# AN EMPIRICAL ANALYSIS OF THE PROPENSITY TO PAY OR NOT TO PAY DIVIDENDS: A TEST OF THE LIFE CYCLE THEORY WITH NIGERIAN DATA

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**Abstract**

This study examined the factors that affect the dividend payout policy of firms within the Life cycle theory framework. It sought to discover the propensity to pay or not to pay dividends by firms in Nigeria. The study was based on a sample of 62 firms with a total of 558 observations over a nine-year period covering 2000-2008. Maximum Likelihood (ML) Binary Logit (Quadratic hill climbing) models were used to undertake the analysis. The estimated results revealed that the tendency of a firm to pay or not to pay dividends is most affected by Return on Equity (ROE), Life cycle stage (LCS) and Size. The Test of Model Accuracy show that overall, the estimated model correctly predicts 74.55% (49.12% of the Dep=0 and 91.87% of the Dep=1) observations. The results of the Logit model Goodness-of-Fit test $\chi^2$ to test The Validity of the Model report Hosmer-Lemeshow statistic of 13.12 (p-value = 0.175), and Andrews Statistic 11.72(p-value = 0.375) respectively. These statistics indicate that the Logit model provides a good fit to the data and that the estimates of the variables' parameters in the model are meaningful The above findings show that ROE and Size has positive relationships with the propensity to pay dividends while the relationship between life cycle stage and the propensity to pay dividends is negative. This is against the positive relationship expected by the study. Finally, one practical utility of the study is the fact that it can guide investors in Nigeria and elsewhere decide between capital gain and cash dividend firms in building their portfolios of investments.

## 1. INTRODUCTION

This paper examines the propensity to pay or not to pay dividends /determinants of payout policy in Nigeria. In particular, we test whether there is support for the theory that corporate payout policy corresponds to different stages of firm life cycle. Given the importance of corporate payouts and the longstanding interest in understanding the determinants of payout policy, a careful documentation of the payout policies of firms' is timely. Despite many years of investigation, explaining payout policy remains challenging. There is little published Nigeria research documenting the nature of and changes in corporate payouts using the life cycle theory. Prior Nigerian research (Adelegan 2003; Musa 2005; Okpara 2010; etc) adopted the conventional approach of seeking relationships between some firm characteristics and dividend payout policy without relating the variables to the theoretical underpinning behind the issues involved in dividend policy formulation and evaluation. Thus, it is necessary to explore further and situate the determinants of dividend payout policy according to their theoretical foundations as is done elsewhere. Theoretically, the life-cycle theorem proposes that dividend payment is a function of the age and stage in the life-cycle of a firm. Prior empirical U.S. evidence supports the life-cycle explanation for dividend payments (Fama and French, 2001; Grullon et al 2002; DeAngelo et al (2006). The question is does this apply to firms in Nigeria? According to Frankfurter and Wood (1997) dividend policy of firms is a cultural phenomenon that changes continuously according to environment and time. Therefore, dividend behavioural models must necessarily be continuously modified to capture these factors that are peculiar to a particular period and environment. We investigate whether the life-cycle theory explains variation in Nigerian firms' payouts, and test whether the age and different stages of firm life cycle in Nigeria conform to the expectations of the life-cycle theory. We control for firm size, profitability, growth, and managerial efficiency. The remainder of the paper is arranged as follows. We review the life cycle theory in section two and present the design, data sources and sample selection in section three. Results are discussed in section four, while section five concludes the study.

