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The Determinants of Corporate Cash Holdings in Nigeria: Evidence from General Method of Moments (GMM)

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***Abstract*—**The study examines the determinants of corporate cash holding of non-financial quoted firms in Nigeria using a sample of fifty four non-financial quoted firms listed on the Nigeria Stock Exchange for the period 1995-2009. Data were sourced from the Annual reports of the sampled firms and analyzed using Generalized Method of Moments(GMM). The study finds evidence supportive of a target adjustment model and that firms can not instantaneously adjust towards the target cash level owing to the fact that adjustment cost being costly,. Also, the result shows significant negative relationship between cash holdings and firm size, net working capital, return on asset and bank relationship and positive relationship with growth opportunities, leverage, inventories, account receivables and financial distress. Furthermore, there is no significant relationship between cash holdings and cash flow. In Nigerian setting, most of the variables that are relevant for explaining cash holdings in the Developed countries are found by this study to be relevant also in Nigeria.

***Keywords*—**Adjustment Model , Cash holding, Determinant, Generalized Method of Moments(GMM)

1. Introduction

THE preponderance of corporate cash holdings has gained much attention in the empirical financial literature. The prevailing questions have been: Why do firms hold large amount of cash?, is there an optimal level of cash holdings? The theoretical literature in finance offers three alternative model to answer the above mentioned prevailing questions namely the trade-off theory model, pecking order theory and free-cash flow theory. Many empirical studies have been designed to investigate the determinant factors of firms' cash level within the theoretical background of the three alternative models. References [1]-[11]studies concentrated on both the large public and private firms in well developed economies.

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However, recent researchers have been focusing their empirical studies on developing economies as evidenced in the work of [12] and [13] on Brazil, [14] on China,[15] on Pakistan,[16] on Latin American countries, [17] and [18] on Malaysia and [19] and [20] on Taiwan. Also, in Chile, [21] carried out similar studies while in Africa, [22]on Ghana and [23] in South Africa but the available empirical study on cash holdings on Nigerian firms comes from the studies undertaken on international samples alongside other 44 countries by [24]. However, Nigeria data are not isolated in the analysis.

The purpose of this paper is to provide empirical evidence on the determinants of cash holding in an imperfect market scenario in Nigeria. The result of this study will enhance understanding of cash holding determinants and relevance of postulated theories in Nigerian context because of its distinctiveness in making use of panel data on Nigeria corporate quoted companies.

II. Literature Review

Based on trade-off theory, pecking order theory and agency theory, various firms characteristics, such as ownership structure, growth opportunities, cash flows, liquid assets, leverages, size etc, have been identified as determinant variables of cash holdings in previous studies. The relationship between cash holding and other explanatory variables that is the firm specific characteristics is the object of focus in this study. For the purpose of this study, cash holding is measured as the ratio of cash and cash equivalent to total asset. This is in line with the approach adopted by [25]while other explanatory variables used in explaining the level of cash holdings are discussed below.

According to pecking order theory, firms prefer internal finance to external finance. Therefore, firms that have higher cash flows are expected to hold larger amounts of cash as a resource of internal funds [2], [25] and [26]. Therefore, a positive relation between cash holdings and cash flows is expected. However, [1] claimed that the relation is in fact negative, as they consider that cash flows represent an additional source of liquidity for the firm and can therefore

substitute for cash. We measure cash flows as the ratio of cash flows to net total assets.

Net working capital which is proxy of investments in liquid assets can be seen as a substitute for cash. References [2], [26] and [25] all calculated the measure for liquid assets as the ratio of working capital less cash to total assets. The proxy is the ratio of net working capital minus cash to total assets. We expect a negative relation between cash holdings and non-cash liquid assets.

A number of studies imply that leverage is a significant determinant of cash holdings with a negative relationship between leverage and cash holding which is negative. However, according to agency theory, highly leveraged firms find it difficult and expensive to raise additional funds nor renegotiate existing debts hence, hold larger cash and induce a positive relationship. Our measure of leverage is the debt to assets ratio of the firm.

