DETERMINANTS OF CASH HOLDINGS OF DEPOSIT MONEY BANKS IN NIGERIA

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A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF FINANCE, FACULTY OF MANAGEMENT SCIENCES, UNIVERSITY OF BENIN, BENIN CITY.

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE BACHELOR OF SCIENCE (B.Sc.), DEGREE IN FINANCE.

FEBRUARY, 2025.

DECLARATION

I hereby declare that this work titled "Determinants of Cash Holdings of Deposit Money Banks in Nigeria", was done by me under the supervisor of Dr. C.O. Ighodaro of the Department of Finance, University of Benin, Nigeria. The information gathered from literatures has been duly acknowledged in the text and a list of reference provided. No part of this work was presented elsewhere for award of any certificate.

I take the sole responsibility of any errors therein.

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Lawrenta Omonefe OYAMEDA
(*Project Student)*

Date:_____

CERTIFICATION

This is to certify that this work titled: "Determinants of Cash Holdings of Deposit Money Banks in Nigeria", by Lawrenta Omonefe OYAMEDA, MGS2003552 meets the regulations governing the award of the Degree of Bachelor of Science (B.Sc.) Degree in Finance in University of Benin, Nigeria, and its approved for its contribution to knowledge and literary presentation.

DR. C.O. IGHODARO **(Project Supervisor)**	**DATE**
DR. O. AIGBOVO **(Project Coordinator)**	**DATE**
DR. O.G. OMORUNKUWA **(Head of Department)**	**DATE**

DEDICATION

This project is dedicated to God Almighty for His love, care, protection, provision and favour, and most especially for making my academic pursuit a success. May His name be praised for ever, Amen!

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ABSTRACT

The study examines the determinants of cash holdings of 12 deposit money banks in Nigeria for a period of 13 years (2013 to 2025). The panel data sourced from the Nigerian stock exchange fact book, Annual financial statement and cash flow reports of banks were used. The econometric tools analysis was employed to analyze five bank's specific variables such as return on assets, asset tangibility, leverage, bank size and volume of deposits to assets.

The empirical findings revealed that asset tangibility is negative and is an 'important factor in the determination of cash holding behaviour of deposit money banks in Nigeria. Return on assets (a proxy for bank profitability) does not have any significant relationship with cash holding; leverage has an insignificant positive impact on cash holdings; bank size has an insignificant negative relationship with cash holding; and volume of deposits to assets (VDA) has a weak negative impact on deposit money banks' cash holding.

The study recommends among others that, management should be cautious in setting up a cash holding friendly policy that can be effectively linked with performance. This will ensure that as bank increases its level of cash holding, it will in turn enhance the overall performance of the bank. Also, since asset tangibility has proven to be a major factor that determines bank's cash holding behaviour of firm in Nigeria, it therefore follows that banks should hold more cash in order to increase tangible assets. Thus, appropriate policy that will ensure that as bank increases its cash holding capacity, its corresponding tangible assets would also be enhanced.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The decision-making of cash holdings is a primary concern to companies' management. This is closely related with the companies' daily operations, investments, the behaviors of financing, dividend payments and other activities (Byoun, 2011). Specifically, cash is an indispensable component and the most liquid assets on each company's balance sheet, it is also an important requirement to ensure continued operations of every company. Cash provides the company with liquidity and it facilitates the payment of various types of obligations. Without adequate cash or liquid assets a company will not be able to meet its obligations and hence will be forced to declare bankruptcy, sooner or later. As such, companies have to determine the most appropriate level of cash holdings to improve their operating efficiency.

The importance of cash holding to financial institutions cannot be over emphasized because it creates a level of confidence on the financial institutions, and whenever cash is not available, it takes away the freedom to react to drum beatings of the money/capital market (Ubesie, Okorie & Nwachukwu). In other words, holding cash at its required quantity as and when needed makes the holder a King (Williams, 2012). Cash holding refers to cash or cash equivalent readily available for investment in physical assets and to distribute to investors (Gill & Shah, 2012). Cash equivalents are current assets, which can

be converted into cash in a very short term and are thus characterized by a high degree of liquidity, they include Treasury bills, certificates of deposits, banker's acceptances and further money market instruments. These securities have a low-risk, low- return profile (Ferreira and Vilela, 2004; Opler et al., 1999; Ozkan and Ozkan, 2004).

Deposit money banks (DMBs) is an institution that deals in money and its substitutes (such as commercial papers, bill of exchange promissory notes Treasury bills) and provides other financial services. Banks accept deposits from the surplus units of the society and make loans to the deficit units and derive a profit from the difference in the interest rates paid and charged respectively. Banks are critical to national economy (Obringer, 2015). The primary function of banks is to put their account holder's money to use by lending it out to others who can then use it for their various business ventures (Benjamin, Yeboah & Samuel 2012). In the banking sector, being liquid is crucial to the on-going viability of any bank as liquidity can have dramatic and rapid effects on even well capitalized banks. The issue of cash holding in banks is likened to banks liquidity which means the ease with which an asset can be turned to cash with certainty (Orji, 2014). A bank is considered to be liquid when it has sufficient cash and other short term financial instruments like treasury bill, treasury certificate and call money in its port-folio together with the ability to raise funds quickly from other sources (like the capital market) for it to meet its payment obligation and other financial commitments as at when due. Liquidity in banks can be defined as the capacity of the bank to meet promptly its current obligations, that is, its customers demand (Cuale, 2014). Anyanwaokoro (2008), opines

that for the operation of the firms to run smoothly, optimum level of liquidity within the firm should be maintained.

Analyzing the key determinants of cash holdings of deposit money banks is considered important in finance because of their roles as financial intermediaries. In order words, the crux of this study is primarily to shade light in examining the key determinants of cash holding of deposit money banks in Nigeria using some germane specific factors such as Return on Asset, Leverage, Firm Size, Asset Tangibility and Volume of Deposit.

1.2 Statement of the Research Problem

There is a growing number of empirical evidence on the determinants of corporate cash holding from developed economies (Ozkan & Ozkan, 2004, Gill & Shah, 2012, Ali & Yousaf, 2013, Uyar & Kuzey, 2014) as well as from developing countries (eAfza & Adnan, 2007, Wasiuzzaman, 2014, Kariuki, Namusonge & Orwa, 2015, Ali, Ullah & Ullah, 2016). However, these studies reveal that the sampled firms were drawn from mainly non-financial sector of the economies. Cash holding and its management plays an important role in the management of banks and other financial institutions, especially in helping to resolve the conflicting goals of liquidity, solvency and profitability. To the best of my knowledge there is scanty empirical evidence on determinants of cash holding of deposit money banks in developing countries like Nigeria, this paucity may be due to the fact that in practice bank regulators such as the Central Bank of Nigeria (CBN) usually determines the cash holding of deposit money banks via regulations of cash

reserve ratio (CRR). Notwithstanding, we believe that the decision of bank regulators is influenced by several factors which is subject to empirical investigations.

Theoretical explanations for the relationship between leverage, asset tangibility, firm size deposits and asset holdings are not entirely conclusive. It is believed that firms with higher leverage ratios tend to hold higher levels of liquid assets in an attempt to reduce the probability of experiencing financial distress or bankruptcy (Guney, Ozkan & Ozkan, 2007). The availability of tangible assets that can be liquidated to avoid cash shortages decreases the need for cash. In order words, firms with more tangible fixed assets are reluctant to hold excessive cash amount, so that they can sell these assets when the urgent cash is needed. With respect firm size, big firms enjoy the economies of scale, which enable them secure external finance relatively cheap, hence, they hold less cash than their smaller counterparts, because transaction costs are lower for larger firms than smaller companies this tends to make external funds relatively more expensive for smaller firms and encourage them to hold more cash (Bigelli & Sanchez-Vidal, 2012). On the other hand, if bank deposits are judiciously placed in the right investment, it will impact on incomes generated by the banks and increase their overall cash holdings.

In this case, several empirical studies have been carried out in this regard, but also with mixed findings, for instance, the studies (Ferreira & Vilela, (2004); Drobetz & Gruninger, 2007) found a negative relationship between leverage, firm size and cash holding. Those of (Kariuki, Namusonge & Orwa, 2015; Abbas & Samaran, 2013) produced variant

results. It is in view of these inconclusive findings that this current study intends to investigate this relationship in the Nigerian context.

Based on these gaps found in literature this study seeks to take advantage of recent advances in econometric procedures as well as using more recent data to investigate the fundamental factors that drive cash holding of Deposit Money Banks in the Nigerian context.

1.3 Research Questions

In the light of the above, the study seeks to provide answers to the following research questions:

1. How does profitability affect cash holdings of deposit money banks in the Nigeria?
2. What is the influence of leverage on cash holdings of deposit money banks in Nigeria?
3. What is the relationship between asset tangibility and cash holdings of deposit money banks in Nigeria?
4. To what extent does firm size affect cash holdings of deposit money banks in the Nigeria?
5. To what extent does volume of deposit to asset ratio influence cash holdings of deposit money banks in the Nigeria?

1.4 Objectives of the Study

The main objective of this study is to examine the determinants of cash holding of deposit money banks in Nigeria, while the specific objectives are to:

1. Ascertain the effect of profitability on cash holdings of deposit money banks in Nigeria; and
2. Determine the effect of leverage on cash holdings of deposit money banks in Nigeria;
3. Examine the relationship between asset tangibility and cash holdings of deposit money banks in the Nigeria;
4. Investigate the effect of firm size on cash holdings of deposit money banks in Nigeria;
5. Examine the effect of volume of deposit to asset ratio on cash holdings of deposit money banks in Nigeria

1.5 Research Hypotheses

The following hypotheses are formulated in line with the research questions and objectives. The hypotheses are stated in null form as follows:

1. Profitability does not significantly impact on cash holdings of deposit money banks in Nigeria.
2. Leverage do not significantly influence cash holdings of deposit money banks in Nigeria.

3. Asset tangibility does not significantly impact on cash holdings of deposit money banks in Nigeria.
4. There is no significant relationship between firm size and cash holdings of deposit money banks in Nigeria.
5. There is no significant relationship between the volume of deposit to asset ratio and cash holdings of deposit money banks in Nigeria.

1.6 Significance of the Study

The significance of this study involving the banking sector of Nigeria as a greater and important component of financial system cannot be overemphasized. This study will be significant in the following ways:

Banks management will benefit from the recommendations that shall be drawn at the end of this study which will help them formulate and implement sound financial strategies towards maintaining an optimal level of liquidity to enhance smooth operation.