## 2. LITERATURE REVIEW

According to Bulan and Subramanian (2009), Mueller (1972) proposed a formal theory that a firm has a relatively well defined life cycle, which is fundamental to the firm life cycle theory of dividends. Drawing on the work of Knight (1921) and Schumpeter (1934), Mueller (1972) posits that a firm originates in an attempt to exploit an innovation involving a new product, process, or marketing or organizational technique. In its initial stages, the firm invests all available resources in developing the innovation and improving its profitability. The firm's growth is likely to be slow until it successfully sorts out "teething issues" and establishes a foothold in the market. Thereafter, the enterprise will grow rapidly, as it enters new markets and expands its customer base before any major competition can arise. The agency problem is either absent or not significant at these initial stages for three reasons. First, the firm faces so many opportunities for profitable investment that the pursuit of growth is also consistent with the pursuit of profits. Second, unable to meet all its financing needs through internal cash generation; the firm is forced to tap external capital markets and is therefore subject to market monitoring and discipline. Third, the entrepreneur or manager still retains a sufficiently high fraction of the firm's shares for his or her interests to be well aligned with those of the other suppliers of capital. After a while, competitors begin to enter the market, adopting and improving on the pioneering firm's innovations. As existing markets become saturated and new markets harder to find, the growth of the firm begins to slow down. To maintain growth and profitability, the firm needs to generate innovations. However, as the firm grows as an organization, its ability to process information deteriorates, and the risk-taking incentives of the average manager diminish (Mueller (1972). These factors place a limit on the ability of a large firm to grow through innovations. As a result, the firm eventually reaches a point at which it lacks profitable investment opportunities for the cash generated from its existing operations. At this mature stage, a shareholder-value-maximizing firm would begin distributing its earnings to its shareholders. Eventually, when all the existing operations of the firm are on the verge of becoming unprofitable, a value maximizing firm would liquidate all assets and distribute the proceeds to its shareholders. However, when the managers of a firm do not pursue strict value maximization but are rather interested in expanding the size of the firm to reap perks and other rewards, the distribution of earnings to shareholders will deviate from the optimal policy. In summary, under the life cycle theory proposed by Mueller (1972), the typical firm will display an S-shaped growth pattern, with a period of slow growth at start-up leading to a period of rapid growth and eventually to maturity and stagnation or slow growth. Mueller (1972) then traces the implications of the life cycle theory of the firm to dividend policy. As previously discussed, the optimal dividend policy at a value-maximizing firm in his framework is to retain all earnings in the rapid growth phase and to pay out 100 percent of the earnings at maturity. The cost of capital that a firm faces will vary over its life cycle as a result of changes in risk, information asymmetry, and the extent of the agency problem. Grullon et al. (2002) present evidence supporting the hypothesis that the systematic risk of firms declines around dividend increases. They explain the decline was caused by a decline in the number of growth options, including compound options, held by the firm. This is, of course, a joint explanation for a reduction in both the cost of capital and the return on investment with maturity. Therefore, it does not, by itself, explain why firm maturity should shift dividend policy in the direction of higher payouts. A better understanding of the link between maturity and payout policy requires analysis of the changes in the level of information asymmetry and the extent of the agency problem over the firm's lifecycle. As Bulan and Subramanian (2009) notes, when a firm is young and relatively unknown, substantial information asymmetry exists between its insiders and outside investors. As a result, raising capital from external sources is costly. At the same time, the firm's investment needs are likely to exceed the cash flow from its

operations, which implies that its financing comes from external sources at the margin. As a result, the firm faces a high cost of capital. As the firm becomes more established and well known, investors gain better knowledge about its assets and its management, and the level of information asymmetry decreases. Correspondingly, the firm's cost of external capital decreases. In the context of dividend policy, this implies that as a firm matures, its management has less need to conserve cash for potential future projects and is, therefore, in a better position to make dividend payments. The assumption that a firm derives its dividend policy from the objective of shareholder-value maximization may be appropriate for a small entrepreneur managed firm in which the manager holds a substantial fraction of the firm's shares and the suppliers of capital are able to monitor the manager closely and take steps to prevent value-destroying activities. However, the professional managers who are employed at large corporations typically do not hold large fractions of the company's stock. In addition, the diffused nature of shareholding at a large corporation implies that the average shareholder may not have the power to control the management effectively. Mueller (1972) notes that this separation of ownership and control in large corporations implies that managers of these firms may have lower incentives to maximize shareholder value than the entrepreneur manager. He hypothesizes that managers of large corporations will consequently aim to maximize firm size and growth rather than market value, and will therefore invest more and pay lower dividends than a shareholder-value-maximizing management (Jensen and Meckling (1976) provide a detailed treatment of this agency problem). Mueller (1972) links dividend policy to the firm's life cycle, stating that the "freedom to pursue growth, and the management-stockholder conflict that accompanies it, appear only over time as the firm expands and matures." On a similar note, Jensen (1986) observes that the shareholder-manager conflict is particularly severe in firms with large free cash flow (i.e., cash flow in excess of investment opportunities), coining the phrase "agency cost of free cash flow" to denote this problem. The management of a firm with a large free cash flow may be tempted to waste the cash by awarding itself excessive perks and benefits. Another potential problem with high levels of free cash flow is diversion. That is, at firms that are part of a business group controlled by one main shareholder, the controlling shareholder may be tempted to divert cash flow from firms in which he or she has low cash flow rights to firms in which he or she has high cash flow rights.
DeAngelo and DeAngelo (2006) and DeAngelo et al (2006) characterize the agency cost of free cash flow as a cost associated with retention, which becomes progressively more severe as the firm becomes mature. Grullon et al. (2002) have earlier recognized that the agency problem becomes important in the mature stage of a firm's life cycle. One view is that the agency cost of free cash flow is more usefully considered a part of the cost of capital of the firm. In an efficient market, investors will incorporate the possibility that the management might waste a portion of the returns on the firm's investments (whether the wastage occurs through consumption of perks by the management or diversion of profits) and demand a correspondingly higher expected return or yield on the firm's securities when the agency cost is higher. Whether the agency cost is viewed as a cost of retention or an element of the cost of capital, the implication for the life cycle theory of dividends is the same—as a firm matures, it generates more cash than can profitably be invested, and the optimal dividend policy becomes one of investing less and paying out more to shareholders.
Finally, the exact point at which a firm may shift from being a non–dividend payer to a dividend payer may depend on various factors, including the severity of the agency problem, its corporate governance, and the market for corporate control. DeAngelo et al (2006) emphasize this, and in support, they present evidence that there is no cutoff or trigger point based on the ratio of retained earnings to total assets beyond which a firm would necessarily start paying dividends..