The existence of a bank relationship would enhance the ability of firms to raise external finance which signifies the borrowing firms' credit worthiness. References [25], [26] as well as [4] argued that bank debt can serve as a substitute for holding high levels of cash because bank debt is more easily renegotiated when firms need to. These arguments suggest that firms with more bank debt are expected to hold less cash, hence a negative relationship is expected. We measure bank debt as the ratio of total bank debt to total debt.

Also, market to book ratio is a proxy for growth opportunities. References [1], [2], [26] and [25] suggested that the existence of growth opportunities has a positive impact on the level of cash holdings. Based on Trade off theory, we expect a positive relation between cash holdings and growth opportunities but with pecking order theory negative relationship is expected. For this study, market-to-book ratio is measured as the ratio of Book value of assets less book value of equity plus market value of equity to Book value of assets of the firm.

Firm size is an important determinant of cash holdings, small firms suffer more severe information asymmetries [27], more financial constraints [28] and [29] and consequently, they are more likely to suffer financial distress [30] and [31]. In addition, the cost of external financing is smaller for larger firms because of scale economies resulting from a substantial fixed cost component of security issuance costs. All these would in turn imply that small firms should hold more cash. The size of firms is measured by the natural logarithm of sales. We expect a negative relation between cash holdings and the size of firms.

The trade-off theory predicts a negative relationship between return on assets and cash holdings claiming that profitable firms have enough cash flows to avoid under-investment problems [1], [25], and [32]. The pecking order theory, on the other hand, predicts the opposite as cash holdings fluctuate with cash flows [26] and [33]. Return on assets is measured as ratio of net profits to the book value of assets.

References [25], [26] as well as [4] used the level of bank debt to measure the effect of bank relationship lending on cash holdings and conclude that high debt levels and cash holdings are positively correlated. Bank debt to total debt ration is assumed for this variable.

Account receivable is another significant explanatory variable in determining cash holding. The greater receivables connotes lower cash holdings, taking into account the possibility of trading them in the financial markets for cash; however, it may also be that greater receivables imply in higher cash holdings, considering the risk of non-payment of these receivables and the corollary needs of reserves in cash to cover the resulting losses [13].

Also greater inventories result in lower cash holdings, due to the possibility of converting them into cash or of using them as collateral to get loans in the financial markets. Also, greater inventories may imply higher cash holdings if risk of decrease in their values due to obsolescence set in, hence, larger cash [13].

Considering the risks of incurring additional costs to negotiate the payment conditions with suppliers (transaction motive) and of having to make payments in larger amounts or in shorter time periods than the originally expected (precaution motive), firms tend to keep higher cash. Notwithstanding, greater account payables may also imply lower cash holdings, taking into account the possibility of delaying the payment to the suppliers when it is possible or necessary and, therefore, making easier the management of the cash shortage situation [13].

The cost of financial distress arises when the firm cannot meet its payment obligations contracted with third parties, either in the short or the long term. References [34], [26] and[25] argued that firms in financial distress could raise their cash levels in order to reduce their default risk. On the other hand,[1] expect firms with greater likelihood of financial distress to have lower levels of liquidity, as they cannot accumulate cash, since they will use any liquid resources available to pay what they owe. The likelihood of financial distress is calculated according to the re-estimation of [35] model carried out by [36], given by the following expression:

$$ZSCORE=0.104*X1 + 1.010*X2 + 0.106*X3 + 0.003*X4 + 0.169*X5$$

where X1= Working capital / Total assets; X2= Reserves / Total Assets; X3= Net operating profits / Total assets; X4= Book value of capital / Book value of debt; X5= Sales / Total assets [37]