The outcome of this study will be of huge benefit to various stakeholders including government and regulatory authorities such as Central bank of Nigeria (CBN) on what area of operations to monitor and guide in terms of cash holding of commercial banks. This outcome again will provide a guide to policy regulators in the banking sector in determining the optimum cash reserve ratio (CRR) to impose on deposit money banks.

In addition, the study will boost the knowledge and stimulate the curiosity of researchers and students in finance field to further research and build on this study.

1.7 Scope of the Study

The study covered the entire deposit money bank quoted in the Nigerian Stock Exchange (NSE) for the period of thirteen years (2013-2025). This period is important because it looks at the trends of cash holding in deposit money banks prior and post recapitalization/consolidation era i.e. before and after the banking sector reforms. The choice of the sector is anchored on the fact that banks are major cash holding firms and contributes significantly to the economy.

1.8 Limitations of the Study

The followings are the limitations of this study.

The accuracy of data extracted from various sources and their measurement procedures may not be without some intricacies, this is as a result of the fact that we are relying on secondary data. However effort is made to ensure that errors are mitigated in order to ensure results obtained are valid, reliable and dependable with respect to the data employed.

With respect to the methodology employed in the analysis of this study, it is known knowledge that no method is all embracing nor free from some weaknesses, however we ensured that methods currently in use in the literature that guarantee reliable and verifiable results were employed in the study**.**

Our model will only test some variables relating to determinants of cash holding of deposit money banks in Nigeria and leaving other variables behind.

The result cannot be generalize to all the sectors, as the study shall be limited to the banking, sector alone in the Nigeria economy.

Another limitation of this study is that it is cross-sectional in nature and can only measure what is obtainable now. This limitation shall be overcome by using longitudinal data.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter focuses on the review of conceptual, theoretical and empirical literature with respect of the determinants of cash holding of deposit money banks.

2.2 Conceptual Review

The conceptual Review gives robust explanations of the dependent and independent variables employed in this study.

2.2.1 Concept of Cash Holding

Cash holding refers to cash or cash equivalent readily available for investment in physical assets and to distribute to investors (Gill & Shah, 2012). Cash reserves give firms much needed financial independence, thereby enabling firms to follow their strategic trajectory with limited external interference (Boubaker, Derouiche & Nguyen 2015). Excessive cash reserve increases firm's opportunity cost, if firms trade off their profitable projects to hold it (Al-Najjar, 2012); whereas, less cash holding may let investment opportunities to pass and make firm prone to financial distress. Furthermore, internally generated funds are cheaper than those externally sourced. As such, firms with sufficient cash in hand can invest in viable investment opportunities at a low cost of financing.

Stockpiling cash reserves, however, might unintentionally fuel inefficiencies involving the use of corporate resources. Ali and Yousaf (2013) argue that sufficient liquid assets

afford managers the flexibility to use these resources even in negative net present value (NPV) projects. Recent studies (Faulkender & Wang, 2006; Dittmar & Mahrt-Smith, 2007) have confirmed Jensen's (1986) free cash flow hypothesis that an additional dollar that a firm hold is less than one dollar. Daher (2010) posits that underlying these findings is the assumption that excessive cash conceals the benefits of externally sourced funds as the monitoring tool, as well as allowing managers to extract personal advantages. Cash holdings, therefore, have both an upside and a downside so that firms need to maximize the former while minimizing the latter.

In perfect markets with no information asymmetry, taxes, and agency and transaction costs, companies have no need to hold cash, as there are no benefits or costs of allocating cash. When internal cash owned by the firm is not sufficient to meet the needs, the company can obtain external financing at fair prices that do not compromise growth and investment (Gomes, 2012). In such a frictionless world, cash holdings would have no effect on the firm value or shareholder wealth (Opler, Pinkowitz, Stulz & Williamson, 2001). Markets are, however, imperfect, and these imperfections cause external financing to be more expensive than internal resources. Therefore, in the real world of imperfect markets, corporate cash holdings are a strategic component of the business capital structure.

2.2.1.2 Motives of Holding Cash

Academic literature on reserves of cash and cash equivalents was first developed in the early work of Keynes (1936). There, Keynes discusses the preference for liquidity, indicating three reasons for holding currency: (i) transaction motives, (ii) precautionary motives and (iii) speculation motives. The first arises from the need for cash for current business transactions due to time lags between fund inflows and outflows. For Keynes, precautionary motives arise from the desire for security with regard to uncertainties and the desire to take advantage of unforeseen opportunities. Finally, Keynes interprets money as a way of preserving wealth as an alternative to investing in risky assets (speculation motive).

There are various other motives that influence firms to hold cash. The most outstanding, in literature, of these are the transaction motive, the precautionary motive, the tax motive and the speculative motive. These are discussed below.

a) The Transaction Motive

The transaction motive is a classic model for optimal demand for cash, which gained popularity in the 60s with the major proponents being Miller and Orr (1966). The reasoning behind this motive is that in a case where a firm does not have cash to meet its financial obligations or to invest in profitable projects, the company either should approach the financial markets or to dispose of noncash financial assets to raise the finance needed. The cash required to make these payments is the optimal demand for cash. In a perfect market, the transaction motive may not exist, since there is no

opportunity cost to hold liquid asset. However, in reality these fundraising transactions can incur significant costs (Bates et al., 2009). Myers and Majluf (1984) argue that because of the information asymmetry, external financing is much costly than using internal funds. Therefore, firms prefer to hold cash as buffer to avoid transaction costs.

Keynes (1936) introduces transaction cost model based on the definition of marginal cost. He claims that the optimal amount of liquid assets is obtained by the intersection of the marginal cost of liquid asset shortage curve and the marginal cost of liquid assets curve. Classic finance model from Baumol (1952), who is more interested in the transaction motive of cash holdings, applies the classical "lot size" model of inventory management to cash holdings. He also derives the optimal demand for cash by dealing with the tradeoff between holding cash and giving up the return in form of interest, which is generated by remaining the assets on the balance sheet as noncash financial assets. Miller and Orr (1966) include the volatility of cash flow in the adaption of the Baumol‟s model and point up that the demand for money is increasing with the volatility of cash flow. They also show that brokerage cost could be one of the reasons of firms to hold more liquid assets. Mulligan (1997) uses evidence to support the existence of economies of scale theory, which states that large firms hold less cash than small firms. Saddour (2006) states that in a world of imperfect markets, a firm can circumvent transaction costs by increasing its cash holdings. Since difference options of raising funds are costly, according to the transaction motive, the firm that is more likely to trigger high transaction costs tends to hold more cash.

b) The Precautionary Motive

Firms without enough liquid assets tend to hold cash to prevent from cash flow shortfalls, which might lead to give up profitable projects or even financial distress. Opler, Pinkowitz, Stulz and Williamson (1997) define this as precautionary motive for holding cash.

Companies tend to retain more cash if they anticipate future cash flows to be volatile and access to capital markets to be costly (Bates et al., 2009). According to Mikkelson and Partch (2003), if future cash flows are expected to be volatile, firms will increase their cash holdings as a way of hedging against future uncertainty. These differential cash holdings are known in the literature as precautionary cash holdings. Almeida, Campello and Weisbach (2004) set a model to analyze the precautionary demand for cash. They find that cash holdings of firms that are financially constrained are positively related to cash flow, while the cash flow sensitivity for holding cash is not found in financially unconstrained firms. Han and Qiu (2007) extend the theoretical model of Almeida, Campello and Weisbach (2004) to allow for a continuous distribution of cash flow. They suggest that cash holdings of financially constrained firms increased with cash flow volatility. Firms that anticipate future difficulties in raising funds for investments and operations tend to retain high cash holdings as a safeguard.

c) The Speculative Motive

Speculative motives relate to the ability of firms to finance profitable investment activities from cash reserves in order to avoid the cost of external funding. Sometimes firms arm themselves with cash piles in anticipation of future profitable investment opportunities (Kariuki, Namusonge & Orwa, 2015). Although Yu, Lee, Yi and Fok (2015) find that previous period cash holdings by Chinese firms lead to increased speculative activities in the following year, the speculative motive of holding cash was also found to weaken, as the level of corporate governance improved. This is because, as the study explains, speculative activities are generally noncore and oftentimes unethical activities. As corporate governance is more pronounced in South Africa than in China due to the influence of institutional investors (Zhang, 2016), this study envisages that the speculative motive of cash holdings is negligent in South African firms. Again, the difficulty of identifying and measuring risk activities inhibits the possibility of empirically investigating the speculative motive of cash holdings (Yu, Lee, Yi & Fok, 2015).

d) The Tax Motive

While the transaction motives and the precautionary motives have mostly been cited in the empirical literature to be driving corporate cash holdings, Foley, Hartzell, Titman and Twite (2007) investigates the effect of repatriation taxes on cash stashes overseas and found evidence that repatriation taxes in part influenced the cash holdings of US

transnational firms. US multinationals choose to keep their earnings overseas in low tax countries in order to avoid having to pay high tax costs of repatriating these funds to the US. The US obligates these companies to pay taxes on foreign income, but grants tax credits for foreign income taxes paid abroad. “Taxes due upon repatriation are equal to the difference between foreign income taxes paid and the tax payments that would be due if earnings were taxed at the US rate. “Therefore, there is no incentive for multinationals to repatriate their cash promptly unless there is a sudden liquidity crunch. These earnings are placed in low tax jurisdictions in order to avoid foreign income taxes. Foley’s regression output concludes that “one standard deviation increase in tax costs associated with repatriations is associated with a 7.9% increase in the ratio of cash to net assets.” This supports past literature that repatriation taxes play a big factor in influencing companies to hold onto cash. In addition, “the median firm facing an above average repatriation tax burden holds 47% of its cash abroad, but the median firm facing a below average repatriation tax burden holds only 26% of its cash abroad.” Companies with incorporated affiliates in foreign nations choose to leave this cash overseas despite having their main operations in the US. This is a cause for concern for the US government since less domestic investment would occur due to costs of repatriation. Therefore, in 2004, President George W. Bush approved a tax repatriation holiday through the American Job Creation Act.35 This allowed companies to bring back their cash for a comparably lower tax rate than usual. Billions of dollars were sent back by companies, yet the results were the not quite what the government had hoped for. Instead of having a dramatic increase in

investing that would stimulate the economy, companies used these funds to reward managers or buy back shares. As a result, there has been little support for another tax repatriation holiday, and multinationals seem to be happy to keep their cash in tax havens. Foley also suggests that technology companies are extremely sensitive to repatriation taxes and more often move funds to low-tax jurisdictions. “Technology intensive firms typically have high profit margins and intangible assets like intellectual property that are easy to transfer within the firm. “This means that a company like Apple would be able to have its foreign affiliates purchase intellectual property from its parent before the project is successful. Thus, Apple can avoid taxes on profitable R&D ventures through these loopholes. Foley’s findings strengthen the argument that multinationals hold larger amounts of cash to avoid triggering repatriation taxes. Overall, companies must decide whether keeping so much cash on their books actually minimizes their tax exposure.