## 2.2 Studies on Life-Cycle Theory of Dividends

This section provides a discussion of the empirical evidence in support of the life cycle theory of dividends. Early empirical studies on dividend policy in the life cycle context attempt to compare the rates of return on dividends and retained earnings at young and mature companies and industries. According to Mueller (1972), shareholders' preference for dividends over retained earnings (especially in mature industries), documented in many studies, indicates that shareholders tend to believe that firms overinvest for the sake of growth and maintain dividend levels below optimum. Grabowski and Mueller (1975) take a similar static approach, focusing on a comparison of the market valuation of retained earnings and dividend payments in mature companies against non mature companies. These studies do not address the question of whether firms delay initiating dividends beyond the optimal point, and only indirectly deal with the question of whether firms pay lower dividends than optimal after initiation. As discussed here, subsequent studies address these questions more directly by examining the market reaction to dividend initiations and dividend changes. Until recently, few studies directly tested the firm life cycle theory of dividends. Most studies focused on other theories of dividend policy, such as the signaling and clientele hypotheses, with most of the evidence being contrary to the predictions of those theories. The recent interest in the life cycle theory of dividends may perhaps be traced to Fama and French's (2001) study of the dividend payment behavior of publicly traded U.S. firms. They investigate the patterns and determinants of payout policy over the 1926–1999 periods. Their results point to life cycle factors playing a major role in the decision to pay cash dividends. In particular, their findings show that dividend-paying firms are large and highly profitable. These firms have retained earnings that are sufficient to cover their capital investments. On the other hand, firms that have never paid dividends are small and not as profitable as dividend-paying firms. These firms have many investment opportunities that require external financing because their capital spending is far greater than their earnings. Thus, dividend-paying firms have the characteristics of mature firms, while firms that have never paid dividends have the characteristics of young, fast-growing firms. Furthermore, Fama and French (2001) find that dividend payment propensity decreased in the latter decades of their sample and attribute this, in part, to a surge in new listings after 1978, with the new lists being dominated by firms with strong investment opportunities, low profitability, and high growth rates (i.e., firms in the early high-growth phase of their life cycles). In summary, this study shows a significant relationship between the overall patterns of dividend payment and firm characteristics that determine a firm's life cycle stage.