III. The Methodology And Model

This study covers non-financial quoted companies in Nigeria. The population of quoted companies listed on Nigerian Stock Exchange was 192 companies. Sample of 54 companies was purposively selected which cuts across all sectors for analysis. The rationale for the exclusion of financial related quoted companies is due to the peculiarity in their cash holding policies which are exogenously determined by Central Bank of Nigeria, hence, substantially different from non-financial quoted companies. Also excluded were non-quoted companies because of non-disclosure of their financial

reports and newly quoted companies that will result into missing data for the period being studied. Data for this study were obtained from the annual financial reports over a period of 1995-2009 from Nigerian Stock Exchange fact book and the headquarters of the sampled companies majorly in Lagos, Nigeria. Data collected were analyzed using dynamic panel analysis, that is, Generalised Method of Moments (GMM).

Baseline empirical model which will be adapted from [33] will be used based on theoretical framework. Most variables which according to the Trade-off and Pecking Order theories are the most relevant in determining the cash holdings are included model below. This is similar to the ones used by [4] as shown below.

$$CASH^*_{it} = \beta_0 + \beta_1 MTB_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 CF_{i,t} + \beta_4 NWC_{i,t} + \beta_5 LEV_{i,t} + \beta_6 ROA_{i,t} + \beta_7 STO_{i,t} + \beta_8 INV_{i,t} + \beta_9 APAY_{i,t} + \beta_{10} AREC_{i,t} + \beta_{11} FDISTRESS_{i,t} + \beta_{12} BANKR_{i,t} + \varepsilon_{it} \quad (1)$$

where ε_{it} is a random disturbance and β_k are the unknown parameters to be estimated.

To capture the influence of economic factors that may also affect the length of cash holding and examine a partial adjustment model to confirm whether firms pursue a target cash holding or not time effects will be included. If there is a target cash holding, firms should take the appropriate steps to achieve it.

To estimate target cash ratio *Cash*i,t,* suppose that unobservable target cash ratio of firms, *Cash*i,t* is taken to be function of several firm-specific characteristics, and a distribution term. This idea, applied as suggested by partial adjustment model and as used in testing trade-off theory and model specification for cash equation, is as follows:

$$Cash^*i,t = \sum_{k=1}^{t} \beta_k \, \mathcal{X}_{k,i,t-1} + \mathcal{E}_{i,t,} \;\; \mathcal{E}_{i,t,} \sim N(0,1) \quad (2)$$

where firms are denoted as subscript i=1,…,N and time as t=1,…,T. Cash*$_{i,t+1}$ is firm i's target cash ratio at *t+1*. Cashi,t is vector for firm characteristics related to the costs and benefits of operating with various cash ratios and it is well known that this vector is playing in significant role in determining corporate cash holdings suggested by many previous studies such as [1], [6], [25] , and [19]. [25]observed that firms adjust their cash holdings in order for their current cash to be close to the target ratio and this intuition leads to a partial adjustment mechanism. However, adjustment is not immediate because firms have to bear costs of adjustment, so they will adjust their current CASH according to the following expressions:

$$CASH_{i,t} - CASH_{i,t-1} = \gamma(CASH^*_{i,t} - CASH_{i,t-1}) \; 0<\gamma<1 \quad (3)$$

where

$CASH_{i,t}$ is the Cash holding in the period t, and

$CASH_{it-1}$ is lagged cash holdings

$CASH^*_{i,t}$ is the target Cash holding, which will be estimated from the equation 1 above:

The expression $CASH_{i,t} - CASH_{i,t-1}$ is the adjustment required to reach the firm's target Cash holding, and the coefficient measures the speed of adjustment, which is inversely related to adjustment costs, and takes values between 0 and 1.

