Variance Decomposition of Dividend Policy at Three Levels

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Dividend is an unresolved puzzle in corporate finance and present study attempted to resolve this puzzle by testing the impact of industry, firm, and firm year on dividend policy. The study applied the variance decomposition technique in order to investigate the variance in dividend payout ratios at firm year, firm, and industry level. Study used conveniently sampled data of 57 non-financial firms from 2005 to 2017. The study revealed that at firm and firm year level dividend payout ratios are varied significantly in Pakistan. However, the study found insignificant variation at industry level (measuring by dividend to cash flow and sale ratios) in dividend payout ratios. The study provides important evidence to the stakeholders about the relation of dividend policy and firm year, industry, and firm. The investors and managements need to consider the impact of firm year on dividend policy while formulating dividend policy of the Pakistani firms. Furthermore, the study adds significant contribution to the existing literature by clarifying the three important determinants of dividend policy with respect to their contribution in Pakistan.

Keywords: Dividend policy, variance decomposition, hierarchical linear modeling, dividend payout ratios, corporate finance

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Dividend policy stands amongst the most researched topic in finance. Previous research studies have mostly focused on the association of dividend payments and share prices (Erkan, Fainshmidt and Judge, 2016). Many theories have been proposed to deal with dividend policies. The empirical results of past studies are consistent with dividend irrelevance theory proposed by Miller and Modigliani (1961). "Dividend" is the return given to investors on investments in stocks; and the class of investors (shareholders) is determined by board of directors. Dividends can be in the form of cash payment or shares of stock. How or under what considerations a firm or company's management decides to pay dividend is explained in terms of "dividend policy". Kato, Loewenstein and Tsay (1997) defined dividend policy as "the set of guidelines a company uses to decide how much of its financial resources it will pay out to share–holders, when it is not required by law". Dividend policy not only affects the investor expectations but also influences the firm's value (Farrell and Saloner, 1985).

There are several factors that affect the dividend policy, such as institutional investors, tax rates, profitability, investor expectations, risk, volatility etc. (Skinner, 2008). Dividend is paid by the firm with more and stable expected earnings (Dyl and Weigand, 1998), thus in such cases the dividend policy is linked to the expectations of the management about future earnings. Firms with higher idiosyncratic and systematic risk tend to pay fewer dividends (Hoberg and Prabhala, 2009), whereas firms with more idiosyncratic risk often pay smooth dividends because of asymmetric information (Booth and Xu, 2007).

Decision to pay dividends and how much a firm actually pays is affected by a firm's cash flow uncertainty which is measured in terms of current stock return volatility (Chay and Suh, 2009). If there is a larger time lag between dividend announcement and dividend payment, then there will be higher probability of cut in dividend that is in accordance with the idea of delaying bad news (Alti, 2006).

According to the dividend irrelevance theory, for perfect capital markets, share repurchases and dividends are perfect substitutes, given how investors are indifferent to the source of gain (Miller and Modigliani, 1961). Batool and Javid (2014) studied the relationship of corporate governance with the dividend payment. They reported a positive relationship between dividend and corporate governance structures which show that higher dividends are paid by the firms implementing corporate governance. Liquidity and profitability have more effect on dividend pay-out policy (Afeef *et al.*, 2017). According to Imran (2011) dividend pay-out ratio has negative relationship with cash flows and liquidity had no relationship with dividend in Pakistani Engineering firms. The literature on subject matter examines several determinants of dividend policy like country, industry, firm, and firm-year (Zhou, Booth and Chang, 2013). Nonetheless, researchers have analyzed various determinants effecting dividend policy in an isolated way. Consequently, the relevant effect of each contributing level to dividend policy was not determined, especially in the context of Pakistan. A study decomposed the variance within each year showed that firm level had the strongest effect on dividend policy, while decomposition of variance of dividend policy at each level was dependent upon the proxies used for dividend policy (Erkan *et al.*, 2016).

