi^2(1)$= 15.515(0.000)			HAUSMANN: $\chi^2(3)$ = 173.28(.000)^		
SOA	**1 - β2= (1-.34)=.66 i.e. 66%**								
TD/P	**β_1/ (1-β_2)= .5/.66=.757i.e. 75.7%**								

Note 1: The results provided in the Table are estimated using R Software. 2. ***, **,* and + indicates .001, 1%, 05% and 10% level of significance respectively. 3. For variable definitions see Appendix 4A. 4. Model is either Pooled Ordinary Least Squares (OLS) model where the firm individual mean is subtracted from each variable, or random effects (ECM): Feasible Generalized Least Squares (FGLS) model where data is transformed by subtracting [1-SQRT (θ)] times the individual firm mean from each variable or Fixed effects (LSDV):5. F-test FIXED versus Pooled (OLS): H_o is that both slope and intercept coefficients are the same across all firms. H_a is that the regression slope coefficients are identical but that the intercepts are not. 6LM test Random versus Pooled (OLS). 7. Haussmann test: Comparing the fixed effects and the random effects estimators. Under H_o both OLS and FGLS estimators are consistent but the OLS is inefficient. Under H_a OLS estimators are consistent but FGLS estimators are not. 8. P values are given in parenthesis () for F test. 9. Speed of adjustment and Target payout ratio is given for the significant panel test model.

The results of pooled OLS data, the FIXED or least square dummy variable (LSDV) and RANDOM or error component (ECM) effects models of the Metal Sector are shown in Exhibit No.1. As depicted in pooled data results, regression coefficient both Income1 as well as regression coefficient of dividend paid during the previous year is significant at .001%.The F statistics tests the validity of the Lintner model in the Metal sector which is significant indicating Lintner model's validity for metal sector. To examine the existence of autocorrelation Durbin Watson test has been applied. The DW statistics is 1.8 indicating that there is no problem of serial autocorrelation in the data for pooled OLS model. The R square and adjusted R square for pooled data analysis is 73% indicating goodness of fit of the model.

The panel data regression results of the FIXED or least square dummy variable (LSDV) and RANDOM or error component (ECM) effects models shows that regression coefficient of dividend paid during previous year and Income1 is significant at 99% level of significancefor both REM and FEM model respectively. The R squared and adjusted R square is 73.3% and 73.2% respectively for random effect model. The R squared and adjusted R square is 66% and 63% respectively for fixed effect model. The results demonstrate overall validity of the Lintner model as F statistics is significant at 1% level of significance. The results fixed effect time model shows that both the independent variables PAT and dividend paid during previous year are statistically significant at 1% level of significance.

The test conducted for validating panel models indicates that Fixed and Random effect models were preferred over Pooled OLS as per F test and LM Test.Haussmann statistics results highlight that Least square Dummy variable (LSDV)panel regression model should be preferred over Random effects. Hence, the results of fixed effect model (FEM) data should be used for interpretation of the study conducted on Lintner model. Under FEM model,F test results are significant at 99% level strongly supporting validity of the Lintner model in Indian Metal sector. Further, statistical analysis indicates firm effects are present and time effects are absent in metal sector.The individual firm effect for each firm under metal sector are provided in the appendix No.2. Totally 9 firms are having individual fixed firm effects out of 49 firms.

As the fixed effect modelis preferred over pooled OLS and randomeffect model, speedof adjustment and target payout ratio are calculated for LSDV model as represented in the exhibit No.1.The model-I indicates 66% of speed of adjustment and 76% of the target payout ratio for the metal sector. We found high dividend smoothing in metal sector as results indicate high target payout ratio and high speed of adjustment coefficient.