2.2.1.3 Determinants of Cash Holdings

Literature has shown that the factors discussed below form key determinants of cash holdings among firm specific factors.

a) Leverage and Cash holding

Leverage refers to the extent to which firm finance, assets with debt. Theoretical explanations for the relationship between leverage and liquid asset holdings are not entirely conclusive. On the one hand, it is generally accepted that higher leverage tends to increase the probability of financial distress because of the pressure that rigid

amortization plans put on the firm's funds management. This implies that firms with higher leverage ratios would tend to hold higher levels of liquid assets in an attempt to reduce the probability of experiencing financial distress or bankruptcy (Guney, Ozkan & Ozkan, 2007). Further, financially constrained or small firms also have incentives to maintain large cash balances as they face constraints to raise external capital (Guney et al., 2007; Fazzari, Hubbard & Petersen, 1988; Hovakimian & Titman, 2003). On the other hand, financial hierarchy theory assumes high leverage displays the more investment of firms than their retained earnings. Since, companies borrow after retained earnings are exhausted, high leveraged firms hold less cash amounts. Therefore, both negative and positive association between leverage and corporate cash holding levels is possible.

The pecking order theory argues that debt grows when a firm's investment needs surpass its retained earnings (Ferreira & Vilela, 2004). Therefore, highly levered firms will have less cash as their investment needs outweigh their cash-generating abilities, indicating a negative relationship between leverage and cash holdings. From an agency theory perspective, highly levered firms are less likely to hold high cash reserves because of the monitoring role of debt.

Although some researchers find a nonlinear relationship between leverage and cash holdings (Drobetz & Gruninger, 2007; Guney et al., 2007), most recent studies have found that highly levered firms tend to hold less cash (Al-Najjar & Belghitar, 2011; Uyar

& Kuzey, 2014; Wasiuzzamam, 2014). In line with many prior studies, this study envisages a negative relationship between leverage and cash holdings.

b) Firm Size and Cash holding

The nexus between corporate cash holdings and firm size has been debated extensively in many studies. Bigelli and Sanchez-Vidal (2012) postulate that larger companies enjoy the economies of scale, which, in turn, enables these companies to secure external finance relatively quickly and cheaply in order words large firms are found to hold less cash than their small counterparts, because transaction costs are lower for larger firms than smaller companies this tends to make external funds relatively more expensive for smaller firms and encourage them to hold more cash. According to Al-Najjar and Belghitar (2011), larger firms are more diversified than the smaller ones and so are less susceptible to bankruptcy cost. Larger companies achieve growth through profitability and are likely to retain more cash after controlling for their investment needs (Ferreira & Vilela, 2004). Furthermore, the agency theory posits that larger firms have dispersed shareholders, allowing more autonomy to the managers to hold more cash for private perquisites (Ferreira & Vilela, 2004).

According to trade-off theory, the relationship between firm size and cash holdings is negative. The pecking order theory envisages a positive correlation between firm size and corporate cash holdings, as the former is viewed as a proxy for business success. Empirical evidence supports the trade-off theory in explaining the association between

firm size and corporate cash holdings. Our study, thus, envisages a negative relationship between firm size and cash holdings.

c) **Volume of Deposits and Cash holding**

Deposit are the amount of money which bank receives from the customers for safe keeping and the banks use them to generate incomes from lending activities. The bank aggregates deposit through demand deposit accounts; savings deposit accounts, time deposit accounts and special deposit accounts. The more deposits bank receives and if these deposits are judiciously placed in the right investment will impact on incomes generated by and banks and increase its cash holdings. In line with the study of (Ubesi, Okorie & Nwachukwu, 2017) this study envisages a positive relationship between volume of deposit and cash holding.

d) Profitability and Cash holdings

Profitability is the capability of an entity to generate return. The key objective of many businesses is to generate profit. A business will not survive without profitability. On the other hand, a high profitable business will reward the owners with high profit margins for generation of profits relative to equity sales and assets profitability ratios are used which emphasize on the profits of a company. For this purpose, return on Assets formula is used as a proxy for profitability. Ogunpide, Ogunpide and Ajao (2012) indicates that firms with higher profitability measured by ROA tends to hold more cash than firms with low ROA. 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 underinvestment problems (Almeida & Campello, 2010; Myers & Majluf, 1984). The pecking order theory, on the other hand, predicts the opposite because firms with higher financial result retain higher level of liquidity because profitable firms accumulate the cash flow generated. Consequently, controlling for investment the most profitable companies should have more cash as cash holdings fluctuate with cash flows (Kim, Mauer & Sherman, 1998). Opler et al. (1999) argue that there is a positive relationship between profitability and cash holdings. Ferreira and Vilela (2004) and Al-Najjar and Clark (2016) confirms this argument. In line with this, our study thus envisages a positive relationship between profitability and cash holding. Return on assets is measured as ratio of net profits to the book value of assets.

e) Asset tangibility and Cash Holdings

Tangible assets are assets that has physical form they are used to generate revenue for the firm they include fixed assets such as machinery, buildings and land which firms use their business operation, and current assets such as cash, marketable securities and inventory which are used within a year and can be readily sold to raise cash for emergencies. A business core operations are centered around its asset which is recorded on the balance sheet statement (Investopedia, 2018). The availability of tangible assets that can be liquidated to avoid cash shortages decreases the need for cash. In order words, firms with more tangible fixed assets are reluctant to hold excessive cash amount, so that

they can sell these assets when the urgent cash is needed. Hence, according to assumption of pecking order theory, the negative relationship between asset tangibility and cash holding is expected. Furthermore, tangible assets can perform an important role as collateral for debt financing (Titman & Wessels, 1988). Consequently, we hypothesize a negative association between asset tangibility and cash holdings.

2.3 Theoretical Review

We expound the three theories of cash holdings that have been used to explain the pattern of cash holdings across various industries.

2.3.1 Trade off Theory

The Tradeoff Theory, originally proposed by Baumol (1952) and Tobin (1956), seeks an optimal level of cash holdings. The trade-off argument hypothesizes that firm's optimal level of cash holdings are determined by a trade-off between the marginal costs and marginal benefits of cash. The advantages of holding cash derive from the transaction cost motive and the precautionary motive (Boubaker, Derouiche & Nguyen, 2015). Maintaining large cash balances offers several benefits to a firm. First, having large cash balances lead to a reduction in the probability that the firm will experience financial distress as cash acts as a safety reserve to face unexpected losses or external fundraising constraints. Second, even after overcoming financial constraints, cash holdings still help

firms to adopt an optimal investment policy which would otherwise have not been possible because of the external fund raising constraints as it would force the firm to forgo investment projects with positive net present value (NPV). Finally, cash holdings contribute to minimize the costs of raising external funds or liquidating existing assets as it acts like a buffer between the firm's sources and uses of funds (Tong, 2010). This benefit particularly pertains to high growth firms, with large amounts of intangible assets, whose firm value is largely determined by their growth opportunities.

On the other hand, the marginal cost of holding more cash, comes with a price, as businesses pay a liquidity premium in the form of the lower rate of return generated by these stored liquid assets. Shah (2012) posits that the main cost of holding cash is the opportunity cost of capital invested in liquid assets such as forfeited profitable investments (Ferreira & Vilela, 2004).

However, some factors make cash holdings deviate from their optimal level. Myers & Majluf (1984) suggest that asymmetric information between managers and investors make external finance too expensive and, to avoid it, firms should create financial slack accumulating cash holdings (Myers, 1984). These implications are at the basis of the Pecking Order Theory by Myers & Majluf (1984).

2.3.2 Pecking Order Theory

The pecking order (or financial hierarchy) model was first developed by Donaldson (1961) and then extended by Myers and Majluf (1984). This theory advocates absence of optimal cash level. Financial hierarchy is followed by firm to reduce cost of information

asymmetry. The model presents a different way of looking at investment decisions by considering how the investment is financed. The

financial hierarchy theory asserts that to minimize asymmetric information costs and other financing costs, firms should finance investments first with retained earnings, then with safe debt and risky debt, and finally with equity (Myers & Majluf, 1984). This theory suggests that firms do not have target cash levels, but cash is used as a buffer between retained earnings and investment needs. Thus, the motive for holding cash is to avoid external financing. Consequently, when retained earnings are inadequate to finance new investments, firms use their cash holdings and then issue new debt and finally when they get out of their debt servicing capacity they will issue securities. As such, the cash level would just be the result of the financing and investment decisions, and therefore debt and cash are viewed as opposite sides of the same coin (Dittmar et al., 2003; Saddour, 2006). Thus, when resources are adequate and surpass the amount required for investments, the firm will pay dividends, pay debt when it becomes due, and will otherwise accumulate cash (Opler et al., 1999; Dittmar et al., 2003). Accordingly, cash holdings follow an inverse pattern over time, that is cash decreases when investments exceed retained earnings, and vice versa.

2.3.3 Agency Cost and Free Cash Flow Theory

According to Jensen and Meckling (1976) the agency costs of debt appear when there is a conflict of interest between shareholders and creditors or when the conflict arises

between various categories of creditors making more difficult and costly to resort to external finance. A way to prevent them and lessen the probability of financial distress is by keeping a low level of leverage or keeping high levels of cash holdings. On the other hand, Free Cash Flow Theory by Jensen (1986) states that conflicts between managers and shareholders are more serious in the presence of high free cash-flows that give the manager greater discretionary power in the firm's decisions

According to Harford (1999), corporate cash holdings are perceived as free cash flows, since they can be used to serve management's own interests at the expense of the shareholders. The free cash flow hypothesis, thus, envisages that managers are more inclined to stock up cash, as it increases the assets under their control. This, in turn, affords them more unrestricted investment prerogative. With a stockpile of cash, managers can relatively easily avoid the capital markets and do not have to comply with their transparency requirements regarding possible investments (Ferreira & Vilela, 2004). "Managers' selfish behaviors can include lavish spending on luxurious offices and unjustifiable mergers and acquisitions. Hence, excessive cash can create overinvestment problems, because they may be used to fund negative NPV projects" (Thanatawee, 2011). This assertion agrees with the notion of Dittmar and Mahrt-Smith (2007) that shareholders ascribe an inferior value to a marginal dollar of cash reserves, when there is a greater probability of agency conflicts in a firm.