DeAngelo et al (2006) attempt to explicitly test the life cycle theory of dividends by analyzing the relationship between dividend payment propensity and the mix of earned and contributed capital. They measure the mix of earned and contributed capital by the ratio of retained earnings to total equity or total assets of the firm. They assert that this ratio is a good proxy for a firm's life cycle stage because it captures the extent to which a firm relies on internally generated and external capital. When firms are in their high-growth phase, they rely heavily on external sources to finance their investments because their earnings capacity is low. Therefore, this ratio will be low for young high-growth firms. In contrast, firms in their mature stage will have high cash flows and few investment opportunities, and will largely be self-financing. Hence, for mature firms, this ratio will be high. The authors test the firm life cycle theory of dividends by relating dividend payment propensity to the mix of retained earnings to contributed capital. Using a sample of publicly traded U.S. firms in the period 1972–2002, De Angelo et al. (2006) find support for the theory. They document a positive relationship between the proportion of dividend-paying firms and the ratio of retained earnings to total equity and total assets, after controlling for firm characteristics such as profitability, growth, firm size, leverage, cash balances, and dividend history. Thus, a firm is more likely to be a dividend payer when its main source of financing is internally generated earnings. They also find similar results for dividend initiations and omissions. Denis and Osobov (2008) extend the evidence to five other countries, namely, Canada, United Kingdom, Germany, France, and Japan. In those five countries as well as in the United States, they find that the propensity to pay dividends is strongly associated with the ratio of retained earnings to total equity. However, Megginson and von Eije (2008) report no such association between the ratio of retained earnings to total equity and the propensity to pay dividends in their study of dividends and repurchases at firms listed in fifteen European Union countries. But they do find that firm age, size, and past profitability are positively related to the propensity to pay dividends as predicted by the life cycle theory. Skinner (2007) studied corporate payout policy including dividends and repurchases and finds that firms are increasingly using repurchases in place of dividends to payout cash flow. He finds that for a large group of firms that payout earnings through dividends and repurchases, the level of repurchases is driven by earnings over two- or three-year windows, which is supportive of the life cycle theory. However, the annual relationship is weaker, leading Skinner to suggest that managers time repurchases within those windows on the basis of other considerations, such as taking advantage of a low stock price, offsetting dilution associated with employee stock options, managing reported earnings, and distributing excess cash. Grullon et al. (2002) propose that firm maturity and the accompanying decline in systematic risk has important implications for dividend policy. Echoing the arguments discussed in the previous sections, they state that firm maturity is associated with high cash flows but fewer investment opportunities. At the same time, there is a decline in the systematic risk of the firm, as the number of growth options, including compound options, held by the firm have decreased. Consequently, as a firm matures, its earnings growth would slow down and its systematic risk and profitability (return on assets) would decline. This, in turn, brings about a reduction in the reinvestment rate (the reinvestment of retained earnings) of the firm and an increase in dividend payout. Thus, an increase in dividend payout signals the transition of the firm from a high-growth phase to a low-growth phase, or the mature phase, in its life cycle. The announcement effect of dividend changes, specifically the positive stock price reaction to dividend increases, is then explained by the change in systematic risk rather than profitability. To test their maturity hypothesis, or what is essentially the firm life cycle theory of dividends, Grullon et al. (2002) use a sample of New York (NYSE) and American (AMEX) stock-exchange-listed firms that increased or decreased their dividends during the period 1967–1993. One of their main findings is the existence of a relationship between dividend changes and changes in risk. They show that systematic risk declines for dividend-increasing firms and increases for dividend-decreasing firms. In addition, they find a significant relationship between the positive announcement effect associated with dividend increases and the decline in the firm's systematic risk. In terms of profitability, Grullon et al (2002) find that the return on assets of dividend-increasing firms declines after the dividend increase. In summary, their evidence supports the firm life cycle theory. Dividend increases signal a decline in risk and profitability as the firm has reached a more mature stage in its life cycle.

Furthermore, Bulan and Subramanian (2009) emphasis that empirical tests of the traditional signaling theories of dividends rely on the information content of a change in dividend policy. If, indeed, dividend increases or decreases represent significant changes in firm characteristics, then there should be even more significant changes in firm characteristics around dividend initiations since initiations, by definition, occur only once in the firm's life cycle. This is the premise behind Bulan et al.'s (2007) analysis of the timing of dividend initiations in a firm's life cycle. They study how firm characteristics evolve over time as a firm moves toward dividend initiation. The authors estimate a firm's propensity to initiate a dividend as a function of firm characteristics relative to other firms that are at the same stage in their life cycles but that have never paid dividends. Their data cover publicly traded U.S. corporations during the period 1963–2001. Bulan et al. (2007) find evidence supportive of the firm life cycle theory of dividends. Dividend initiators are firms that are larger, more profitable, and have higher cash balances but fewer growth opportunities than firms in the same life cycle stage that have never paid dividends. Thus, dividend initiators are mature firms. They find further evidence of firm maturity in the type of payout policy that firms adopt. Prior work by Jagannathan, Stephens, and Weisbach (2000) and Guay and Harford (2000) shows that firms use stock repurchases to pay out volatile cash flows but use regular cash dividends to pay out permanent cash flows. Their evidence shows a positive relationship between repurchasing activity and the probability of initiating a dividend (i.e., repeated repurchases indicate that a firm is moving toward maturity as its cash flows stabilize). The firm ultimately pays out its excess cash flows in the form of cash dividends. Contrary to Grullon et al.'s (2002) evidence for dividend increases, Bulan et al. (2007) do not find evidence fully supporting the risk-signaling aspect of the life cycle theory of dividends. While firms that initiate dividends are mature firms, they show that the event of dividend initiation itself does not signal a change in the firm's life cycle characteristics. They find that there is no significant difference in sales growth or risk in the pre- and post initiation periods. In addition, Bulan et al (2007) report no evidence that life cycle factors account for the positive market reaction to dividend initiation announcements. Instead, their findings indicate that firms choose an opportune time to initiate a dividend upon reaching maturity. This opportune time to initiate a dividend depends on the market sentiment for dividend-paying stocks measured by Baker and Wurgler's (2004) dividend premium.