Exhibit 2: Panel Data Results of Pooled (OLS), REM &FEM Modelsin Metal Sector for the Period of 2000-2016 (MODEL –II)

	Pooled (OLS) Model			Random Effect Model (ECM)			Fixed Effect (LSDV) Model		
	Estimate	Std. Error	t-value	Estimate	Std. Error	t-value	Estimate	Std. Error	t-value
Constant	41.80	312.37	0.13	40.65	341.07	0.12			
Income 2	-0.02	0.01	-1.84^{+}	-0.02	0.01	-1.24**	0.05	0.02	3.08
L.Divd	0.76	0.03	28.89***	0.74	0.03	28.02***	0.63	0.03	22.35***
Size	0.03	0.01	3.11**	0.03	0.01	2.59	-0.01	0.01	-1.02**
R-Sqr	0.559			0.541			0.454		
Adj. R Sqr	0.557			0.539			0.416		
ANOVA -F	F(3,780): 329.181(.000)			F(3,780):306.223(.000)			F(3,732):203.073(.000)		
DW Test	2.1678			2.1663			2.0365		
Panel Tests	F(48,732): 3.3876(0.000)			LM TEST: $\chi^2(1)$= 38.046(0.000)			HAUSMANN: $\chi^2(3)$ = 123.32 (.000)^		
SOA	**1 - β_2= (1-.34)=.37 i.e. 37%**								
TD/P	**β_1 / (1-β_2)= (.5/.66)=.135 i.e. 13.5%**								

Note 1: The results provided in the Table are estimated using R Software. 2. ***, **,* and $^{+}$ indicates .001, 1%, 05% and 10% level of significance respectively. 3. For variable definitions see Appendix 4A. 4. Model is either Pooled Ordinary Least Squares (OLS) model where the firm individual mean is subtracted from each variable, or random effects (ECM): Feasible Generalized Least Squares (FGLS) model where data is transformed by subtracting [1-SQRT (θ)] times the individual firm mean from each variable or Fixed effects (LSDV):5. F-test FIXED versus Pooled (OLS): H_o is that both slope and intercept coefficients are the same across all firms. H_a is that the regression slope coefficients are identical but that the intercepts are not. 6LM test Random versus Pooled (OLS). 7. Haussmann test: Comparing the fixed effects and the random effects estimators. Under H_o both OLS and FGLS

estimators are consistent but the OLS is inefficient. Under H_a OLS estimators are consistent but FGLS estimators are not. 8. P values are given in parenthesis () for F test. 9. Speed of adjustment and Target payout ratio is given for the significant panel test model.

The results of pooled OLS data, ECM and two way fixed effect model-II of metal Sector are shown in Exhibit No.2. The pooled data results indicate regression coefficient both income during the current year as well as regression coefficient of dividend paid during the previous year is significant at 10% and 1% level of significance respectively. Results of random effect model as presented in the exhibit No.2 shows that the regression coefficient of dividend paid during previous year and income is significant at 1% and 5% level of significance respectively. Size variable is significant for pooled OLS and fixed effect model. The results least square dummy variable model shows that the independent variables PAT is not statistically significant but lagged dividend are statistically significant at 1% level of significance. The F statistics tests the validity of the Lintner model in the metal sector for all the three models. To examine the existence of autocorrelation Durbin Watson test has been applied. The DW statistics is approximately 2.02 indicating that there is no problem of serial autocorrelation in the data for all the three models.

The R square for pooled data analysis is 55% for pooled OLS and random effect model and 45% for fixed effect model indicating fair amount of the relationship between dependent and independent variables being explained. The Adjusted R square is 54.8%. The results demonstrate overall validity of the model as F statistics is significant at 1% level of significance.

Panel test like Lagrange multiplier test, F test and Haussmann conducted for the validationof panel models. Results indicates that Fixed and Random effect models were preferred over Pooled OLS as per F test and LM Test. LM test results reported above are statistically insignificant. Haussmann statistics results highlight that Least square Dummy variable (LSDV) panel regression model should be preferred over Random effects. Hence, the results of fixed effect model (FEM) data should be used for interpretation of the study conducted on Lintner model. Hence, as F test results are significant at 99% level in the fixed effect model depicting Lintner model holds strength in Metal sector. Further, statistical analysis indicates firm effects are present and time effects are absent in metal sector. The individual firm effect are provided in the appendix No.1 which indicate that smoothing varies across firms but not over time and all firms do not follow same policy with respect to smoothing.

As the fixed effect model is preferred over pooled OLS and random effect model, speed of adjustment and target payout ratio are calculated for LSDV model as represented in the exhibit No.2. The model-II indicates 37% of speed of adjustment and 13.5% of the target payout ratio for the metal sector. Compared to model –I, we can findlow dividend smoothing in model –II, but as per the dividend payout ratio and speed of adjustment suggested by Lintner, results indicate low target payout ratio and high speed of adjustment coefficient.