The expression $\gamma(CASH_{i,t} - CASH^*_{i,t-1})$ $0<\gamma<1$ is the adjustment required to reach the firm's target cash holding, and the coefficient measures the speed of adjustment, which is inversely related to adjustment costs, and takes values between 0 and 1. If $\gamma = 0$, then, $CASH_{i,t} = CASH_{i,t-1}$ and the current cash holding remains as in the previous period, indicating that companies bear high adjustment costs. If, in contrast, $\gamma = 1$, then, $CASH_{I,t} = CASH^*_{I,t}$ and firms immediately adjust their cash holding to their target.

If equation (3) is substituted for (2) and it includes the unobservable heterogeneity and the time dummy variables, the current cash holding is determined by the following testable model in quadratic form (non-monotonic).

$$\text{Cash} * \text{i,t} = \alpha + \rho \, \text{CASH}_{\text{i,t}-1} + \sum_{k-1}^{t} \gamma\beta\text{k}\text{X}\text{k, i, t} - 1 + \text{vi} + \text{vt} + \text{ui,t} \quad (4)$$

Inserting the other firm characteristics into the above equation, the following model expression shall be generated:

$$CASH^*_{I,t} = \alpha + \rho \, CASH_{it-1} + \delta_1 MTB_{i,t} + \delta_2 SIZE_{i,t} + \delta_3 CF_{i,t} + \delta_4 NWC_{i,t} + \delta_5 LEV_{i,t} + \delta_6 ROA_{i,t} + \delta_7 STO_{i,t} + \delta_8 INV_{i,t} + \delta_9 APAY_{i,t} + \delta_{10} AREC_{i,t} + \delta_{11} FDISTRESS_{i,t} + \delta_{12} BANKR_{i,t} + \eta_I + \lambda_I + \mu_{it}, \quad (5)$$

where $\alpha = \gamma\beta_{0;}$ $\rho = (1-\gamma)$; $\delta_k = \gamma\beta_{k;}$ $\mu_{it} = \gamma\varepsilon_{it}$,

Where, α = intercept term i.e. autonomous cash holding, $\delta_{1\ldots}$ δ_{12} = the coefficients of the independent variables, η_I = individual effects (unobservable heterogeneity), i.e. firm specific effect

λ_I =time specific effects (time dummy variable e.g. interest rate, demand shock) which are common to all firms and can change overtime

μ_{it}, = the time varying disturbance term is severally uncorrelated with mean zero and variance

γ = adjustment required to reach the firm's target cash holding

CASH$_{I,t}$* = Cash holdings of firm i in year t, $CASH_{it-1}$ = is lagged cash holdings, MTB is taken as a proxy for the firm's Growth opportunities, Size (SIZE) is taken as a proxy for the real size (SIZE) of firms. It is calculated as the natural logarithm of sales**,** *CF* is measured by Cash flow to net assets ratio, NWC is taken as a proxy for liquid asset substitutes as these assets can be seen as substitutes for cash holdings measured by Net working capital-to-assets ratio, LEV is the ratio of total debt to total assets, ROA is measured as ratio of operating profits to net assets, STO is measured as ratio of inventories to net assets, INV is measured as variation in investment of fixed asset to net assets, APAY is measured as

Trade creditor to net assets, AREC is measured as Trade debtor to net assets, FDISTRESS is calculated according to the re-estimation of Altman's model carried out by [36] and BANKR (Relationships with Financial Institutions) the proxy used to express this variable are the bank debt/total debt ratio [25]

It is assumed that *uit* is independently distributed across firms with zero mean, but there are no restrictions on heteroskedasticity across firms and time. It is assumed that firm-specific effects are unobservable but have a significant impact on cash holdings. They differ across firms but are fixed for a given firm through time. In contrast, time-effects vary through time but are the same for all firms in a given year, capturing mainly economy-wide factors that are outside the firms' control.

It is essential to allow for unobserved firm-specific effects since different firm may differ in cash holdings due to several unobserved factors related to preferences, management idea, firm conditions, competition from other firms, etc. Ignoring unobserved firm-specific effects is likely to result in biased parameter estimates since these effects must be expected to be correlated with the observed explanatory variables.