2.4 Empirical Review

A number studies have emerged with mixed conclusions and result on the determinants of cash holding across different countries. In this section, we focus on some of these studies and their major findings.

Kim, Mauer and Sherman (1998) analyze the determinants of cash holdings U.S. industrial firms. The study employed panel regression technique. The study reports that firms with higher growth opportunities, measured by market-to-book ratios, and lower returns on assets have significantly larger positions in liquid assets. On the other hand, firm size appears to be negatively related to cash holdings, but never significant. They conclude that "these results support the model's prediction of a positive relation between liquidity and the cost of external financing to the extent that the market-to-book ratio and firm size are reasonable proxies for the cost of external financing".

Opler, Pinkowitz, Stulz and Williamson (1999) examine the determinants of corporate holdings of cash and marketable securities among publicly traded U.S. firms from using panel regression technique. The study reveals that firms with strong growth opportunities and riskier cash flow holds relatively high ratios of cash to total asset. Firms that have the greatest access to the capital market (e.g. large firms and those with credit ratings) tend to hold lower ratio of cash to total asset. These results are consistent with the view that firm hold liquid asset to ensure that they will be able to keep investing when cash flow is too low relative to planned investment and when outside funds are expensive. The study also

finds that the short run impact of excess cash on capital expenditures, acquisition spending and payouts to shareholders is small.

Ferreira and Vilela (2004) study the determinants of corporate cash holdings for a sample of 12 Economic and Monetary Union (EMU) countries using cross sectional and time series regression model. Their results indicate that the amount of cash held by firms is positively affected by the investment opportunity set and cash flows. In contrast, the amount of cash held by firms is negatively affected by the amount of liquid asset substitutes, leverage and size. In addition, firms in countries with superior investor protection and concentrated ownership hold less cash, which supports the agency perspective of the role of managerial discretion. They also suggest a negative relation between the development of capital markets and cash levels.

Ozkan and Ozkan (2004) study the empirical determinants of corporate cash holdings of UK firms using dynamic panel data model. The study finds that the existence of non-cash liquid assets and leverage has a negative influence on levels of cash. The authors also focus on the importance of managerial ownership, board structure and ultimate controllers of companies. Contrary to the findings of Mikkelson and Partch (2003), they conclude that managerial ownership plays an important role regarding the cash holdings. They find a non-monotonic association between both variables, and firms with managerial ownership between 20% and 30% have the lowest cash levels. In addition,

they provide evidence that firms controlled by families hold higher levels of cash and marketable securities.

Guney, Ozkan and Ozkan (2007) investigate the cash holding behavior of firms in France, German, Japan, UK and US using panel regression model. Firstly, they present a detailed analysis concerning the relation between cash holdings and leverage. In particular, they establish that borrowing decision of firms exert a non-linear impact on cash holdings decisions. Hence, leverage can act as a substitute for cash holdings, but at same time increases the probability of financial distress, which suggests high levels of cash. "Hence, one observes first a negative relationship at lower levels of leverage and the observed relation becomes positive at high leverage levels" (Guney et al., 2007, p. 59). Secondly, their study also focuses on the importance of corporate governance aspects. They find that the degree of investor protection can influence the cash policies of firms. Specifically, strong investor protection and high ownership concentration seem to lead firms to hold lower cash balances.

Drobetz and Grüninger (2007) investigate the determinants of cash holdings of non-financial firms in Swiss using panel regression technique. Their findings indicate that asset tangibility and firm size are both negatively related to corporate cash holdings, and there is a nonlinear relationship between leverage ratio and liquidity. Dividend payments and operating cash flows are positively related to cash reserves. Moreover, they suggest a

positive relation between cash holdings and CEO duality as well as a nonsignificant relation between cash holding and board size.

Afza and Adnan (2007) investigate the determinants of corporate cash holdings of non-financial firms in Pakistan. The study adopted panel regression model and utilizes data set of a sample of Pakistanis firms across industries and firm size over the period 1995 – 2005. The finding of the study shows that net working capital, market-to-book ratio, dividend payment and leverage are negatively related to corporate cash holdings. However, a positive association was found between firm's cash flows and leverage with cash holdings.

Gill and Shah (2012) extends the work of Afza and Adnan (2007) by investigating the determinants of corporate cash holdings of Canadian firms employing the ordinary least square regression analysis. The study used a sample of 166 firms listed on Toronto Stock Exchange Market during the period 2008 – 2010. The findings of the study show that firm' cash flows, net working capital, market-to-books ratio, board size, firm size, leverage and CEO duality are significant determinants of corporate cash holdings of Canadian listed firms.

Ogundipe, Salawu and Ogundipe (2012) examine 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

dynamic panel data i.e Generalized Method of Moments (GMM). The study finds evidence supportive of a target adjustment model and that firms cannot 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, the study found no significant relationship between cash holdings and cash flow.

Yifan Ma (2012) investigate the empirical determinants of corporate cash holdings of 11 Eurozone countries for the period of 1999 to 2011 using panel regression technique. The results reveal that firms with quality investment opportunities tend to hold more cash. Furthermore, firms that have better access to capital markets and have access to more substitutes for cash, hold relatively lower cash to total assets ratios.

Željko and Nemanja (2013) investigate the empirical determinants of cash holdings of non-financial companies operating in the Republic of Serbia. For this purpose, dynamic panel data models was estimated by utilizing the generalized method of moments (GMM) for the period from 2008 to 2013. The econometric analysis indicates that companies with higher cash flow hold more cash in their assets. Larger companies as well as companies with more liquid assets and higher turnover coefficients tend to reduce their cash levels. According to the results, companies operating in the Republic of Serbia tend to hold the

optimal level of cash and prefer internal sources of financing, which is in line with the principles of trade-off theory and pecking order theory.

Abbas and Samran (2013) investigate the determinants of cash holding of non-financial firms in Germany using the panel regression model for the period of 2000 to 2010. The findings of this study are consistent with the predictions of the trade-off theory, pecking order theory, and agency cost theory. The result gave strong evidence that firm size, working capital, and leverage significantly affect the cash holdings decisions of non-financial firms and that are in conformity with the existing literature on the determinants of corporate cash holdings.

Uyar and Kuzey (2014) investigates the determinants of firms' cash holdings for Turkish non-financial firms using multiple regression for a period of 1997-2011. The findings of this study shows that cash flow and growth opportunities are statistically significant and positively affect cash level; whereas, asset tangibility degree, capital expenditure amounts, and leverage negatively affect. Moreover, there was observed steadily increasing tendency of cash level holding levels during analyzed period.

Kariuki, Namusonge and Orwa (2015) investigate the corporate cash holdings determinants of private manufacturing firms in Kenya. The study adopted cross-sectional descriptive survey design, stratified random sampling technique for a sample of 156 manufacturing firm and multiple regression model analysis. The study also utilises questionnaire to obtained self-reported financial measures from the CFOs of the sample

firms. The result of the study shows that growth opportunities and likelihood of financial distress are negatively associated with the corporate cash holdings. Firm leverage shows a significant positive relationship with corporate cash holdings whereas, firm size reveals a positive relationship with corporate cash holdings.

Muhammad, Norhani and Rokiah (2015) investigate the determinants of the cash holdings for small and medium-sized entities in Nigeria. The study employed panel data regression analysis using secondary data on a sample of 311 Nigerian SMEs for the period 2007 – 2013. The finding which is robust of endogeneity shows statistically significant association between cash conversion cycle, account receivables period, return on assets and board size with SMEs cash holdings. Also found a significant relationship between cash holdings with firm size, leverage, growth opportunities and firm age.

Bayyurt and Nizaeva (2016) investigate the determinants of corporate cash holding behaviors of Turkish manufacturing firms using fixed effects panel regression over the period of 2003 to 2013 using both firm-specific and country specific determinants. According to our examination, on average, manufacturing firms hold 7.3 % cash to total assets. The findings of the panel data analysis indicate that large firms, based on their total assets, hold more cash than their smaller counterparts. A positive effect of interest rate and risk on corporate cash holding was observed. Furthermore, negative associations between net working capital, leverage, asset tangibility degree, capital expenditures and cash holding level were captured.

Shaukat, Mishkat and Nazir (2016) examine the determinant of corporate cash holding of textile sectors in Pakistan. Multiple regression models were used to conduct the results.A sample of 30 textile firms of Pakistan listed on Karachi Stock Exchange (KSE) was selected for the study, for the reason of examining their relationship. Secondary data for the period 2006-2013 was selected for the study. Variance Inflation Test (VIF) was used to check the problem of multicollinearity. Results calculated by regression model show consistency with the literature available. Profitability (ROA) and firm size (FS) show a positive and significant relation with cash holding. However negative and significant relationship was found between net working capital (NWC) and leverage (LEV) with cash holding.

Ubesie,Okorie and Nwachukwu (2017) investigates the determinants of Bank's Corporate Cash Holding in Nigeria. A simple linear regression analysis was used in the analysis. The study adopted ex post facto research design while secondary data were obtained from the annual reports of Access Bank, First Bank of Nigeria and Zenith Bank for the period of ten years, (2005 to 2014). The study seeks to explore the relationship that exists between cash holding and profit after tax, volume of deposit and loans and advances. The findings show that corporate cash holding has a significant relationship with profit after tax, volume of deposits, and loans and advances.

Chireka and Fakoya (2017) investigate the determinants of corporate cash holdings in the South African retail industry. The paper used panel and ordinary least square regression

technique to test the relationships between cash holdings level and the identified determinant factors for a period of 16 years (2000-2016). The authors found evidence that liquid asset substitutes, capital expenditure, dividend payments and cash flow volatility significantly influence the cash holdings levels of retail firms listed on the Johannesburg Stock Exchange.

2.5 Gaps in Empirical Literature

From the above literature review, it is obvious that most of the studies where carried out in both developed and developing countries. In each of these studies, there were mixed findings with respect to the determinants of cash holdings.

For instance, Gill and Shah (2012) in Canada, Ogundipe et al. (2012) in Nigeria, Zeljko and Nemanja (2013) in Republic of Serebia, Abbas and Samran (2013) in Germany, Muhammad et al. (2015) in Nigeria, Shaukat et al. (2016) in Pakistan, Ubesie et al. (2017) in Nigeria, all confirmed that firm size, cash flow, return on asset, leverage and volume of deposit determines the cash holdings decision of firms. However, some other studies like Afza and Adnaa (2007) in Pakistan, Drobetz and Gruinger (2007) in Swiss, Uyar and Kuzey (2014) in Turkey, all showed that asset tangibility, dividend payment and networking capital does not determine cash holding decision of firms. In view of these mixed findings, we deem it necessary to empirically examine this relationship in the Nigeria context, using Nigerian-specific data in order to ascertain the those factors that determine cash holding behavior of firms.