## 3. METHODOLOGY

This study made use of econometric methods designed for time series cross-sectional modeling. It is analytical and empirical in nature and made use of secondary data. The population of interest for this study is all quoted companies in the Nigeria stock exchange (NSE) listed on or before 1999 and are in operation as at the end of 2010. The study covers all the sectors as classified by the NSE excluding the insurance sector. In this study, yearly data for the years 1999 through 2010 were collected on the variables of interest across the 62 companies that entered into the analysis. As at the time of this study, there were 245 firms (based on the 2010 Nigerian stock exchange Factbook) quoted at the Nigerian stock exchange (NSE). This study is interested in those companies that were listed prior to or by 1999 and remained in operation as at the end of 2010. Firms were removed once it did not meet this criterion. Secondly, those that met the criteria but had missing data were also removed.

### 3.1 Sources of Data

The data for this study was obtained mainly from the publications of Nigerian stock exchange (NSE) especially: the NSE Factbook several issues and company annual reports several issues. The Cashcraft Asset Management plc and Proshare plc websites were also visited.

### 3.2 Measurement of Variables

The variables for this study's analyses are defined below:
PAYOUT=Y = (dependent variable) the common cash dividend for year t. Y will be (1) if firm pay cash dividend in any year, otherwise, Y will be zero

- Growth rate (GR) = internal growth rate of firm.
- Firm size = the natural logarithm of total assets.
- Age = number of years since listing
- Retained earnings (RE) = earnings not paid out to shareholders at time t
- Debt /equity ratio (DR) = ratio of total borrowings to equity. i.e. (Long term liabilities+ Short term liabilities)/equity
- ROE = the ratio of profit after tax to equity at time t
- Managerial efficiency (ME) = asset turnover ratio squared
- Life cycle stage (LCS) = ratio of retained earnings to total equity (DeAngelo et al (2006)).

### 3.3 Model Specification and Analytical Procedure

#### *3.3.1 Logit Analysis*

This tool of analysis was used to estimate the relationship between the identified Life-cycle theory factors and the propensity to pay or not to pay dividends of firms in Nigeria. The model proceeds as follows:

Let y* denote dividend payout tendency,

Let y denote dividend choice result, then we can establish duality dependent variables model:

$$y_i^* = x_i'\beta + u_i$$

$$y = \begin{cases} 1 & y^*>0 \\ 0 & \text{other} \end{cases}$$

y* is latent variable, which cannot be observed in its concrete volume. $X_i$ denotes the influence factor vector of dividend payout tendency. $U_i$ is residual error.

From the model, we get that expectation value of y is the probability of y equal to 1, namely:

$$E(y_i|x_i,\beta) = 1 \cdot \Pr(y=1|x_i,\beta) + 0 \cdot \Pr(y=0|x_i,\beta) = \Pr(y=1|x_i,\beta)$$

The probability of y equal to 1 is the probability of y* >0, thus:

$$\Pr(y_i = 1|x_i,\beta) = \Pr(y_i^* > 0) = \Pr(x_i'\beta + u_i > 0) = 1 - F_u(-x_i'\beta)$$

$F_u$ is the cumulated distribution function of u, and it follow Probit or Logit distribution, this study adopt Logit distribution namely:

$$\Pr(y_i = 1|x_i,\beta) = 1 - F_u(-x_i'\beta) = F_u(x_i'\beta) = \frac{1}{1+\exp(-x_i'\beta)}$$

According to this model, the probability of paying dividend is decided by influenced factors of dividend payout tendency, we can get marginal impact of influenced factors on dividend payout tendency and its influence on the probability of paying dividend from this model, and can estimate the extent of dividend payment tendency by a group of factor vector $X_i$, therefore can forecast and evaluate the choice results of dividend payment plan.