To the best of our knowledge, there is no published study available on dividend policy using data from multiple industries to investigate the variance at different levels in context of Pakistan. This study is an endeavor to understand the dividend policy in Pakistan in terms of variance decomposition of industry, firm, and firm-year levels. This study applied Hierarchical Linear Model (HLM) technique to capture variance in dividend policy for each level. In this study, the examination of decomposition of dividend variance at industry, firm, and firm year levels of 53 firms from nine major industries of Pakistan Stock Exchange (PSX) has been carried out. Firstly, this study is helpful to investors, policy makers, stakeholders, and researchers in understanding dividend payout policies of Pakistan. Second-

ly, it is also helpful for policy makers and researchers to make policy decisions or amend their existing policies in the interest of stake holders. To venture further in their businesses, the government can use outcoes of this study to monitor the dividend policies and better regulate the market. Finally, the signaling theory suggests that dividend payout sends a signal to investors regarding their perception of competency of mangers and future performance of corporations (Baker and Powell, 1999). Likewise, the payment of dividends not only represents better corporate performance in present but it also gives a positive signal about future earnings (Fosberg, 2004), thus affecting the shareholders wealth (Michaely and Roberts, 2011). Surprisingly, to the best of authors' knowledge, prior research studies have not analyzed the signaling effect of dividend policy at various levels. The results of this research will be helpful in re-examining previous studies yielding a more focused future inquiry (Al-Twaijry, 2007). This study further contributes to the literature on subject with respect to Pakistan by decomposing the variance at industry, firms, and firm-year levels to see their relative contribution at each level. Next sections of present paper will present the literature review, methodology, results and discussion. Finally, conclusion, implications, limitations and future directions are included.

LITERATURE REVIEW

Dividend Policy

Dividend policy is a complex matter as managers have to consider several factors e.g., profitability, leverage, growth, agency costs, signaling incentive, risk, liquidity and size, regulation, industry, firm, firm-year etc. According to Brealey *et al.* (2012), in financial economics, formulation of dividend policy is the most difficult problem for businesses that requires an impressive solution. Investors expect good returns on their investments, so both investors and businesses are anxious for better investment opportunities and returns, therefore, dividend policy is of utmost importance to firms trading their stocks (Michaely and Roberts, 2011). Dividends indicate to investors that their capital is growing and safe. Moreover, when the shareholders receive their return it becomes evident that the mangers handling their investment are competent and reliable. Their continued confidence means that agency costs are acceptable to them and no over investment took place (Baker and Powell, 1999). Dividend policies are not uniform across countries rather these vary from country to country (Denis and Osobov, 2008). The variance in dividend policies is explained in terms of agency explanations in cross-country research (Shao, Kwok and Guedhami, 2010).

Dividend Policy at Industry Level

Prior research studies have indicated that dividend policy is affected by industry conditions. Generally, it is believed that firms in an industry tend to have common practices regarding strategic decisions.

Further, it is observed that dividend policy decisions of managers are directly affected by their competitor firms. For instance, firms that are operating in growth-oriented industries are inclined to pay less dividends and retain higher level of earnings, because pecking order theory postulates that retained earnings are cheaper source of financing. On the contrary, firms operating in highly competitive environs such as telecom and banking pay higher voluntary dividends as compared to other industries. Several researchers worked on these lines projected that dividend policy is affected by regulatory institutions charged with protecting the interest of investors or creditors (Brockman & Unlu, 2009). Similarly, Lin and Shen (2012) found that taxes and legal regime influence the dividend policy. Booth and Zhou (2015) stated that market power of a firm plays a role in dividend payout. In addition, Brockman and Unlu (2011) reported that business disclosure standards also show influence on dividend policy. According to North (1994) the variance in dividend policies amongst countries was due to difference in regulatory regime, drawn from national regulatory institutions that have influence on dividend policy. La Porta *et al.* (2000) discussed that usually higher dividend is paid in those economies, in which shareholders are well protected by legal systems of states. Millar *et al.* (2005) found that variations amongst regulatory mechanisms lead to variations in information asymmetries across economies. Resultantly, regulatory mechanisms determine how agency costs are perceived and dealt with by stakeholders. The same regulatory mechanisms make the "means by which a nation constrains and directs corporate power so that it efficiently creates economic value and equitably distributes economic wealth" (Judge, Douglas and Kutan, 2008). Thus, a national regulatory mechanism within a country affects the corporate policies including dividend policy, while making strategic decisions on resource allocation within one industry, there is a trend that firms follow similar path (Spender, 1989). Based on the above literature review, following hypothesis is proposed:

H_1: Industry level effect on dividend policy is significantly different from zero.

Dividend Policy at Firm Level

Managers always try to negotiate between dividends on the one side and to cater the needed investments on the other, given that various resources are available at their disposal (Varadarajan, 1983). Aggarwal and Kyaw (2010) studied the relationship between capital structure theory and dividend policy and reported that more dividends are tended to pay by multinational firms as compared to domestic firms. Baker and Wurgler (2004a) suggested a "catering theory" of dividends and elaborated that decision for dividend payments are made on the basis of prevailing investors' demand for dividend. Decisions regarding dividend payments are also influenced by firm's debt level, financial performance, and cash reserves (Shao *et al.*, 2010). Investors seek dividends from firms with

large cash reserves, but firms with higher debt even if they have cash reserve try to avoid dividend payout. Lower dividends signal that firms desire to deal with higher debts (Holder, Langrehr and Hexter, 1998). Thus, there is evidence from some studies that firm level factors also have impact on dividend policy (Aivazian, Booth and Cleary, 2006). Mirza and Afza (2010) investigated the influence of cash flow and ownership structure on dividend policy in Pakistani scenario. The results revealed that operating cash flow and profitability have strong positive influence on dividend, however, leverage and cash flow sensitivity had no significant impact on the firm's dividend payment. Ahmed and Murtaza (2015) critically analyzed the actors affecting the dividend payout using pooled least squared method while taking into account the cement, oil, energy. and sugar industry. They found significant relationship of liquidity, EPS, debt to equity ratio (leverage), firm size with dividend payout ratio. Ahmed and Javid (2009) investigated changing aspects and factors of dividend pay-out policy and found that current payment of dividend depends upon current earnings per share and past dividend paid per share. However, the dividend policy was more sensitive to current earnings and the firms having high speed of adjustment and low target pay-out ratio show the instability to smoothing their dividend payments. According the Afeef *et al.* (2017) profitability and liquidity had a significant relationship with dividend policy. Imran (2011) tried to identify various factors that determine the firm's dividend paying behavior, using Ordinary Least Squares Regression (OLS) technique on a sample data of 36 Pakistani Engineering Sector firms listed in KSE, and reported that dividend per share has positive relationship with profitability, growth in sale, earning per share and negative relationship with firm size. Therefore, we propose following hypothesis:

H_2: Firm level effect on dividend policy is significantly different from zero.

Dividend Policy at Firm-Year Level

Prior literature suggests that dividend policies are quite stable in US. However, the empirical studies have shown that dividend policies vary across firms over the period of time (Shao *et al.*, 2010). But outside the USA, variation in dividends payout from year to year is more common (La Porta *et al.*, 2000). Zhou and his colleagues stated that such variances are explained in terms of share repurchases instead of cash dividends (Zhou *et al.*, 2013) or "catering" in particular years. The managers do so by distributing dividends in such particular years (Baker and Wurgler, 2004b). However, opposite is witnessed by Alti (2006) during "cold" market years and relatively large dividends in "hot" market years. In this way, effort and time taken for the payout affects the dividend policy (Baker and Wurgler, 2002), resulting in payout ratios that are more variable at the firm-year level. Al-Twaijry (2007), using correlation and mean comparison analysis, conducted a research in context of Malaysia and

concluded that dividends payout take effect from the past and future prospects. Dividends in a particular year are associated with earnings in that year but not entirely. Moreover, growth of future earnings is not affected by payout ratios but have negative correlation with a company's leverage. Based on above arguments, following hypothesis is proposed:

H_3: Firm-year level effect on dividend policy is significantly different from zero.