Furthermore, previous research work like Yifan Ma (2012), Abbas and Samran (2013), Kariuki et al. (2015), Muhammad et al. (2015), Chireka and Fakoya (2017) amongst others, employed Panel Regression Methodology. Other research work that employed Linear Regression, Ordinary Least Square and Multiple Regression include Gill and Shah (2012), Uyar and Kuzey (2014), Ubesi et al. (2017), Shaukat et al. (2016), respectively. Few studies employed the panel data econometric technique in their empirical analysis. Hence, this study employed the panel data analysis because, the method is more appropriate and superior to those of OLS or multiple regression due to its ability to deal with heterogeneity of cross sectional data as well as omitted variables, which those of OLS and multiple regression cannot handle.

It was observed that previous studies like Gill and Shah (2012), Ogundipe et al. (2012), Muhammad et al. (2015), Chireka and Fakoya (2017) amongst others, made use of non-financial sectors, while only one study Ubesi et al. (2017) made use of financial sector.

It is on these basis of the gaps with respect to these mixed and inconclusive findings in empirical literature that warrant a further study on the on the determinants of cash holding of deposit money banks in Nigeria. Using the panel data analysis which we believe is more revealing and will address the problem of endogenity measurement problem and omitted variable.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This section discusses the methodology of the study. Issues relating to the choice of research design

Population and sample size, sources of data, theoretical framework, model specification, definition of variables and estimation technique.

3.2 Research Design

This study employs the causal research design as it attempts to examine the determinants of cash holding of quoted deposit money banks in Nigeria. This research design was chosen because it attempts to explore the possible causative relationship between the independent variables and the dependent variable on an occasion in which the researcher is unable to control the independent variables. Also, this leads to formulation of regression model which emanates from theoretical considerations.

3.3 Population and Sample of the Study

The population of this study consist of the entire banking sector for a period of 13 years (2013-2025). The sample size of this study consists of 12 deposit money banks listed on the Nigerian stock exchange (NSE) as at December 2024. The sample size is of interest to

the researcher because deposit money banks represent the greatest portion of the entire banking sector.

3.4 Sources of Data

The study employed a dynamic panel data covering the period 2010 to 2025 for the study in 12 deposit money banks. The source of data include the Nigerian Stock Exchange Fact Book, the Annual Financial Statement and cash flow report of banks for a The NSE fact book and the annual financial statements of sampled companies are reliable secondary sources because, the annual financial statements and cash flow reports require the authorization of an external auditor, and the information supplied in the fact book are inspected by the Security Exchange Commission (SEC). The justification for these 12 banks is based on the fact that they are active players in the Nigerian Stock Exchange and invariably contributing to the overall growth and development of the Nigerian economy.

3.6 Model Specification

Flowing from the above theoretical framework, and in order to achieve the objectives and hypotheses of the study, a functional relationship between the dependent and independent variables are presented in a panel regression model. The model used in this study is underpinned to the works of Ogundipe, Salawu and Ogundipe (2012) and modified by introducing variable terms like asset tangibility and volume of deposit.

The functional form of the model for this study is given as;

CASH = f (LEV, FASSET, ROA, VDA, FSIZE) ……..…. (1)

Where,

CASH = Corporate cash holding

LEV = Leverage

FASSET= Asset Tangibility

ROA = Return on Asset (proxy for profitability)

VDA = Volume of deposit to Asset

FSIZE = Firm Size

In econometrics form, the equation will be stated as;

$CASH_{it}= \beta_0 + \beta_1 LEV_{it} + \beta_2 ASSET_{it} + \beta_3 ROA_{it} + \beta_4 VDA_{it} + \beta_5 FSIZE_{it} + \mu_{it}$……(2)

Where i refers to the bank and t to the year time period. $CASH_{it}$ is the dependent variable i.e the cash ratio of the firm i and year t. β_0 is the constant term, $\beta_1 - \beta_5$ are the coefficients of the explanatory variables to be estimated and μ is the stochastic variable.

From the above model, β_0 represents the constant variable. For Equation 1 β_1 is the coefficient of Leverage (LEV) which is less than one ($\beta_1 < 0$) because it is expected to have a negative relationship with Cash holdings (CASH). β_2 is the coefficient of Asset

Tangibility (FASSET) which is less than one ($\beta_2 < 0$) because it is expected to be negatively related to Cash holdings (CASH). β_3 is the coefficient of Return on asset (ROA) which is greater than zero ($\beta_3 > 0$) because it is expected to have a positive relationship with the dependent variable Cash holdings (CASH). β_4 is the coefficient of Volume of Deposit to Asset (VDA) which is also expected to have a positive relationship with the dependent variable Cash holdings (CASH), hence should be greater than zero ($\beta_4 > 0$). B_5 is the coefficient of Firm Size (FSIZE) which is also expected to have a negative relationship with the dependent variable Cash holdings (CASH), hence should be less than zero ($\beta_6 < 0$) Therefore, the mathematical representation of the expected result of the parameters are:

$\beta_1 < 0, \beta_2 < 0, \beta_3 > 0, \beta_4 > 0, \beta_5 < 0, \beta_6 < 0.$

3.7 Definition of Variables and Data Source

Variables	**Code**	**Definition/Measurement**
Dependent Variable		
Cash Holding	CASH	The ratio of total cash and cash equivalents to total assets. i.e Cash and cash equivalents Total assets - Cash and cash equivalents
Independent Variables		
Firm Size	FSIZE	The natural log of total assets
Leverage	LEV	The ratio of total debt to total assets i.e Short-term debt + Long-term debt Total assets - Cash and cash equivalents
Asset Tangibility	ASSET	The ratio of tangible assets to Total assets.

Return on Asset	ROA	Return on assets is measured as ratio of net net income to total assets. i.e. $\frac{\text{Net income}}{\text{Total Assets}}$
Volume of Deposit to Asset	VDA	The ratio of deposits to total asset.

Source: Author's Compilation, 2025

3.8 Data Analysis Technique

The study adopts the Panel Data econometric analysis. The choice of this method is premised on the need to control for endogenity and omitted variables in the period covered. However, for us to do a proper analysis, we first employ descriptive statistics which will describe the relevant aspect of cash holding and provide detailed information about each relevant variables, descriptive statistics also determine the summary qualities of the data and present in a convenient form, which will be the start form of our preliminary test.

Secondly, the Hausman test is also conducted to ascertain the particular method of data estimation in panel data analysis. The various statistical and econometric criteria for assessing the parameter estimates of the regression models such as t-statistics, R^2 statistics, F-statistics are also employed to arrive at the appropriate model of the study. Statistical test of significance will be conducted at 5% level of significance for accepting or rejecting null hypothesis. Correlation test, specifically Pearson correlation was applied to measure the degree of association among the variables under consideration. The E-view 9.0 is used in conducting the economic procedures in this study.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION OF RESULTS

4.1 Introduction

In this chapter, we perform the empirical analysis of the determinants of cash holdings of deposit money banks in Nigeria. The analysis involves the use of descriptive statistics, correlation coefficient and the panel data econometric analysis. The descriptive statistics and correlation coefficient are employed in order to provide a rich background characterization of the relationship among the data sect used for the investigation. These are eventually reported as background to the empirical analysis. The descriptive statistics provide the initial characteristics of the data while correlation analysis shows the direction of co-movements among the variables.

4.2 Data Presentation

Data stream for the period covered and for the selected firms are presented in the appendix.

4.3 Data Analysis

4.3.1 Descriptive Statistics

The descriptive statistics for the annualized data series are presented in Table 4.1. as shown

Table 4.1: Descriptive Statistics

	Mean.	Med.	Max.	Min.	Std. Dev.	Skew.	Kurt.	J-B.	Prob.
CASH	14.086	12.295	59.1	0.58	10.168	1.635	7.3376	191.83	0
LEV	87.118	85.71	254.7	8.63	19.213	5.3476	48.310	14088.	0
ATANG	3.7730	3.495	13.74	0.25	1.8660	1.8064	8.5188	282.82	0
VDA	613.35	1.560	8027.9	0.033	1328.0	3.0577	13.170	915.44	0
ROA	1.2369	1.6	9.54	-20.23	3.389	-3.627	22.904	2917.3	0
FSIZE	8.9557	9.005	10.77	8.03	0.4617	0.1479	3.3923	1.5692	0.45

Source: Author's Computation (2025)

The result of the descriptive statistic test shows the average values as well as first and second moments of the data distribution. The mean value of cash holdings of deposit money banks in Nigeria for the period under investigation is ₦14.086 billion for the entire sample, while the median value is ₦12.295. The data is skewed to the right, and that explains why the mean value is greater than the median value. This was further confirmed by the skewness coefficient of 10.168 which indicated that the distribution was positively skewed to the right, which was a common feature of cash holding behavior of banks in the sample. The maximum value of cash holding for the entire sampled banks' stood at about 59.1, while the minimum value is 0.58. With this result, more banks are seen to hold cash than others banks within the periods. There appeared to be a lot of variations in cash holding among the sampled banks, the standard deviation value of

10.168 is very large compared to the mean value of 14.086. This simply suggests a high level of variability of the pattern of cash holding behaviour either across the banks or overtime within banks. The summary statistics with respect to Jaque-Bera (J-B) statistic value of 191.83 is significant at the 1 percent level and implies that the probability distribution of the sample for the variable is not normally distributed. This invariably suggests that the financial performance across the sampled banks is heterogeneous and exhibit bank-specific characteristic. This is one justification for the application of the panel data estimation technique in this study.

The mean value of leverage (LEV) is 87.118, while the maximum value is 254.7. By this result, it becomes glaring that cash holdings in deposit money banks in Nigeria is higher than the mean threshold; hence, more banks are highly levered. The standard deviation value of 19.213 is low compared to the mean value of 87.118. The skewness coefficient of 5.3476 indicates that the distribution is positively skewed to the right, which was a common feature of cash holding among the banks.