3.3.2 Test of the Validity of the Model

In order to test the validity of the model, we conduct Hosmer-Lemeshow goodness of fit test. The Hosmer-Lemeshow goodness-of-fit statistic is obtained by calculating the Pearson chi-square statistic from the 2 × g table of observed and expected frequencies, where g is the number of groups. The statistic is written

$$\chi^2_{HL} = \sum_{i=1}^{g} \frac{(O_i - N_i\bar{\pi}_i)^2}{N_i\bar{\pi}_i\,(1-\bar{\pi}_i)}$$

Where $N_i$ is the total frequency of subjects in the ith group, $O_i$ is the total frequency of event outcomes in the ith group, and $\pi_i$ is the average estimated probability of an event outcome for the ith group. The Hosmer-Lemeshow statistic is then compared to a chi-square distribution with(g-n) degrees of freedom, where the value of n can be specified in the lackfit option in the model statement. The default is n-2. Large values of $\chi^2$HL (and small p-values) indicate a lack of fit of the model. The idea underlying this test is to compare the fitted expected values to the actual values by group. The Hosmer-Lemeshow test groups observations on the basis of the predicted probability that y=1.

3.3.3 Testing for Heteroskedasticity

For specification tests for binary dependent variable models, we carry out the LM test for heteroskedasticity using the artificial regression method described by Davidson and MacKinnon (1993, section 15.4). We test the null hypothesis of homoskedasticity against the alternative of heteroskedasticity. If the p-value is essentially zero, we decisively reject the null hypothesis of homoskedasticity.

**3.4 Model Specification**

I include age, retained earnings (RE), return on equity (ROE), managerial efficiency (ME), life cycle stage (LCS), growth (IGR), size and debt/equity (DE) ratio as the explanatory variables of the probability of dividend payments.

The equation for this analysis is specified as:

Functionally:

Y = f (AGE, RE, ROE, ME, DE, SIZE, IGR, LCS) ………………… (1)
Equation 1 in its explicit form for estimation is thus stated as:

Let Y = DIV = dividend payment tendency such that:

$DIV = B_o + \beta_1 Age + \beta_2 RE + \beta_3 ROE + \beta_4 ME + \beta_5 DE + \beta_6 SIZE + \beta_7 IGR + \beta_8 LCS + Ui$... (2);

$B_1>0; \beta_2>0; \beta_3>0; \beta_4>0; \beta_5<0; \beta_6>0; \beta_7>0; \beta_8>0.$

Where $\beta_0 \ldots \beta_8$ are parameters to be estimated. Age, RE, ROE, ME, DR, SIZE, GR, and LCS are as defined above. Ui is the error term.

**4. RESULTS AND INTERPRETATION**

The specifications include: estimation technique - maximum likelihood (ML) Binary Logit (Quadratic hill climbing) ,sample period used in estimation – 2000 to 2008 covering 62 panel data with a total of 558 observations. Convergence was achieved after 3 iterations while the Covariance matrix was computed using second derivatives. All estimations were done using Eviews 7.0 econometric software.

From table 1 below, the Logit regression show that three out of the eight predictors as well as the constant in the model have statistically significant relationship at the 5% level with the propensity of paying dividends by firms. These predictors are:

Return on Equity (ROE); Life cycle stage (LCS) and Size

**Table 1: Logit analysis output**

| Variable | Coefficient | Std.Error | z-Statistic | Prob. |
|---|---|---|---|---|
| RE | 6.96E-12 | 1.77E-11 | 0.393789 | 0.6937 |
| DE | -0.008430 | 0.009373 | -0.899491 | 0.3684 |
| ROE | 2.230514 | 0.652134 | 3.420332 | 0.0006* |
| ME | 0.010354 | 0.043554 | 0.237725 | 0.8121 |
| LCS | -2.060979 | 0.648365 | -3.178733 | 0.0015* |
| IGR | 0.718646 | 0.483266 | 1.487061 | 0.1370 |
| SIZE | 0.507786 | 0.102673 | 4.945680 | 0.0000* |
| LAGE | 0.223861 | 0.340926 | 0.656628 | 0.5114 |
| C | -4.854239 | 1.014671 | -4.784054 | 0.0000* |