It is reasonable to employ dynamic panel data model. For the existence of transaction and other adjustment costs, the possibility of delays in the adjustment process can be justified, thus the current cash reserves can not be immediately adjusted to a new desired cash reserves. The dynamic cash holdings model will be estimated by controlling for fixed-effects by a first-difference transformation. Despite its appeal, the dynamic specification involves several estimation problems. Even when unobservable firm-specific effects are not correlated with the regressors, it is still necessary to control them in the dynamic framework. This is because $CASH_{it-1}$ will be correlated with u_{it} that does not vary with time and the first-difference transformation to eliminate fixed effects introduces correlation between the lagged dependent variable and differenced errors. That is, $\Delta CASH_{it-1}$ and Δu_{it} will be correlated through terms $CASH_{it-1}$ and u_{it-1} , and hence OLS will not consistently estimate the coefficient parameters.

Another estimation problem, that is not necessarily specific to the dynamic specification, arises because the firm-specific variables are unlikely to be strictly exogenous. That is, shocks affecting cash holdings of firms are also likely to affect some of the regressors such as MTB (growth opportunities), NWC (liquidity) and LEV (leverage). Moreover, it is likely that some of the regressors may be correlated with the past and current values of the idiosyncratic component of disturbances u_{it} .

In panel estimation, neither the Generalized Least Squares (GLS) estimator nor Fixed Effect (FE) estimator produces consistent estimates in the presence of dynamics and endogenous regressors. since $CASH^*_{I,t}$ equation(9) above has lagged endogenous regressors as well as unobserved firm fixed effects which are correlated with the regressor, hence the orthogonality condition is not likely to be met for a GLS or FE estimator to produce consistent estimates. This explains the use of GMM approach.

The basic GMM panel estimators are based on moments of the form,

$$g(\beta) = \sum_{i=1}^{M} g_i(\beta) = \sum_{i=1}^{M} Z_i' \varepsilon_i(\beta) \qquad (6)$$

Where Z_i is a T_i x p matrix of instruments for cross- section i and,

$$\varepsilon_i(\beta) = (Y_i - \int(X_{it}, \beta)) \qquad (7)$$

In some cases we will work symmetrically with moments where the summation is taken over periods t instead of i.

GMM estimation minimizes the quadratic form.

$$S(\beta) = \left[\sum_{i=1}^{M} Z_i' \varepsilon_i(\beta)\right]' H \left[\sum_{i=1}^{M} Z_i' \varepsilon_i(\beta)\right] = g(\beta)^i H g(\beta) \quad (8)$$

With respect to β for a suitably chosen p x p weighting matrix H.

Given estimates of the coefficient vector, $\hat{\beta}$, an estimate of the coefficient covariance matrix is computed as,

$$V(\hat{\beta}) = (G'HG)^{-1}(G'H\Lambda HG)(G'HG)^{-1} \qquad (9)$$

Where Λ is an estimator of $E(g_i(\beta g_i(\beta)') = E(Z_i' \varepsilon_i(\beta) \varepsilon_i(\beta)' Z_i)$, and G is a T_i x k derivative matrix given by:

$$G(\beta) = [-\sum_{i=1}^{M} Z_i' \nabla \int_i(\beta) \qquad (10)$$

In the simple linear case where $\int(X_{it}, \beta) = X_{it}', \beta$, we write the coefficient estimator in closed form as,

$$\hat{\beta}, = \left\{\left(\sum_{i=t}^{m} Z_i X_i\right) H \left(\sum_{i=t}^{m} Z_i X_i\right)\right\}^{-1} \left\{\left(\sum_{i=t}^{m} Z_i X_i\right) H \left(\sum_{i=t}^{m} Z_i Y_i\right)\right\}^{-1}$$

$$= (M_{ZX} \cdot H M_{ZX})^{-1} (M_{ZX} \cdot H M_{ZY}) \qquad (11)$$

With variance estimator,

$$V\hat{\beta} = (M_{ZX}' H M_{ZX})^{-1} (M_{ZX} \cdot H \Lambda H M_{ZY}) (M_{ZX} \cdot H M_{ZX})^{-1} \qquad (12)$$