The average value for asset tangibility (ATANG) is 3.7730 with corresponding high maximum value of 13.74. The standard deviation value of 1.8660 shows that, there is a low spread or variability in the level of assets held among the sampled banks. The data for the ATANG is positively skewed to the right. The mean value of volume of bank deposit to assets (VDA) is 613.35 billion, with maximum value reaching over 8027.9. There appeared to be high variations in the banks' tangible assets, as the standard

deviation value of 1328.0 is very high as compared to the mean value across the sampled banks in the study. The skewness statistic value of 3.0577 is positively skewed to the right, indicating that more banks have tangible assets that are higher than the reported mean value for the period of the sample. The J-B statistic also shows non-normal distribution, an indication of heterogeneity in the pattern of banks' assets within the period of investigation.

The descriptive statistics for the other variables in the study also present interesting results. For the banks' size (FSIZE), the mean and maximum values are 8.9557 and 10.77. This clearly shows that on average, bigger banks seem to hold more cash than smaller ones. The degree of variability is low compared to the mean value. The skewness statistics value of 0.1479 is positive, indicating that bigger banks hold more cash than the reported mean value for the sampled period. The J-B statistic value 1.5692 for the variable is significant at the 1% level. This also indicate non-normal distribution, an indication of heterogeneity in the pattern of cash holding behavior in the banks. Indeed, all the variables in the study had highly significant J-B values, clearly showing that individual bank's characteristics are quite important in the measurement of the variables.

4.3.2 Correlation Analysis

Furthermore, the ordinary correlations matrix coefficients are presented to examine the background behavioural patterns in the data set. Correlation statistics are used to determine the initial direction of co-movements among variables, especially among the

independent variables. It also suggests any form of multicollinearity among the explanatory variables. The results of the correlation tests is shown in table 4.2.

Table 4.2: Pairwise Correlation Matrix

	CASH	LEV	ATANG	VDA	ROA	FSIZE
CASH	1					
LEV	-0.04027	1				
ATANG	-0.20473	0.42051	1			
VDA	-0.03455	-0.02141	-0.19526	1		
ROA	0.14057	-0.3557	-0.1898	-0.0375	1	
FSIZE	0.09555	-0.21550	-0.60123	0.25371	0.13006	1

Source: Author's computation (2025).

It is seen that the correlation between bank cash holding (CASH) and all the other variables are generally negative, apart from that of total assets (TAASETS), which has a rather weak positive correlation with cash holding. The coefficient of leverage (LEV) has a moderate correlation value of 0.42 percent with assets tangibility (ATANG). On the other hand, assets tangibility (ATANG) has a strong negative correlation with bank size (FSIZE). Indeed, all the other variables are weakly correlated. Thus, it is conclude that, since there is a wide variation among the variables, the correlation matrix results are

indications of the absence of multicolinearity among the hypothesized variables in the model.

4.4 Empirical Results on the Panel Regressions

4.4.1 Hausman Test for Panel Effects

The standard test for the method of panel data analysis is the Hausman test specification for random effects. In a Hausman test, the null hypothesis is that the preferred model is random effects vs. the alternative the fixed effects (Green, 2008). It basically tests whether the unique errors (ui) are correlated with the regressors, but the null hypothesis is that they are not. Since the biases in the pooled data could either come from cross sectional heterogeneity or time series (periodic) changes, the Hausman test (reported in table 4.3) is conducted to determine the best effects model to be adopted. The Chi-square statistic value for the model is not significant. From the results, the statistic did not provide evidence against the null hypothesis that there is misspecification when the Random-effect (RE) model is employed for the estimates in values. Hence, the Random effect strategy is employed for the empirical analysis of the study.

Table 4.3: Hausman Test for Panel Effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	8.992967	5	0.1093

Source: Author's computation (2025).

4.4.2 Estimation Results

The empirical estimation of the determinants of cash holding in deposit money banks (DMBs) in Nigeria is carried out in this section. Although, the Hausman test has shown that the Random Effect (RE) estimates are more appropriate in the estimations, we also include the Fixed Effects (FE) estimates for the purpose of robustness checks. The result of the estimates of the initial model is presented in Table 4.4 below:

Table 4.4: Determinants of Cash Holding in DMB in Nigeria Estimates (Dependent Variable =CASH)

	Fixed Effects(EF)			***Random Effects(RE)***		
Variable	**Coeff.**	**t-Stat.**	**Prob.**	**Coeff.**	**t-Stat.**	**Prob.**
Constant	83.77662	1.601505	0.1117	33.7392	1.477292	0.1417
ROA	0.002899	0.010050	0.9920	0.35166	1.391850	0.1660
LEV	-0.020073	-0.381937	0.7031	0.05990	1.255303	0.2113
ATANG	0.052462	0.073566	0.9415	-1.49024	-2.439613	0.0159*
VDA	0.001838	1.993148	0.0484	-0.00024	-0.356611	0.7219
FSIZE	-7.734648	-1.393933	0.1658	-2.18093	-0.907745	0.3655
R-squared	0.401			0.050		
Adj. R-squared	0.269			0.019		
F-statistic	3.0380	DW = 1.04			1.6037	DW = 1.99

Source: Author's computation (2025) **Note: * Sig. at 5% level.**

From the result, the goodness of fit is not impressive, with the R squared value of 0.050, indicating that over 5 percent of the systematic variations in banks' cash holding is captured by changes in the explanatory variables. The adjusted R-squared value of 0.019 percent is equally very low and it implies that the model has a weak predictive ability. However, given that the data set used is a panel, the outcome of the adjusted R squared may not pose estimation threats to the results (Madalla, 1999; Woodridge, 2002). The F value of 3.0380 for the result is high and easily passes the significance test at the 1 percent level; suggesting existence of significant relationship between cash holding behaviour of banks and all the explanatory variables combined.

The importance of each variable in the model is determined by evaluating their respective coefficients in terms of significance and signs (Greene, 2002; Iyoha, 2004). From the analysis in table 4.4, the coefficients of tangible asset (ATANG), volume of deposit to total assets (VDA) and bank size (FSIZE) variables do not possess the correct signs in line with the apriori expectation in the model. However, the coefficients of return on assets (ROA) and leverage (LEV) are the only variables possessing the expected positive apriori signs.

On the basis of the Random Effect (RE) analysis, the coefficient of return on assets (ROA) proxied for bank profitability does not have any significant relationship with cash holding behaviour of banks. The variable failed the 5 percent significance level. By implication,

the level of banks' profitability does not determine the amount of cash to be held by banks at any given point in time. In other word, the fact that a bank is doing well/profitable does not mean that it should always hold more cash. This finding is not in line with those of Kim, Mauer and Sherman (1998), Ubesie,Okorie and Nwachukwu (2017), Muhammad, Norhani and Rokiah (2015) who find significant positive relationship between profitability and cash holding.

The coefficient of asset tangibility (TAN) has significant negative relationship with cash holding in deposit money banks. It passes the 5 percent significance level. This means that, asset tangibility is an 'important factor to be considered in the determination of cash holding behavior of deposit money banks in Nigeria. For a unit change in asset tangibility decreases financial performance by -2.439613 percent. This result was in line with the view of Keeley (1990) that a firm with high fraction of plant and equipment (tangible assets) as the asset base made the debt choice more likely and influences firm's performance and cash holding. On the other hand, this finding agrees with those of Drobetz and Grüninger (2007) who submitted significant positive relationship between asset tangibility and bank cash holding.

The coefficients of leverage (LEV) is positively signed but failed the 5 percent level of significance. This implies that the level of debt employed by banks does not in any way affect their cash holding behaviour. On the other hand, the coefficient of the volume of deposits to assets (VDA) is negative and also failed the 5 percent level of significance, hence, it is not a significant determinant of cash holding in DMBs in the country. This

finding agrees with those of Gill and Shah (2012) who find positive relationship between leverage and cash holding. It however disagreed with those of Ferreira and Vilela (2004), Ozkan and Ozkan (2004), Afza and Adnan (2007) who find negative relationship between leverage and cash holding.

Surprisingly, bank size (FSIZE) has insignificant negative relationship with cash holding. It failed the 5 percent level of significance, meaning it is not significant in determining bank's cash holding. Ordinarily, one would expect that the bigger the bank the higher the amount of cash to be held. However, it turns out not to be so. Thus, cash holding among banks could be as a result of tangible asset and other inherent factors rather than "size". Indeed, it is seen that a unit increase in bank size reduces cash holding by -2.18093 percent. This finding agrees with those of Kim, Mauer and Sherman (1998), Drobetz and Grüninger (2007), Ferreira and Vilela (2004). It however disagreed with those of Gill and Shah (2012) who submitted positive relationship between firm size and cash holding.

Therefore, the overall results obtained from the model estimation are effectively acceptable because the D.W. statistic value of 1.99 is appropriate and it indicates the absence of multicolinearity in the model. Thus, the results are applicable for structural analysis and policy directions.

4.5 Test of Hypotheses

Hypothesis One: In hypothesis one, we earlier hypothesized that leverage does not significantly influence cash holdings of deposit money banks in Nigeria. However, on

the basis of the results obtained from the empirical investigation, it was observed that leverage does not have significant relationship with cash holdings of deposit money banks. Therefore, the null hypothesis is accepted while the alternative hypothesis is rejected.

Hypothesis Two: We hypothesized that asset tangibility does not significantly impact on cash holdings of deposit money banks in Nigeria. However, from the empirical analysis, it was observed that asset tangibility is a significant determinant of cash holdings of deposit money banks in Nigeria. This indicates that the null hypothesis is rejected while the alternative hypothesis is accepted in this regard.

Hypothesis Three: In the third hypothesis, we hypothesized that there is no significant relationship between firm size and cash holdings of deposit money banks in Nigeria. However, from the empirical analysis, it was discovered that firm size does not actually affect bank cash holdings in Nigeria. Hence, while the null hypothesis holds (accepted), the alternative hypothesis is rejected.

Hypothesis Four: It was hypothesized that profitability (ROA) does not significantly impact on cash holdings of deposit money banks in Nigeria. From the empirical analysis, it was observed that, profitability (ROA) is not a significant factor in the determination of cash holdings of deposit money banks in Nigeria. Thus, while we accept the null hypothesis, the alternative hypothesis is rejected.

Hypothesis Five: In the fifth hypothesis, it was hypothesized that there is no significant relationship between the volume of deposit to asset ratio and cash holdings of deposit

money banks in Nigeria. However, from the empirical analysis, it was discovered that volume of deposit to asset ratio does not actually affect bank cash holdings in Nigeria. Hence, while the null hypothesis holds (accepted), the alternative hypothesis is rejected.

