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A Mathematical Model for Determining Dividend Payout in Nigeria

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Abstract

There has been an unending disagreement over the theoretical specification of a model for determining dividend payout in Nigeria. This research therefore, is borne out of the dissatisfaction with the previous work done on dividend policy in Nigeria.

In attempt to develop a model for determining dividend policy in Nigeria, this study concentrated on the conventional dividend model of Lintner and we subjected it to thorough statistical analysis to know whether the model has strong predictive value in the Nigerian corporate environment.

We further identify the relationship that exists among dividends, taxes and investment through the development of our model, which was tested statistically to confirm its validity.Finally, in this paper we confirmed Lintner's dividend model for determining dividend payout in Nigeria. The relationship that exists among dividends, taxes and investment seems to be inconsistent. This fails to provide a discernable trend to validate future projections.

1.0 Introduction

A company can use its earnings to pay dividends to its shareholders or it can use the funds for other purposes such as retirement of debt or financing new investments. Financing, investment and dividend decisions are the basic components of corporate policy. Dividend decision involves the periodic determination of proportion of a firms total distributable earnings that is payable to its shareholders. The larger the dividend paid, the fewer funds are available for investment.

Dividend according to Osaze [1] "is the distribution of part of the profit of a company to shareholders in proportion to the number of shares held". It also represents the benefits investors get on their stock of investment to compensate them for the risk they are undertaking and for the time value of their investment. Oyejide [2] asserted that dividend payments are themselves very important because their size, relative to corporate after tax income directly influence the magnitude of business savings, which is in turn one of the more critical determination of a country's economic performance. This view was further corroborated by Adesola and Okwong [3] that the payment of dividend conveys to shareholders that the company is profitable and financially strong, and that an increase in payment ratio signals to shareholders a permanent or long-term increase in firm's expected earnings.

In Nigeria, there seems to be a general disagreement over the theoretical specification of a dividend policy in Nigeria. Oyejide [2] asserted that "the determinants of company dividend policy in Nigeria have neither been clearly identified nor their relative impact determined". The disagreement as regard the determinant of dividend policy started with the work of Uzoaga and Alozienuwa [4], Izedonmi and Eriki [5], Adesola and Okwong [3], and Musa [6]

The study carried by Uzoaga and Alozienuwa [4], used 13 companies over a four year period (1969 -1972). Their study was carried out to highlight the pattern of dividend policy pursued by these firms particularly since and during the period of indigenization. Using the classic work of Lintner [7].They identified and described the conventional factors, which are normally expected to guide each company's dividend policy. In their study, they found very little evidence that the traditional factors could adequately explain the unprecedented rate of dividend declared by the firms. They concluded that all classical forces that determine dividend policy, liquidity needs, and cash requirements for corporate expansion and shareholders reactions seem to have given way to fear and resentment induced dividend policy.

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Another contribution to the debate of dividend payment theory was made by Izedonmi and Eriki [5]. They undertook a research survey of 13 companies over a five-year period (1984-1989) to determine the extent to which the traditional theory on determinants of dividend decision of firms serve in explaining the observed dividend characteristics of these companies. They found out that Nigerian publicly quoted companies are interested in maintaining the level of their dividend and that they hardly reduce dividend even in the face of declining earnings per share. This practice is in line with the theory that a

reduction of dividend will be perceived by investors as a sign of bleak future. Further contributions to dividend policy are the works of Adesola and Okwong [3]. In their study, using 27 publicly quoted companies, they evaluated the observed dividend policy of the companies. They found out that the dividend policies of quoted companies in Nigeria are significantly influenced by their earnings and previous year's dividend and that because of the reluctance to cut dividends, companies only partially adjust their dividends to change in earnings. However, in spite of these difficulties in the reconciliation of available empirical findings with almost any theory, there seems a point of convergence among the dividend relevance theorist known as "dividend effect". The controversy, however, has been that the traditional determinants of dividend policy are incapable of explaining concisely the observed dividend behavior of Nigerian publicly quoted companies. The concern of this study therefore, is to consider anew the Lintner dividend model. That is, the study intends to verify the relevance of Lintner's dividend model in explaining dividend behavior in Nigeria, thereby ascertaining whether the model has a strong predictive value for determining corporate dividend policy of Nigeria publicly quoted companies. The study is to be carried out using 10 randomly selected quoted companies. It will cover a five-year period (2007-2011).

2.0 Model Specifications

The following models based on multiple regression technique shall be used for the analysis.