METHODOLOGY

In Pakistan Stock Exchange (PSX), 585 firms were operating in 35 industrial sectors in year 2017. For the purpose of analysis, the study initially selected 106 non-financial firms from 9 different dividend paying sectors. As the basic purpose of the study is variance decomposing of dividend paying firms, so the dividend payers were included in the sample. This limit the data to 57 firms for the purpose of final analyses. The researcher collected the annual data (from 2005 to 2017) reported in the annual reports of the selected firms; however, the data for market price of share for firms had been gathered from SCS trade (scstrade.com) and Business recorder (brecorder.com), in order to calculate market capitalization of firms. In addition, the website of SBP (sbp.org.pk) and Pakistan Stock Exchange (psx.com.pk) had also been consulted for financial data of firms. While applying the methodology used by Erkan *et al.*, (2016), the dividend policy had been measured by dividend to cash-flow, sale, earnings before interest, taxes, depreciation, and amortization (EBITDA), net income, and market capitalization ratios.

Several techniques for variance decomposition exist in the literature like standard errors (SE), nested analysis of variance (ANOVA) and variance components analysis (VCA). Anyhow, this research applied Hierarchal Linear Modeling (HLM) to investigate the variance that exists directly at each level. HLM allows the researchers to determine up to what extend each level is contributing to explain in model and to the error term (Primo, Jacobsmeier and Milyo, 2007).

Hierarchical Linear Modeling (HLM)

Before calculating the variance decomposition, the error terms (residual values) have been calculated at each level (firm-year level, firm level and Industry level) by following the methodology suggested by Erkan *et al*. (2016). Therefore, the HLM equation at each level have been determined as follows:

-Dividend policy at firm-year level (Level-1 Model)

$$\text{Dividend Policy }_{ijk}= \delta_{0jk}+e_{ijk} \qquad (1)$$

−Dividend policy at firm level (Level−2 Model)

$$\delta_{0jk} = \alpha_{00k} + \varepsilon_{0jk} \qquad (2)$$

−Dividend policy at industry level (Level−3 Model)

$$\alpha_{00k} = \beta_{000} + \mu_{00k} \qquad (3)$$

The above equations (1, 2 & 3) were used to determine the dividend payout ratios at each level. In equations suffix shows dividend payout ratio for firm year i in firm j and Industry k. Deviation of dividend policy of firm−year from firm's average is measured by Residual value (e_{ijk}). ε_{0jk} is a deviation of dividend policy of firm from industry average, (α_{00k}). μ_{00k} is a deviation of dividend policy of industry from grand or combined mean (β_{000}), which has been calculated on weight age of presence of firms in an industry. δ_{0jk} is mean value of dividend payout ratio for firm j, and firm−year ijk is nested. Whereas e_{ijk} is error term (residual) or random firm−year influence, which elaborates that how much dividend policy of firm−year level is deviated from firm's average value. Furthermore, the firm j average value is also spread into average value of industry dividend payout ratio (α_{00k}) and residual term (ε_{0jk}), which represents that up to what extent the dividend payout ratio of firm j in industry k varies from the industrial average of dividend payout ratio. This residual shows the random effect at firm level. Finally, the industrial average dividend payout ratio is divided into grand mean (β_{000}) of all industries and error term μ_{00k}. Grand mean has been calculated by using weighted average method. Whereas μ_{00k} represents the difference between industry average and grand mean and elaborates the random effect of payout ratio at industry level.