LR statistic (8df) = 117.54; Prob. (LR stat) = 0.0000; McFadden $R^2$ = 0.16

*Indicates significance at the 5% level

The interpretations of the above findings show that ROE and size has positive relationships with the propensity to pay dividends. This agrees with Fama and French (2001). In particular, their findings show that dividend-paying firms are large and highly profitable. For the life cycle stage, it has been argued that matured firms have greater propensity to pay dividends since they have few investment opportunities (DeAngelo et al (2006). This study finds that there is a negative and significant relationship between the life cycle stage and the propensity to pay dividends. This is against the positive relationship found by DeAngelo et al (2006) which measure a firm’s life cycle stage by the ratio of retained earnings to total equity of the firm. They assert that this ratio will be low for young high-growth firms and high for mature firms. Even Bulan et al. (2007) agrees with DeAngelo et al (2006) that as a company grow in Age the probability of it paying dividend increases. Also it would have built up more capital through retained earnings.

**4.1 Test of Model Accuracy**

Correct” classifications are obtained when the predicted probability is less than or equal to the cutoff and the observed y=0, or when the predicted probability is greater than the cutoff and the observed y=1. In the estimated equation above, (see table 2 below) 111of the Dep=0 observations and 305 of the Dep=1 observations are correctly classified by the estimated model. Overall, the estimated model correctly predicts 74.55% (49.12% of the Dep=0 and 91.87% of the Dep=1) observations.

Table 2: Prediction Evaluation (success cutoff C = 0.5)

| | Estimated Equation | | | Constant Probability | | |
|---|---|---|---|---|---|---|
| | Dep=0 | Dep=1 | Total | Dep=0 | Dep=1 | Total |
| P(Dep=1)<=C | 111 | 27 | 138 | 0 | 0 | 0 |
| P(Dep=1)>C | 115 | 305 | 420 | 226 | 332 | 558 |
| Total | 226 | 332 | 558 | 226 | 332 | 558 |
| Correct | 111 | 305 | 416 | 0 | 332 | 332 |
| % Correct | 49.12 | 91.87 | 74.55 | 0.00 | 100.00 | 59.50 |
| % Incorrect | 50.88 | 8.13 | 25.45 | 100.00 | 0.00 | 40.50 |
| Total Gain* | 49.12 | -8.13 | 15.05 | | | |
| Percent Gain** | 49.12 | NA | 37.17 | | | |

The gain in the number of correct predictions provides a measure of the predictive ability of our model. The gain measures are reported in both absolute percentage increases (Total Gain), and as a percentage of the incorrect classifications in the constant probability model (Percent Gain). In the equation above, the restricted model predicts that all 558 observations will have Dep=0. This prediction is correct for the 226 y=0 observations, but none of the 332 y=1 observations.

The estimated model improves on the Dep=0 predictions by 49.12 percentage points, but does more poorly on the Dep=1 predictions by -8.13 percentage points. Overall, the estimated equation is 15.05 percentage points better at predicting responses than the constant probability model. This represents a 37.17 percent improvement over the 40.50% correct prediction of the default model.

What does all this mean for dividend payout policy?

A Type I error represents the error of classifying a non dividend paying firm as dividend paying firm while a Type II error is the error of classifying a dividend paying firm as a non dividend paying firm. WHAT is the risk? Bad or good investment advice.

Thus if we depend on the estimated model to predict whether a company is a dividend paying firm, we can correctly predict 91.87% but only 49.12% that it would not be a dividend paying firm.

### 4.2 Test of the Validity of the Model

The results of the Logit model Goodness-of-Fit test $\chi^2$ are shown in table 4.3: Hosmer-Lemeshow statistic 13.12 (p-value = 0.175), and Andrews Statistic 11.72(p-value = 0.375) respectively. These statistics indicate that the Logit model provides a good fit to the data and that the estimates of the variables' parameters in the model are meaningful.