2.1 Lintner's Dividend Equation

$$D_t = b_o + b_1 PT_t + b_2 D_{t-1} + V_t \tag{1}$$

Where,

$D_t =$ Current year dividend

$b_o =$ Measure the reluctant to reduce the existing dividend payment that to raise it.

$b_1 =$ The rate of change in dividend payment as a result of a unit change in profit after tax.

$b_2 =$ the change in dividend arising from shareholders dividend expectation

$D_{t-1} =$ Previous year's profit

$V_t =$ Stochastic or disturbance terms

Using the Lintner [7] dividend equations (1), equation (2) are defined for the period (2007-2011)

$$2007: D_7 = b_0 + b_1 PT_7 + b_2 D_6 + V_7$$
$$2008: D_8 = b_0 + b_1 PT_8 + b_2 D_7 + V_8$$
$$2009: D_9 = b_0 + b_1 PT_9 + b_2 D_8 + V_9$$
$$20010: D_{10} = b_0 + b_1 PT_{10} + b_2 D_9 + V_{10}$$
$$20011: D_{11} = b_0 + b_1 PT_{11} + b_2 D_{10} + V_{11} \tag{2}$$

2.2 Derived Dividends, Taxation and Investments Models

This model using the multiple regression analysis is derived to show the relationship between current dividend, taxation and investment.

$$D_t = b_o + b_1 PB_t + b_2 T_t + b_3 I_t + V_t \tag{3}$$

Where

$b_2 < o$ = change in dividend resulting from a unit change in tax payment

$b_3 < o$ = change in dividend result from a unit change in investment expenditure

D_t = current dividend

PB_t = profit before tax

T_t = tax payment

I_t = investment expenditure measured by fixed assets less depreciation

V_t = stochastic terms

The following equations below are derived for the period 2007 – 2011.

$$\begin{aligned}
&2007: D_7 = b_0 + b_1 PT_7 + b_2 T_7 + b_3 I_7 + V_7 \\
&2008: D_8 = b_0 + b_1 PT_8 + b_2 T_8 + b_3 I_8 + V_8 \\
&2009: D_9 = b_0 + b_1 PT_9 + b_2 T_9 + b_3 I_9 + V_9 \\
&20010: D_{10} = b_0 + b_1 PT_{10} + b_2 T_{10} + b_3 I_{10} + V_{10} \\
&20011: D_{11} = b_0 + b_1 PT_{11} + b_2 T_{11} + b_3 I_{11} + V_{11}
\end{aligned} \tag{4}$$

3.0 Data Analysis and Results

It was mentioned, that what constitutes the determinants of dividend payment by quoted companies in Nigeria is rather an empirical questions. To this end, the Lintner dividend model was subjected to thorough statistical analysis using annual cross sectional data for the period 2007 – 2011 obtained for 10 quoted companies that were randomly selected from Nigeria publicly quoted companies. The data obtained were analyzed by method of multiple regression to provide answers to the long-standing dividend policy puzzle. In the analysis, attempt was made to investigate the relationship that exists among dividends, taxation and investment of the sampled companies.

In doing this, data on after tax profit, taxes, dividends, investment and net profit before tax were analyzed. In all, ten regression equations were analyzed for the period under study (2007-2011). The results of the regressed equations would enable us to validate or invalidate whether the Lintner divided model can be used as a model for determining dividend payout in Nigeria. In this study, the model will be assumed to have a predictive value in determining dividend payout if it meets the condition imposed by the statistical tests.

The statistic required includes:

1. Adjusted Multiple R^2 known as co-efficient of determination. This explains the variations that occur in a dependent variable due to change in an independent variable.
2. T – Statistic, which is used to determine the significance of individual estimated parameters.
3. F – Statistic is used to determine the statistical significance of overall parameters of the estimated equations.

The test in this research is based on 5% level of significance using a 2 – tailed test. The results of the tests are presented in equations (5-9).

3.1 Lintner's Dividend Model (2007- 2011)

Relationship between current dividend payment, net profit after tax and one year lagged-dividend payment.

2007

$$D_7 = 0.32 + 0.35PT_7 + 0.23D_6 \tag{5}$$

$$R^2 = 0.39,$$

2008

$$D_8 = 1.17 + 0.28PT_8 + 0.68D_7 \tag{6}$$

$$R^2 = 0.78$$

2009

$$D_9 = 1.87 + 0.16PT_9 + 0.74D_8 \tag{7}$$

$$R^2 = 0.89$$

2010

$$D_{10} = 0.61 + 0.38PT_{10} + 0.23D_9 \tag{8}$$

$$R^2 = 0.69$$

2011

$$D_{11} = 0.47 + 0.13PT_{11} + 0.84D_{10} \quad (9)$$

$$R^2 = 0.72$$

3.2 Interpretation of Results

The equations (5-9), represent Lintner's dividend model which explains dividend payment (D_t) as a function of profit after tax (PT) and previous year dividend (D_{t-1}).