For M_{AB} of the general form

$$M_{AB} = M^{-1}\left(\sum_{i=1}^{M} A_i' B_i\right) \qquad (13)$$

The basics of GMM estimation involve: (1) specifying the instruments Z, (2) choosing the weighting matrix H, and (3) determining an estimator for Λ.

It is worth pointing out that the summations here are taken over individuals; we may equivalently write the expressions in terms of summations taken over periods. This symmetry will prove useful in describing some of GMM specifications that EViews supports. A wide range of specifications may be viewed as specific cases in the GMM framework. For example, the simple 2SLS estimator using ordinary estimates of the coefficient covariance specifies,

$$H = (\hat{\sigma}^2 M_{ZZ})^{-1} \Lambda = \hat{\sigma}^2 M_{ZZ} \qquad (14)$$

Substituting, we have the familiar expressions,

$$\hat{\beta} = (M_{Zx}'(\hat{\sigma}^2 M_{ZZ})^{-1} M_{ZX})^{-1} (M_{Zx}'(\hat{\sigma}^2 M_{ZZ})^{-1} M_{ZY})$$

$$(M'_{Zx}M_{ZZ}^{-1}M_{ZX})^{-1}(M'_{Zx}M_{ZZ}^{-1}M_{ZY})$$
$$\text{and, } V(\hat{\beta}) = \hat{\sigma}(M'_{Zx}M_{ZZ}^{-1}M_{ZX})^{-1} \quad (15)$$

Standard errors that are robust to conditional or unconditional heteroskedasticity and contemporaneous correlation may be computed by substituting a new expression for Λ.

$$\Lambda = T^{-1}(\sum_{i=t}^{m} Z'_t \hat{\varepsilon}_t \hat{\varepsilon}_t Z_i)' \quad (16)$$

So that we have a white cross-section robust coefficient covariance estimator.

Essentially in this work, we use the [38] dynamic panel General Method of Moments (GMM) estimator proposed by [38]. We have used this method partly because we do not have reasonable instruments for the endogenous regressors that can be excluded from the equations and partly because it produces consistent estimates in the presence of endogenous regressors. Arellano and Bond provide a family of dynamic panel GMM estimators in the DPD 98 programme that allows for one to estimate coefficients from levels, first difference or orthogonal deviation of the variables. In this study, we estimate the equations in the first difference form.

The DPD estimator is given as:

$$\hat{\theta} = (\bar{X}^1 Z A_N Z^1 \bar{X})^{-1} \bar{X}^1 A_N Z^1 \bar{y} \quad (17)$$

Where $\hat{\theta}$ is a vector of coefficient estimates on both exogenous and endogenous regressor as, $\hat{X}$ and $\hat{y}$ are the vector of first differenced regressors and dependent variables respectively, Z is a vector of instruments and A_N is a vector used to weigh the instruments. The estimator uses all lagged values of endogenous and predetermined variables as well as current and lagged values of exogenous regressors as instrument in the differenced equation as an illustration for the equation.

Also, the statistics for the [39] test of over-identifying restrictions, suggesting whether the instrumental variables and residuals are independent, will be provided. As used by [25], all variables (i.e., instrumental variables) are treated as endogenous. To check for the validity of the specification of the instrumental variable used in the GMM estimation, the Sargan test will be implemented.

IV. Empirical Results And Discussion

The formulated model was tested for stationarity using the Augmented Dickey Fuller Unit root test to be sure that one is not analyzing inconsistent and spurious relationship. A series that exhibit a stochastic trend, or even simply wanders around at random will not be stationary and cannot be forecast far in the future. A stationary series will constantly return to a given value and no matter the starting point, in the long-run, it is expected to attain that value [40].