−Combination of Equations

Finally, the above equations are combined to construct a mixed model:

$$\text{Dividend Policy}_{ijk} = \beta_{000} + \mu_{00k} + \varepsilon_{0jk} + e_{ijk} \qquad (4)$$

Similarly, e_{ijk} is error term (residual) or random firm−year influence, which elaborates that how much dividend policy of firm−year level, is deviated from firm's average value. Residual term ε_{0jk} represents that up to which extent the dividend payout ratio of firm j in industry k varies from the industrial average of dividend payout ratio. This residual shows the random effect at firm level. Finally, the grand mean (β_{000}) of all industries and error term μ_{00k} have been mentioned. Grand mean has been calculated by using weighted average method. Whereas μ_{00k} represents the difference between industrial average

and grand mean, and elaborates the random effect of payout ratio at industrial level.

RESULTS AND DISCUSSION

Table. 1 shows the averagely dividend policies in each selected sector of Pakistan (see Appendix-I). Table shows the number of firms taken from each industry, the average of dividend payout ratio for each industry, percentage of cash, sales, EBITDA, net income, and market capital. The grand average of each dividend payout ratio shows that averagely 1.795 percent dividend is paid of cash, 0.073 percent of sales, 0.410 percent of EBITDA, 1.002 percent of net income, and 5.343 percent of market capitalization.

–Variance Decomposition at Industry Level

Table. 2 shows that at industry level dividend policy is explaining 2.5 percent by dividend cash flow ratio, which is less as compared to firm level (14%) and very less when compared with firm-year level (83.5%), but it is insignificant. 4.1 percent variation in dividend policy is explained by dividend to sale ratio and this ratio is also not significant, 5.5 percent by dividend to EBITDA ratio and have significant variance, 3.6 percent variance by dividend to net income ratio, and 2.1 percent variance by dividend to market capitalization ratio has been explained at Industrial level. The results are showing that dividend policy reflects variance at all levels, but the ratios like dividend to sale and dividend to cashflow are insignificant but remaining ratios are significant. Therefore, Hypothesis 1 is partially accepted.

–Variance Decomposition at Firm Level

Firm level effect of dividend policy shows that 14 percent variation in dividend policy is explained by dividend to cash flow ratio, 34.2 percent by dividend to sale ratio, 44.6 percent is explained by dividend to EBITDA ratio which is almost equal at firm-year level as well, 27.5 percent variation in dividend policy is explained by dividend to net income ratio at firm level. 19 percent is explained by dividend to market capitalization ratio. Firm level shows more dividend policy effect rather than industry level measured by each ratio. The variations at each level are significant, which supports the hypothesis 2. Therefore, Hypothesis 2 is accepted.

–Variance Decomposition at Firm-Year Level

Firm-year level is an important level to analyze variance in dividend policy. At this level, dividend policy explains 83.5 percent effect measured by dividend to cash flow ratio, 61.7 percent effect of dividend policy is explained at this level while using dividend to sale ratio. Dividend policy reflects 49.9 percent

effect at firm-year level, while determining by dividend to EBITDA ratio that is almost equal to firm level i.e., 44.6 percent. 68.9 percent effect is explained by dividend to net income ratio which is less than from the firm year level. 78.9 percent variance has been explained at firm-year level for dividend policy while measuring it by dividend to market capitalization ratio. So comparatively, more variance is found in cash flow ratio at firm-year level. The variations are significant; therefore, Hypothesis 3 is accepted.

Variance Components (%)					
Levels	**Cash flow**	**Sales**	**EBITDA**	**Net Income**	**Market Cap**
Industry Level	2.5	4.1	5.5**	3.6**	2.1**
Firm Level	14.0**	34.2**	44.6**	27.5**	19**
Firm-Year Level	83.5**	61.7**	49.9**	68.9**	78.9**
Total	100	100	100	100	100

Source: Authors' Computation
Note: ** $p < .01$

Table 2. Variance Decomposition of Dividend Policy

The results show that at firm-year level more variance has been accounted for rather than other level. The results of the study are aligned with the results of the study conducted by Erkan *et al.* (2016). Present study was conducted by using 3 level hierarchical linear modeling (HLM) (Firm-year, Firm level and Industry level) to account for the variance decomposition. However, this study has been conducted in emerging market of Pakistan and showed the similar empirical findings. Erkan *et al.* (2016) study results show that firm-year level explained significant variance on dividend policy. It means that the variance in dividend policy is mainly explained by firm-year level. Variance in dividend policy has also been significantly explained by firm level but less than the firm-year level. Industry level is less significant when examined simultaneously with other levels. It means that in Pakistan industry level is not as much contributing to variance in dividend payout, whereas firm level has more contribution to variance in dividend policy than industry level.