Findings and Conclusion

The analysis of Indian metal sector, pooled data shows that earnings of the present year and equity dividend of the preceding year are significant factors affecting the dividend tobe distributed during the current year. Since the regression coefficients of both independent variables are found to be significant at 1% level of significance, this fact is statistically validated by the findings. The results conclude that the companies ensure the current dividend signals their performance and the desire of management to maintain a stable dividend. Thefirms that are younger, smaller, high growth firms with more volatile earnings and returns smooth less, while firms that are more stable, have more excess cash flow, lower growth opportunities and more persistent earnings, smooth more(Michaely, Richard , Womack, & Thaler, 1995).

The study has confirmed BSE Sectoral firms follow Lintner's description of dividend policy as they firstly, smooth dividends, secondly, they are reluctant to cut dividends even in case of fewer earnings (PAT), and they increase dividends by small percentages with increase in the earnings. The results uses Lintner model to examine difference in dividend smoothing in various BSE Sectoral segments in India. The dependent variable, dividend is regressed on PAT and lagged dividend. Higher coefficient of on PAT and lagged dividend reflects a higher level of dividend smoothing. In other words, it can be concluded that dividend smoothing are highly asymmetric with respect to earnings changes as dividends adjust faster to positive earnings news than to negative earnings news and when a firm's dividend is below the target, it is more likely to smooth dividends less and move towards the target, but when its dividend is above target, it is more likely to smooth dividends more and leave them unchanged (Mark & Michaely, 2009).

In Indian metal sector, the target dividend payout ratio derived from beta 75%as depicted in first model and in the second model between 13%. It is relatively high target payout ratio and same as compared to what was suggested by Lintner. The partial adjustment factor is found to be 66% in first model and 37% for second model. This is similar as highlighted by Lintner in his findings. The choice of a particular speed of adjustment factor depends upon possible variations in net earnings after tax and stability of dividends required. Stable net earnings after tax would induce a management to choose a higher adjustment coefficient. But if net earnings are subject to wide fluctuations, a desire to have stable dividend would lead to choosing lower adjustment coefficient. It can be concluded that the principal determinant of dividend policy is profitability. The results signify that Indian metal sector, specifically score high on dividend stability.

Thus, through the analysis and the discussions presented an endeavor has been made to empirically test the Lintner model in Indian consumer goods sector. Our study unearths the applicability of dividend smoothing and signaling approaches and relevance of information asymmetry models in metal sector. Our study contributes as an addition to the finance literature and holds statistical significance similar to many other studies in the developed countries on dividend signaling and smoothing approach used by the management. The future research in the area of dividend smoothing can be focused on exploring other sectors of Indian market to test validity of Lintner model.

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Appendix 1

Exhibit 3: Individual Firm Effects of FEM Models in Metal Sector for the Period of 2000-2016