To illustrate the use of Dickey Fuller test, one can state the autoregressive AR(1) process. Thus,

$$Yt = \mu + \rho Yt\text{-}1 + \varepsilon t \quad (18)$$

Where μ and ρ are parameters and εt is the white noise assumption.

Y is a stationary series if $-1 < \rho < 1$. If $\rho = 1$, Y is a non-stationary series (a random walk with drift). The hypothesis of a stationary series can therefore be evaluated by testing whether the absolute value of ρ is strictly less than one [41]. Thus, H0: $\rho = 0$ and H1: $\rho < 1$. If the series is correlated at higher order lags, the assumption of white noise disturbance is violated and the ADF test makes a parametric correction by assuming that the series follows an AR(ρ) process. The test methodology is then adjusted by adding lagged difference terms of the dependent variable Y to the right hand side of the regression.

Table II shows estimation results for the dynamic GMM Model for determinants of cash holding of non-financial quoted firms in Nigeria. The coefficient of lagged dependent variable (cash) is positive and significantly different from zero at 1%. This suggests that current cash levels are positively influenced by cash level in the previous year. The adjustment coefficient is about 0.892537 (1-0.107463), which providing strong evidence that the dynamic model is reasonable, firms can not instantaneously adjust towards the target cash level following changes in firm-specific characteristics or random shocks. One possible explanation is that the adjustment process is costly because of the existence of transaction and other adjustment costs.

Market to Book (MTB), that is, an indicator of a firm's business opportunities, as such it is an important factor that allows firms to enjoy improved cash holding. Growth opportunities is positively and significantly related to cash holding. This is in line with the findings of [1], [2], [26] and [25].

The effect of cash flows on cash holdings is positive and marginally insignificant at 1%. The positive coefficient of cash flows (*CF*) is in line with the pecking order or financing hierarchy theory. Which view that firms of higher cash flows prefer to hold larger amounts of cash as a result of their preference for internal over external finance. [1] claimed that the relation is negative is upheld, as they consider that cash flows represent an additional source of liquidity for the firm

TABLE I
PANEL UNIT ROOT TEST: SUMMARY

Variable	Augmented Dickey Fuller Test Statistic	Prob**	Order of Integration
CASH	167.129	0.0001	I(0)
DMTB	249.520	0.0000	I(1)
CF	163.231	0.0002	I(0)
NWC	172.439	0.0000	I(0)
DSIZE	210.454	0.0000	I(1)
LEV	160.508	0.0003	I(0)
ROA	166.849	0.0001	I(0)
DSTO	275.940	0.0000	I(1)
INV	150.797	0.0019	I(0)
APAY	157.285	0.0006	I(0)
DAREC	233.250	0.0000	I(1)
DFDI	227.847	0.0000	I(1)
BANKR	172.590	0.0000	I(0)

1. ** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.
2. Maximum Lag=1

TABLE II
ESTIMATION RESULTS FOR THE DYNAMIC GMM MODEL FOR DETERMINANTS OF CASH HOLDING OF QUOTED FIRMS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CASH(-1)	0.107463	0.013371	8.037256***	0.0000
DMTB	0.172005	0.105966	1.623200*	0.1053
CF	0.008043	0.005225	1.539191	0.1245
NWC	-0.350679	0.016920	-20.72592***	0.0000
DSIZE	-0.018102	0.008807	-2.055467**	0.0405
LEV	0.434872	0.048461	8.973665***	0.0000
ROA	-0.008399	0.002756	-3.047912***	0.0025
DSTO	0.121167	0.066498	1.822097*	0.0692
INV	0.001277	0.000140	9.108854***	0.0000
APAY	0.073131	0.084394	0.866544	0.3867
DAREC	0.245395	0.083332	2.944797***	0.0034
DFDI	0.019524	0.011108	1.757685*	0.0796
BANKR	-0.001781	0.001030	-1.728365*	0.0847
Effects Specification				
Cross-section fixed (orthogonal deviations)				
Mean dependent var	-0.003230	S.D. dependent var		0.345787
S.E. of regression	0.316627	Sum squared resid		40.80292
J-statistic	39.33692	Instrument rank		54