CONCLUSION

The objective of this study was to analyze and decompose the variance in dividend policy and to find that which one level from three levels i.e., industry, firm and firm-year, contributes more toward the total variance on dividend policy in Pakistan. The dividend policy was operationalized by using five ratios which are dividend to cash flow, dividend to earnings before interest , tax , depreciation and

amortization (EBITDA), dividend to market capitalization, dividend to net income, and dividend to sales. This study has empirically examined the variance decomposition of dividend policy on the three levels i.e., Industry, firm and firm year levels of Pakistan stock market using data of 57 non-financial firms from 2005 to 2017. Hierarchical linear modeling (HLM) was applied to determine the variance decomposition in dividend policies at firm, firm-year, and industry level. The study reveals that at firm and firm year level dividend payout ratios are varied significantly in Pakistan. However, the study found insignificant variation at industry level (measuring by dividend to cash flow and sale ratios) in dividend payout ratios. As the dividend policy has its stylized pattern at industry level and moreover, the dividend payout ratio depends upon the size of the company, so the results are consistent with the elaborated pattern.

IMPLICATIONS

This study provides some practical implication as it is based on insight into dividend policy. The most significant contribution of the study is for shareholders and potential investors. The study provides them conclusive evidence with respect to variation in dividend policy. These two stakeholders are required to consider the outcome of the study in order to avoid future uncertainty. As per results of the study, a firm-year effect causes more variation in dividend policy of Pakistani firms. So, the shareholders and potential investors need to make measures before investing in those companies where year effect is more pronounced. Secondly, the management can consider to take measures to minimize the year effects on dividend policy. This will help them in providing signal to market and controlling the year effect that may cause variation in final dividend. Smooth dividend policy can mitigate the year effects in case of Pakistani firms.

LIMITATIONS AND FUTURE DIRECTIONS

This study is a first attempt to highlight the factors causing variation in dividend policy in the context of Pakistan, so it has some limitations as well. First, limited sectors were selected due to availability of data and time constraints. Furthermore, more industries could be added to the sample for broader vision and it may happen that relative importance of each level may be different than this finding. Dividend policy variance was decomposed only at three levels of industry, firm and firm-year level. As this study was conducted at three levels of non-financial data of 57 firms listed in Pakistan stock exchange through hierarchical linear modeling (HLM), further studies could extend to analyze more firms taken by all industries (35) at different levels like regional level in Pakistan and other countries like Asian countries, developing countries or in Sub-continent. Propensity to dividend payout can be

added and compared with dividend payout of the firms.

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Industry	Firms	Cash flow	Sales	EBITDA	Net Income	Market Cap
Sugar	9	0.670	0.025	0.220	0.033	1.439
Chemical	9	0.411	0.092	1.133	3.662	32.367
Consumer	12	1.523	0.117	0.240	0.355	0.004
Cement	6	12.544	0.060	0.403	0.375	0.017
Fertilizer	4	-0.765	0.103	0.222	0.572	0.008
Oil and Gas Mkting	5	0.428	0.013	0.233	0.157	0.006
Oil and Gas Explore	4	-0.076	0.170	0.319	0.287	0.008
Engineering	4	-0.359	0.033	0.513	3.141	0.013
Textile	4	0.426	0.017	0.133	0.148	0.004
Grand Average	**57**	1.795	0.073	0.410	1.002	5.343

Source: Authors' Computation

Table 1. Industrial Averages (%)