4.6 Discussion of Findings

In this study, bank profitability is measured by return on assets, which represents the capacity of a bank to generate return. It should be noted that one of the key objectives of any business venture (banks inclusive) is profit generation. No bank will survive without profitability. It is argued in the empirical literature that firms with higher profitability tend to hold more cash than firms with low profitability (Ogunpide, Ogunpide & Ajao 2012). This submission was also in line with those of the pecking order theory, which argue that firms with higher financial result retain higher level of liquidity because profitable firms accumulate the cash flow generated. Thus, taking cognizance of investment, most profitable firms are expected to hold more cash, since cash holdings fluctuate with cash flows. However, from the result of this study, profitability does not have any impact on cash holding of banks. By implication, the fact that deposit money banks in Nigeria are doing well/profitable does not mean that they should always hold more cash, as this could be detrimental the overall performnce. Hence, in the context of the Nigerian banking industry, profitability is not a major determinant of cash holding. This finding seems to contradict those of Ubesie,Okorie and Nwachukwu (2017), Al-Najjar and Clark (2016) and Muhammad, Norhani and Rokiah (2015) who find significant positive relationship between profitability and cash holding.

Leverage being the measure of how much bank uses equity and debt to finance its assets, does not influence the cash holding behaviour of banks in Nigeria. Ordinarily, it is expected that leverage employed by any firm is intended to earn more cash for the firm and thus encourage firms to hold enough cash at all times. This probably suggests that Nigerian banks employed leverage mainly for investment purposes and not for retention or precautionary purposes. If they do otherwise, it might spell doom for them. Therefore, the purpose of cash holding might be as a result of other factors or reasons and not leverage. But this seems to contradict the submissions of Guney, Ozkan and Ozkan (2007) that firms with higher leverage ratios tend to hold higher levels of liquid assets in order to reduce the probability of experiencing financial distress or bankruptcy. But align with those of the pecking order theory who submitted that high levered firms is an indication of more investment opportunities than their retained earnings. Since, firms borrow after retained earnings are exhausted, high leveraged firms hold less cash amounts. Therefore, highly levered firms will have less cash as their investment needs outweigh their cash-generating abilities, indicating a negative relationship between leverage and cash holdings (Ferreira & Vilela, 2004).

With respect to tangible assets, it can be liquidated by banks to avoid cash shortages and thus, decreases the need for cash (Investopedia, 2018). In order words, firms with more tangible fixed assets are reluctant to hold excessive cash, so that they can sell these assets when cash is urgently needed. This view seems to completely align with the finding of this study in that tangible assets was negative and significant at the 5 percent level. This

is an indication that, asset tangibility is a major determinant of banks' cash holding in Nigeria within the period of study. As Tangible asset increases, it decreases cash holding capacity of banks. As argue by Titman and Wessels (1988), tangible assets can perform an important role as collateral for debt financing for a firm. Thus, a negative relationship between asset tangibility and cash holding is expected according to pecking order theory.

Deposit money banks are expected to judiciously used cash deposits received from customers placing them in the right investment (assets yielding investment). Doing this will meaningful impact on incomes generated by banks and thus, increase their cash holdings level. In this study however, volume of deposits though negative but does not have any significant impact on cash holding. This contradict the findings of Ubesi, Okorie and Nwachukwu (2017) that concluded a positive relationship between volume of deposit and cash holding. Thus, in Nigeria, volume of deposits is not a relevant factor in the determination of bank cash holding. Indeed, increase in volume of deposits seem to have a decreasing effect on cash holding of deposit money banks.

Finally, the analysis relating to firm size has shown that firm size is negatively signed and does not significantly affect deposit money banks' cash holding in Nigeria. This in part agrees with the submission of Bigelli and Sanchez-Vidal (2012) that big firms enjoy economies of scale, which enable them secure relative cheap external financing. Thus, big firms are found to hold less cash than their small firms, because transaction costs are lower for larger firms than smaller firms. This probably suggests that an average bank in

Nigeria is a big firm and enjoys economies of scale, which enable it to secure relative cheap external financing and have no need to hold excessive cash. This view is in line with those of the trade-off theory which holds that a negative relationship exist between firm size and cash holding. It however differs from those of pecking order theory who believed a positive relationship exist between firm size and corporate cash holdings.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

The study examined the determinants of cash holdings of deposit money banks in Nigeria. The random effect of the panel data analysis technique was employed in the empirical investigation. On the basis of this analysis, the following findings are made:

a) That return on assets (ROA) proxied for bank profitability does not have any significant relationship with cash holding behaviour of banks.
b) That asset tangibility (TAN) has significant negative relationship with cash holding in deposit money banks. It passes the 5 percent significance level. This means that, asset tangibility is an 'important factor to be considered in the determination of cash holding behaviour of deposit money banks in Nigeria.
c) That leverage (LEV) is positively signed but failed the 5 percent level of significance. This implies that the level of debt employed by banks does not in any way affect their cash holding behaviour.

d) That bank size (FSIZE) has insignificant negative relationship with cash holding. It failed the 5 percent level of significance, meaning it is not significant in determining bank's cash holding.

e) That volume of deposits to assets (VDA) also failed the 5 percent level of significance, hence, it is not a significant determinant of cash holding in DMBs in the country.

5.2 Conclusion

The literature on cash holdings has significantly increased since the 2008 financial crisis, indicating relevant stakeholder's concerns regarding cash holdings behaviour of firms not only in Nigeria but across countries of the world. Considering the relevance of cash holdings to the banking sector, the study specifically investigate in the Nigerian context, using Nigeria-specific data, the determinants of cash holdings of 12 deposit money banks for a period of 13 years (2006 to 2018). Five bank's relevant variables such as return on assets, asset tangibility, leverage, bank size and volume of deposits to assets were used in the analysis of the study. Employing the panel data econometric technique (based on the Random Effect), the results generally indicate that asset tangibility is an 'important factor in the determination of cash holding behaviour of deposit money banks in Nigeria. Return on assets (a proxy for bank profitability), leverage, bank size and volume of deposits to assets do not have any significant relationship with cash holdings in Nigeria within the period of investigation. The study conclude that since asset tangibility has proven to be a major factor that determines bank's cash holding behaviour of firm in Nigeria, it

therefore follows that banks should hold more cash in order to increase tangible assets. Thus, appropriate policy that will ensure that as bank increases its cash holding capacity, its corresponding tangible assets would also be enhanced.

5.3 Recommendations

The main policy recommendations that may be inferred from the findings of this study could be deduced as follow:

1. Since the study has shown that return on assets (ROA) does not have any significant relationship with cash holding behaviour of banks, management needs to be cautious in setting up a cash holding friendly policy that can be effectively linked with performance. This will ensure that as bank increases its level of cash holding, it will in turn enhance the overall performance of the bank.
2. Since asset tangibility has proven to be a major factor that determines bank's cash holding behaviour of firm in Nigeria, it therefore follows that banks should hold more cash in order to increase tangible assets. Thus, appropriate policy that will ensure that as bank increases its cash holding capacity, its corresponding tangible assets would also be enhanced.
3. When management make decisions with respect to the amount of cash to be kept, they should not do so in isolation, rather, they should consider other factors such as asset tangibility leverage and firm size that are equally relevant to the financial performance of the bank

4. Management should properly manage the volume of deposits to bank assets (a major liability of bank) in relation to cash holding level. This will help them avoid holding unnecessary excess liquidity that could be detrimental to the overall financial health of the bank. Also, the volume of customers' deposits must be appropriately engaged on assets yielding investment which will at the same time minimize/moderate the level of cash holding by the bank at all times.
5. Leverage is positively signed but failed the 5 percent level of significance. This implies that a highly levered firm does not determined the cash holding behaviour of firm. Managers must bring their wealth of experience into bear in ensuring that cash holding threshold of bank should always align for the overall performance of the bank.

5.4 Contribution to Knowledge

The study contributed to knowledge in the following ways:

(i) It provides an empirical understanding of those salient factors that are relevant in the determination of the level of cash that should be held by a bank at any given point in time, which will in turn guarantee its continuous profitability. This understanding is very crucial for banks' management, the government, policy makers and relevant stakeholders in shaping the future cash holding behaviour of banks towards higher performance in the country.

(ii) It provides an econometric understanding of the determinants of cash holdings of deposit money banks in Nigeria. This understanding is important for banks, academia, policy makers and relevant stakeholders in the banking industry in shaping cash holding behaviour.

(iii) This study has added a new clause to findings in the extant literature. Contrary to existing theory that, a levered firm is likely to hold more cash; this study has proven otherwise that, the level of leverage employed is independent of the amount of cash held by the bank.

5.5 Suggestions for Further Studies

Since this study focused on the determinants of cash holding in deposit money banks in Nigeria, we suggest that further studies on cash holding risk behavior should be carried out in other sectors such as the manufacturing, service and other non-financial sectors of the Nigerian economy.

Also, beside those factors employed in this study as determinants of bank cash holding, other bank's related factors like dividend payout, age, deposits, credit and return on equity (ROE) could be employed to ascertain bank's cash holding behaviour in Nigeria.

Finally, in this study, we have used panel data analysis as the main method of investigation. However, we suggest that other methods of data analysis like panel least square and the generalized methods of moment (GMM) should also be employed in this study. By so doing we will be able to effectively compare the results from both methods.