* Indicates significance at 10% level, ** indicates significance at 5% level, *** indicates significance at 1%. level

and can therefore substitute cash, this is contrary to [26] and [25] position of positive relationship. The insignificant level may be due to the fact that cash flow was used as a ratio of net total Asset (Total Asset less cash and cash equivalent.

The negative coefficient of Net working Capital (NWC) which is proxy for liquidity variable supports the hypothesis that firms with more liquid assets will tend to reduce their cash levels, since these assets can be used as cash substitutes. This result is consistent with the arguments of the Trade-off Theory and with the precious findings of [7] and [42].

Interestingly, according to our expectation, the estimated coefficient of size variable (*SIZE*) is negative and strongly significant(at 1% level), which supports the view that small firms should hold more cash. This is not in line with [2] and [43], but it is consistent with [26]and [4] results.

The coefficient estimate on leverage(*LEV*) is significantly positive at 1% level, which is not consistent with [25] that supports that firms can use borrowing as a substitute for holding cash, because leverage can act as a proxy for the ability of firms to issue debt. However, our findings support the prediction about the relation between leverage and cash holdings, based on agency cost theory of debt, that firm with a high leverage will increase its cash holdings to decrease the likelihood of financial distress.

Although, the variable is not significant in this study, the positive relation between cash holding and account payable (APAY) shows that firms hold large cash to settle payment to creditors. Hence, when there is an increase in cash holding as firms may not survive postponing payment to suppliers. Also, the positive relation between account receivables (AREC) and cash holding, greater receivables imply that higher cash holdings considering the risk of non-payment of these receivables and the consequent needs of reserves in cash to cover the resulting losses through delayed settlement. This is in consonant with [13] findings.

The argument that firms with higher leverage need more cash holdings to prevent bankruptcy, as [25] also refer in their study is consistent with our results on the financial distress variable, as the coefficient for FDI is positive and significant only at 10% as previously observed by [25] and [4].

The coefficient of the variable BANKR is negative and significant at 10% which indicates that maintaining a banking relationship improves access to this type of external financing by reducing the information asymmetry between borrower and lender. This complies with the Trade-off Theory as empirically confirmed by [44] and [4].

The coefficients of inventories (STO) and investment (INV) are both positive and significant at 10% and 1% respectively. The impact of investment is negligible which is less than 0.1%

Since the reported J-statistic is simply the Sargan statistic (value of the GMM objective function at estimated parameters), and the instrument rank of 54 is greater than the number of estimated coefficients (13), we may use it to construct the Sargan test of over-identifying restrictions. It is worth noting here that the J-statistic reported by a panel equation differs from that reported by an ordinary equation by a factor equal to the number of observations. Under the null hypothesis that the over-identifying restrictions are valid, the Sargan statistic is distributed as a $X(p-k)$, where k is the number of estimated coefficients and p, is the instrument rank. The p-value of 0.54 was computed using scalar pval = @chisq(39.33692, 41)" . The null hypothesis that the over-identifying restrictions are valid is not rejected since p-value tends towards 1.

V. Summary And Conclusions

The paper uses a dynamic panel estimator to examine the determinants of corporate cash holding of non-financial firms in Nigeria over a period 1995 – 2009. The study will be expanded to determine the determinants of the speed of adjustment of each variables on individual basis as against the collective speed examined in the present study. The further study will estimate the cash holding equation in the dynamic model framework to determine the adjustment speed and those factors which affect the speed to target cash holding.

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