Looking at equations (5-9), one would observed that

(i) The co-efficient of profit after tax (PT) for the five year period are positive and this is an increasing function of current dividend payment (D_t) as was predicted. They are all statistically significant at 5% level of significance. This means that the estimated equations are economically desirable.

(ii) The estimated parameters of previous year dividend for the five-year period are positive and this is an increasing function of current dividend payment. This means that they are statistically significant and as such have predictive values. This further gives credence to the importance of previous year dividend in corporate dividend payment when one looks at the magnitude of the estimated parameters as mostly highly correlated with current dividend (D_t) compared with profit.

(iii) The constant terms are expected to be positive as postulated by Lintner "to reflect the greater reluctance to reduce than to raise dividends, which was commonly observed as well as the influence of the specific desire for a gradual growth in dividend payments". This constant term is in agreement with Lintner model.

(iv) The co-efficient of variation, which is a measure of goodness of fit, is highly significant in all the 5 years under study (2007-2011). The F-test which is, usually described as the test of the significance of R^2, is statistically significant at 5% level of significance. Also, the values of R^2 are 0.39, 0.78, 0.89, 0.69 and 0.72 respectively meaning that net profit after tax and previous year dividend explain about 39%, 78%, 89%, 69% and 72% of the variation in current dividend payment in Nigeria over the period of (2007-2011). The value of R^2 for 2007 is low, this might be due to the general elections and unstable economic climate at that time, and firms generally experience hard times because of the unfavorable economic and political climate.

(v) In 2007, unit change in net profit after tax (PT) and previous year dividend (D_{t-1}) will change current dividend (D_t) by 0.35 and 0.64 units respectively.

In 2008, a unit change in PT and D_{t-1} will change D_t by 0.28 and 0.68 units respectively.

In 2009, a unit change in PT and D_{t-1} will change D_t by 0.16 and 0.74 respectively.

In 2010, a unit change in PT and D_{t-1} will change D_t by 0.38 and 0.52 units respectively.

In 2011, a unit change in PT and D_{t-1} will change D_t by 0.13 and 0.84 units respectively. From this analysis, we can see that a unit change in D_{t-1} leads to more increment in D_t than a unit change in PT. This means that the significance of D_{t-1} is more pronounced in dividend decisions.

Considering all the points (i-v), it can be seen that Lintner divided model is valid and has a good predictive power for determining dividend payout in Nigeria.

4.0 Relationship between Dividend, Taxation and Investment

The results of this model for the period (2007 – 2011) are follows:

2007

$$D_7 = 0.31 + + 0.23T_7 - 0.76I_7 \quad (10)$$

$$R^2 = 0.86$$

2008

$$D_8 = 0.68 + 0.18PB_8 + 0.06T_8 - 0.31I_8 \quad (11)$$

$$R^2 = 0.14$$

2009

$$D_9 = 0.58 + 0.28PB_9 - 0.13T_9 - 0.69I_9 \quad (12)$$

$$R^2 = 0.78$$

2010

$$D_{10} = 0.57 + 0.38PB_{10} + 0.85T_{10} - 0.29I_{10} \quad (13)$$

$$R^2 = 0.89$$

2011

$$D_{11} = 0.57 + 0.38PB_{11} + -0.29I_{11} \quad (14)$$

$$R^2 = 0.89$$

4.1 Interpretation of Result

In equations (10-14), we try to show the relationship that exists among dividend payment (D_t profit before tax (PB), Taxation (T) and investment (I). Hence, current dividend payment is regressed on profit before tax, taxation and investment spending.

Profit before tax shows a positive relationship with current dividend. With respect to taxation, equations (10), (11) and (14), and the co-efficient are positively signed. This violates the economic apriori test, which is supposed to be negative. Even equations (12) and (13) that are negatively signed are statistically insignificant at 5% level of significance. This means that the result is by chance and can therefore be ignored.