**Table 4.3 Andrews and Hosmer - Lemeshow Goodness of Fit Tests**

Andrews and Hosmer-Lemeshow Goodness-of-Fit Tests
Grouping based upon predicted risk (randomize ties)

| | Quantile of Risk | | Dep=0 | | Dep=1 | | Total | H-L |
|---|---|---|---|---|---|---|---|---|
| | Low | High | Actual | Expect | Actual | Expect | Obs | Value |
| 1 | 0.0011 | 0.5120 | 46 | 32.5213 | 9 | 22.4787 | 55 | 5.3684 |
| 2 | 0.5134 | 0.5456 | 26 | 26.2936 | 30 | 29.7064 | 56 | 0.00618 |
| 3 | 0.5470 | 0.5681 | 29 | 24.7727 | 27 | 31.2273 | 56 | 1.29363 |
| 4 | 0.5696 | 0.5977 | 26 | 23.3017 | 30 | 32.6983 | 56 | 0.53513 |
| 5 | 0.5982 | 0.6258 | 16 | 21.6538 | 40 | 34.3462 | 56 | 2.40693 |
| 6 | 0.6260 | 0.6425 | 20 | 20.1647 | 35 | 34.8353 | 55 | 0.00212 |
| 7 | 0.6435 | 0.6643 | 17 | 19.3652 | 39 | 36.6348 | 56 | 0.44157 |
| 8 | 0.6644 | 0.6885 | 12 | 18.1773 | 44 | 37.8227 | 56 | 2.10815 |
| 9 | 0.6893 | 0.7234 | 18 | 16.3870 | 38 | 39.6130 | 56 | 0.22446 |
| 10 | 0.7236 | 0.8950 | 16 | 13.2707 | 40 | 42.7293 | 56 | 0.73568 |
| | | Total | 226 | 215.908 | 332 | 342.092 | 558 | 13.12225 |

| | | | |
|---|---|---|---|
| H-L Statistic: | 13.12225 | Prob. Chi-Sq(8) | 0.175 |
| Andrews Statistic: | 11.7242 | Prob. Chi-Sq(10) | 0.3750 |

Hosmer et al. (1997) discuss that an overall goodness-of fit statistic often has an easy interpretation but may miss important deviations from the fit and can only directly test covariates that are in the model. For Logit regression, they found that their global goodness-of-fit statistic formed by partitioning on deciles of risk has high power for detecting quadratic terms missing, slightly less power for detecting interactions, and little power for detecting additional covariates left out of the model. Thus a non significant goodness-of-fit statistic should not be considered definitive evidence that the model is a good fit and vice versa.

## 4.3 Specification Test: Lm Test for Heteroskedasticity

White (1980) describes this approach as a general test for model misspecification. The null hypothesis underlying the test assumes that the errors are both homoskedastic and independent of the regressors, and that the linear specification of the model is correct. Failure of any one of these conditions could lead to a significant test statistic. Conversely, a non-significant test statistic implies that none of the three conditions is violated. From the results in table 4.4, the p_ values are essentially zero indicating the presence of heteroskedasticity so we decisively reject the null hypothesis of homoskedasticity.

**Table 4: W**hite Heteroskedasticity Test:

| | | | |
|---|---|---|---|
| F-statistic | 11.26219 | Probability | 0.000000 |
| Obs*R-squared | 125.5658 | Probability | 0.000000 |

Nevertheless, Heteroscedasticity does not cause ordinary least squares coefficient estimates to be biased, although it can cause ordinary least squares estimates of the variance (and, thus, standard errors) of the coefficients to be biased, possibly above or below the true or population variance. Thus, regression analysis using heteroscedastic data will still provide an unbiased estimate for the relationship between the predictor variable and the outcome. As Gujarati et al. (2009, p. 400) noted, students in Econometrics should not overreact to heteroskedasticity. John Fox (the author of Applied Regression Analysis) wrote, "unequal error variance is worth correcting only when the problem is severe." (Fox 1997, p. 306; Cited in Gujarati et al. 2009, p. 400). And another word of caution from Mankiw, "heteroscedasticity has never been a reason to throw out an otherwise good model." (Mankiw 1990, p. 1648) (Cited in Gujarati et al. 2009, p. 400).

## 5 CONCLUSSIONS

The study finds a highly significant relation between the decision to pay dividends and life cycle stage, return on equity and firm size. Of note is the finding that earned/contributed capital mix (life cycle stage) has a quantitatively greater impact on the probability that a firm pays dividends than do measures of risk and growth opportunities, the determinants of the decision to pay dividends that to date have received primary attention in the empirical payout literature. However, return on equity has a quantitatively greater impact on the probability that a firm pays dividends than do measures of the life cycle stage and growth opportunities. Finally, through this study a model that can help investors in Nigeria and elsewhere decide between capital gain and cash dividend firms in building their portfolios of investments is proposed.

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