S. No	Metal Sector	Model-I			Model-II		
	Firm Name	**Estimate**	**S.E.**	**t-value**	**Estimate**	**S.E.**	**t-value**
1	20 Microns Ltd.	-17.34	1473.92	-0.01	-61.7	1880	-0.03
2	A P L Apollo Tubes Ltd.	-66.68	1473.99	-0.05	-321	1880	-0.17
3	Adhunik Metaliks	46.81	1474.57	0.03	-276	1880	-0.15
4	Alicon Castalloy Ltd.	-54.32	1473.93	-0.04	-112	1880	-0.06
5	Ashapura Minechem	96.91	1474.05	0.07	-207	1880	-0.11
6	Bhushan Steel Ltd.	-1164.8	1521.35	-0.77	-1690	1940	-0.87
7	Coal India Ltd.	7215.95	1817.12	3.97***	22800	2210	10.28***
8	Electrotherm (India)	-3191.2	1503.21	-2.12*	-7150	1900	-3.76***
9	Gallantt Ispat Ltd.	-22.97	1473.91	-0.02	-51.6	1880	-0.03
10	Gandhi Special Tubes	-45.81	1473.91	-0.03	-3.99	1880	0
11	Godawari Power & Ispat	-234.32	1474.19	-0.16	-341	1880	-0.18
12	Goodluck India Ltd.	-78.03	1473.95	-0.05	-218	1880	-0.12
13	Gujarat Mineral Devt Corpn	-974.29	1475.56	-0.66	-46.4	1880	-0.02
14	Gujarat N R E Coke Ltd.	198.21	1474.94	0.13	-162	1880	-0.09
15	Hindalco Industries Ltd.	-8052.1	1718.64	-4.69***	-5920	2240	-2.64**
16	Hindustan Zinc Ltd.	-8956.7	1689.36	-5.30***	6010	1950	3.08**
17	I S M T Ltd.	23.73	1474.82	0.02	-396	1880	-0.21
18	Indian Metals & Ferro Alloys	-258.01	1474.23	-0.18	-242	1880	-0.13
19	J S W Steel Ltd.	-4694.9	1664.55	-2.82**	-6750	2290	-2.94**
20	Jai Balaji Inds. Ltd.	379.08	1475.15	0.26	-428	1880	-0.23
21	Jai Corp Ltd.	-326.22	1474.25	-0.22	-119	1880	-0.06
22	Jindal Stainless Ltd.	-72.37	1492.66	-0.05	-1930	1910	-1.01
23	Jindal Steel & Power Ltd.	-4273.8	1529.87	-2.79**	-2270	1940	-1.17
24	Kalyani Steels Ltd.	-252.91	1474.2	-0.17	-367	1880	-0.2
25	Lakshmi Precision Screws	-18.85	1473.93	-0.01	-87.5	1880	-0.05
26	MOIL Ltd.	-1065.6	1475.28	-0.72	18.4	1880	0.01
27	M S P Steel & Power Ltd.	-30.86	1474.03	-0.02	-166	1880	-0.09
28	Maithan Alloys Ltd.	-143.89	1473.96	-0.1	-184	1880	-0.1
29	Monnet Ispat & Energy Ltd.	74.23	1476.38	0.05	-340	1880	-0.18

30	Mukand Ltd.	-126.23	1476.99	-0.09	-732	1880	-0.39
31	NMDC Ltd.	-8078	1631.18	-4.95***	4310	1950	2.21*
32	National Aluminium Co.	-3446.2	1505.86	-2.29*	-572	1910	-0.3
33	Orissa Minerals Development	-288.9	1474.01	-0.2	0.74	1880	0
34	Pennar Industries Ltd.	-86.72	1474.01	-0.06	-242	1880	-0.13
35	Rohit Ferro-Tech Ltd.	188.64	1474.3	0.13	-330	1880	-0.18
36	Sarda Energy & Minerals	-280.15	1474.14	-0.19	-236	1880	-0.13
37	Sathavahana Ispat Ltd.	-40.26	1474.01	-0.03	-181	1880	-0.1
38	Shah Alloys Ltd.	144.56	1474.2	0.1	-298	1880	-0.16
39	Srikalahasthi Pipes Ltd.	-140.71	1474.02	-0.1	-199	1880	-0.11
40	Steel Authority Of India Ltd.	-13435	2140.98	-6.28***	-11500	3170	-3.61***
41	Sunflag Iron & Steel Co.	-190.61	1474.28	-0.13	-462	1880	-0.25
42	Surana Industries Ltd.	6.25	1474.15	0	-232	1880	-0.12
43	Surya Roshni Ltd.	-229.87	1474.63	-0.16	-717	1880	-0.38
44	Tata Metaliks Ltd.	-70.89	1474.05	-0.05	-301	1880	-0.16
45	Tata Sponge Iron Ltd.	-266.57	1474.04	-0.18	-147	1880	-0.08
46	Technocraft Industries (India)	-199.49	1474	-0.14	-144	1880	-0.08
47	Usha Martin Ltd.	-143.32	1477.28	-0.1	-710	1880	-0.38
48	Vedanta Ltd.	-5100.8	1537.34	-3.32***	-1700	1960	-0.87
49	Visa Steel Ltd.	265.59	1474.61	0.18	-216	1880	-0.12

Note: 1. The results provided in the Table are estimated using R Software. 2. ***, **,* and + indicates .001, 1%, 05% and 10% level of significance respectively.

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