Investment expenditure is correctly signed in all the equations under study. This shows that the higher the investment spending, the lower the dividend that is paid, and it is statistically significant at 5% level of significance. The implications of the behavior of taxation and investment spending in the regressed equation can be summarized as follows:

1. The positively signed co-efficient of taxation shows that the higher the tax, the higher the dividend payout. This is not acceptance because inverse relationship is expected between dividend payment and tax. This means that changes in company's tax rate would affect dividend payout ratio downward.
   Also, the positively signed co-efficient of taxation as noticed in the equation above, can be said to mean that management continuous action to meet the dividend obligation in the form of a target payout ratio to avoid adverse shareholders reactions may be a phenomenon to partly explain the positive relationship between dividend and this implies that, although tax may affect the target payout ratio of dividend payment, but once target ratios are set, they are not changed frequently with respect to change in taxation. This is the trend that pervades the five-year period under study.
2. In all the equations above, there is a negative relationship between investment spending and dividend payment meaning that the higher the investment spending, the lower the dividend payout ratio. This is an ideal situation and it occurs when the board of directors wants the company to be a growth company that is attractive to investors.
   On the whole, equation (10) and (14) can be used for prediction because they fulfill economic apriori test to a certain extent as well as fulfilling some statistical and economic requirement. Equation (11) should have been the best predictive equation but we are discouraged by the unusually low value of R^2. With this low value, we need to look elsewhere for better explanation of a model for determining policy because about 86% variation in dividend policy in that year was not explained by the independent variables.

5.0 Conclusion

This study has provided an in-depth analysis of corporate dividend policy by Nigerian publicly quoted companies based on an explicit test of Lintner's dividend models and a derived model to explain the response of dividend to investment and taxes.

In the first case, the result of the study provided strong evidence in support of the conventional Lintner – type dividend model as a basis for determining policy by Nigerian publicly quoted companies.

The estimated co-efficient for most of the equations in the period under study shows high level of statistical significance. This gave credence to Lintner's theoretical framework that dividend depend directly on current net income but are constrained by past dividend because of the reluctance to cut dividends'

The study confirmed the positive relationship between dividend payment, current earnings and previous year's dividend. In the period studied, the previous year's dividend has a stronger correlation; this therefore provides a strong explanatory factor in current dividend than current income. This implies that the Nigerian publicly quoted companies would want to pay dividends as much as they paid in the previous year and will feel reluctant to reduce payment. These findings affirm Lintner's remark that "we found no instance in which the question of how much should be paid in a given year was considered without regard to the existing rate as an optimum problem in terms of the interest of the company".

Secondly, the derived model of investment, taxes and dividend produces an inconsistent result. The degree of the inconsistency in the model makes it highly unreliable for prediction. For instance, there is a positive relationship between taxes and divided in almost all the equations. This relationship violates rational expectation.

Thirdly, the inverse relationship between dividend payout and investment expenditure is quite ideal. This can be explained to mean that management uses retained earnings to finance investment spending rather than reliance on external funding. The obvious implications of the negative link between dividend payment and investment is that any dividend models aimed at increasing investment also tends to increase earnings retention. Therefore, models for determining dividend payout that succeed in increasing the ratio of investment to corporate net income tend to decrease the dividend payout ratio.

6.0 Recommendation

The result of this research work have a good policy relevance especially as it shows that profit after tax is an important source of corporate investment funds as well as for meeting dividend payment.

The implication for the firm is that they must strive to take measures that will enhance their corporate earnings to meet the dual obligations of dividend payment and funds for investment. The study shows that previous year's dividend is a primary factor in dividend decision, this implies that dividend payment must grow with time and that management should resist the temptation of cutting back dividends. If management fails to reflect the previous year's dividend in their current dividend payout, it might provoke adverse shareholders reaction and that in essence might affect the firms' share price in the long-run.

Secondly, as confirmed from this study, dividend could be used as a weapon for industrial growth and overall economic growth as well. This is due to the fact that the size of dividend relative to earning influences the level of business saving which is crucial to macro-economic development. The monetary and financial authority should note that monetary policy may influence dividends and savings through its effect on investment outlays, interest rates on the ability of financial institutions to grant credit. This means that higher credit does induce greater retained earnings, and this would constrain dividend payment and consequently impinge on consumption spending since dividend income is used to some extent, in financing consumption expenditure. The implication is that shareholders might withdraw their investment as they are not yielding the required returns on investment. This might lead to a collapse of industrial growth if done on a large scale, hence a collapse of the economy. The monetary and financial authority therefore must be aware of this implication in their policy formulation.

However, the result of this research will be of great importance in taking dividend decision in Nigeria.

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