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APPENDICES

Appendix 1

DATA

Year	Bank				ROA	LEV	FSIZE	ATANG	CASH	VDA
2013	Access Bank	Nigeria	Finance	Bank	1.92	90.1	9.69	2.09	14.96	14.694079
2014	Access Bank	Nigeria	Finance	Bank	1.51	87.43	9.61	2.37	23.25	6.8313307
2015	Access Bank	Nigeria	Finance	Bank	2.05	86.95	9.54	2.41	20.49	2.0021728
2016	Access Bank	Nigeria	Finance	Bank	2.54	85.81	9.41	2.83	18.46	2.4038953
2017	Access Bank	Nigeria	Finance	Bank	2.05	86.82	9.32	3.31	19.25	1.8266621
2018	Access Bank	Nigeria	Finance	Bank	2.04	86.78	9.26	3.66	23.94	0.8173211
2019	Access Bank	Nigeria	Finance	Bank	2.57	86.19	9.24	3.7	23.22	0.6884584
2020	Access Bank	Nigeria	Finance	Bank	0.94	88.21	9.21	4.15	1.65	0.6465042
2021	Access Bank	Nigeria	Finance	Bank	1.38	78.21	8.91	3.15	3.16	0.2456795
2022	Access Bank	Nigeria	Finance	Bank	0.63	75.74	8.84	4.03	9.31	0.181828
2023	Access Bank	Nigeria	Finance	Bank	1.52	83.56	9.02	1.35	3.33	0.1142975
2024	Access Bank	Nigeria	Finance	Bank	1.85	91.36	8.52	2.48	48.21	0.0641155
2025	Access Bank	Nigeria	Finance	Bank	0.42	83.45	8.24	2.26	26.5	0.033528
2013	Fidelity Bank	Nigeria	Finance	Bank	1.33	88.7	9.24	2.15	22.38	8.1627409
2014	Fidelity Bank	Nigeria	Finance	Bank	1.37	85.26	9.14	2.79	19.55	3.5703236
2015	Fidelity Bank	Nigeria	Finance	Bank	0.75	85.72	9.11	3.11	15.95	1.4874094
2016	Fidelity Bank	Nigeria	Finance	Bank	1.13	85.1	9.09	3.25	15.05	1.5265597
2017	Fidelity Bank	Nigeria	Finance	Bank	1.16	85.42	9.07	3.2	21.75	1.7154805
2018	Fidelity Bank	Nigeria	Finance	Bank	0.71	84.88	9.03	3.47	19.22	1.0902249
2019	Fidelity Bank	Nigeria	Finance	Bank	1.99	82.34	8.96	3.87	12.83	0.7160358
2020	Fidelity	Nigeria	Finance	Bank	0.35	80.2	8.87	4.45	11.15	0.5213255

	Bank									
2021	Fidelity Bank	Nigeria	Finance	Bank	1.27	71.72	8.68	5.25	5.3	0.2752604
2022	Fidelity Bank	Nigeria	Finance	Bank	0.28	74.44	8.7	4.65	4.92	0.2888397
2023	Fidelity Bank	Nigeria	Finance	Bank	2.49	74.38	8.73	3.14	5.77	0.2916043
2024	Fidelity Bank	Nigeria	Finance	Bank	2.16	86.21	8.34	3.33	9.04	0.1279106
2025	Fidelity Bank	Nigeria	Finance	Bank	2.66	78.66	8.08	4.17	10.1	0.0542417
2013	First Bank Holding	Nigeria	Finance	Bank	1.07	90.47	9.75	1.64	11.73	5652.6513
2014	First Bank Holding	Nigeria	Finance	Bank	0.91	87.05	9.72	1.69	12.26	3448.8094
2015	First Bank Holding	Nigeria	Finance	Bank	0.36	87.7	9.68	1.86	14.57	2031.2472
2016	First Bank Holding	Nigeria	Finance	Bank	0.36	86.11	9.62	2.12	17.18	1478.1339
2017	First Bank Holding	Nigeria	Finance	Bank	1.91	87.96	9.64	2.03	16.08	1295.572
2018	First Bank Holding	Nigeria	Finance	Bank	1.82	87.81	9.59	2.1	15.35	1024.0937
2019	First Bank Holding	Nigeria	Finance	Bank	2.37	86.23	9.5	2.37	9.43	767.73275
2020	First Bank Holding	Nigeria	Finance	Bank	0.65	87.11	9.46	2.3	6.97	6258.0249
2021	First Bank Holding	Nigeria	Finance	Bank	1.45	85.22	9.36	2.34	3.28	5040.7165
2022	First Bank Holding	Nigeria	Finance	Bank	0.23	85.68	9.34	2.21	3.24	4761.0517
2023	First Bank Holding	Nigeria	Finance	Bank	2.39	76.72	9.18	1.97	5.83	2623.3575
2024	First Bank Holding	Nigeria	Finance	Bank	2.26	90.82	8.96	1.93	6.79	2224.1842
2025	First Bank Holding	Nigeria	Finance	Bank	2.82	100	8.79	2.31	8.27	1648.3563
2013	First City Monumental Bank	Nigeria	Finance	Bank	1.05	87.18	9.16	2.6	12.94	7.7078837
2014	First City Monumental Bank	Nigeria	Finance	Bank	0.79	84.07	9.07	2.82	8.76	2.6249817
2015	First City Monumental Bank	Nigeria	Finance	Bank	1.22	84.75	9.07	2.75	9.22	1.4185765
2016	First City Monumental	Nigeria	Finance	Bank	0.41	86	9.06	2.58	15.6	1.5219419

	Bank									
2017	First City Monumental Bank	Nigeria	Finance	Bank	1.89	86.29	9.07	2.43	10.8	1.3849429
2018	First City Monumental Bank	Nigeria	Finance	Bank	1.59	85.75	9	2.66	19.81	1.2058622
2019	First City Monumental Bank	Nigeria	Finance	Bank	1.66	85.47	8.96	2.9	13.59	0.8033284
2020	First City Monumental Bank	Nigeria	Finance	Bank	-1.54	80.47	8.78	3.17	8.05	0.6409099
2021	First City Monumental Bank	Nigeria	Finance	Bank	1.47	74.98	8.73	3.7	2.49	0.3512021
2022	First City Monumental Bank	Nigeria	Finance	Bank	0.12	72.05	8.67	4.71	1.94	0.2887549
2023	First City Monumental Bank	Nigeria	Finance	Bank	3.23	71.41	8.67	3.56	5.76	0.2268226
2024	First City Monumental Bank	Nigeria	Finance	Bank	2.26	88.17	8.42	4.86	9.65	0.1582147
2025	First City Monumental Bank	Nigeria	Finance	Bank	2.66	75.26	8.03	6.5	13.44	0.0586012
2013	Guaranty Trust Bank	Nigeria	Finance	Bank	5.62	82.49	9.52	3.4	20.59	3.3520445
2014	Guaranty Trust Bank	Nigeria	Finance	Bank	5.09	81.69	9.53	2.94	19.16	2.8866257
2015	Guaranty Trust Bank	Nigeria	Finance	Bank	4.24	83.8	9.49	3	14.63	2.1630101
2016	Guaranty Trust Bank	Nigeria	Finance	Bank	3.94	83.62	9.4	3.49	10.09	1.5789114
2017	Guaranty Trust Bank	Nigeria	Finance	Bank	4.19	84.11	9.37	3.24	10.48	1.4937707
2018	Guaranty Trust Bank	Nigeria	Finance	Bank	4.28	84.44	9.32	3.25	14.62	0.9369661
2019	Guaranty Trust Bank	Nigeria	Finance	Bank	5	83.83	9.24	3.51	15.96	0.7086249
2020	Guaranty Trust Bank	Nigeria	Finance	Bank	3.09	85.19	9.21	3.57	22.85	0.5388247
2021	Guaranty Trust Bank	Nigeria	Finance	Bank	3.33	81.7	9.06	4.39	2.5	0.3579384
2022	Guaranty Trust Bank	Nigeria	Finance	Bank	2.68	81.97	9.03	4.36	3.37	0.2999087

2023	Guaranty Trust Bank	Nigeria	Finance	Bank	3.11	81.09	8.98	4.12	29.33	0.1807153
2024	Guaranty Trust Bank	Nigeria	Finance	Bank	2.71	89.73	8.69	4.29	26.18	0.1042667
2025	Guaranty Trust Bank	Nigeria	Finance	Bank	2.69	86.78	8.49	3.92	24.01	0.0710596
2013	Stanbic Ibtc Holding	Nigeria	Finance	Bank	4.47	85.59	9.22	1.3	27.4	8027.8996
2014	Stanbic Ibtc Holding	Nigeria	Finance	Bank	3.49	86.64	9.14	1.58	28.95	2475.8767
2015	Stanbic Ibtc Holding	Nigeria	Finance	Bank	2.71	86.64	9.02	2.18	28.6	1780.7773
2016	Stanbic Ibtc Holding	Nigeria	Finance	Bank	2.01	86.24	8.97	2.7	22.56	1779.3323
2017	Stanbic Ibtc Holding	Nigeria	Finance	Bank	3.39	87.9	8.98	2.54	12.33	1499.0553
2018	Stanbic Ibtc Holding	Nigeria	Finance	Bank	3.12	85.33	8.82	3.76	12.4	873.15222
2019	Stanbic Ibtc Holding	Nigeria	Finance	Bank	1.5	87.35	8.83	3.61	11.37	5393.198
2020	Stanbic Ibtc Holding	Nigeria	Finance	Bank	1.2	84.71	8.74	4.46	5.43	4109.3619
2021	Stanbic Ibtc Holding	Nigeria	Finance	Bank	2.46	77.86	8.58	6.94	2.61	2464.1673
2022	Stanbic Ibtc Holding	Nigeria	Finance	Bank	3.13	69.02	8.41	10.35	2.99	2229.1903
2023	Stanbic Ibtc Holding	Nigeria	Finance	Bank	4.44	70.11	8.43	5.72	4.29	1251.2577
2024	Stanbic Ibtc Holding	Nigeria	Finance	Bank	3.63	68.92	8.2	3.5	5.34	1014.6549
2025	Stanbic Ibtc Holding	Nigeria	Finance	Bank	3.52	70.99	8.05	4.75	5.53	724.48999
2013	Sterling Bank	Nigeria	Finance	Bank	0.84	91.13	9.04	1.54	10.67	6.9357769
2014	Sterling Bank	Nigeria	Finance	Bank	0.79	90.4	9.03	1.53	11.44	4.6914576
2015	Sterling Bank	Nigeria	Finance	Bank	0.62	89.73	8.92	1.75	12.93	2.4724172
2016	Sterling Bank	Nigeria	Finance	Bank	1.29	88.05	8.9	1.91	14.5	2.8734042
2017	Sterling Bank	Nigeria	Finance	Bank	1.09	89.73	8.92	1.69	17.48	2.5532164
2018	Sterling Bank	Nigeria	Finance	Bank	1.28	90.15	8.81	1.41	14.03	1.1541208
2019	Sterling Bank	Nigeria	Finance	Bank	1.3	91.26	8.73	1.46	18.27	0.8045919
2020	Sterling Bank	Nigeria	Finance	Bank	1.49	91.13	8.67	1.93	19.55	0.5794593

2021	Sterling Bank	Nigeria	Finance	Bank	2.16	88.72	8.37	2.25	2.86	0.246289
2022	Sterling Bank	Nigeria	Finance	Bank	-4.92	87.93	8.26	2.51	4.67	0.2017346
2023	Sterling Bank	Nigeria	Finance	Bank	3.01	85.6	8.34	2.47	46.22	0.2129462
2024	Sterling Bank	Nigeria	Finance	Bank	1.51	100	8.11	3.96	38.16	0.0928315
2025	Sterling Bank	Nigeria	Finance	Bank	0.96	76.57	8.05	6.57	16.09	0.0527596
2013	Union Bank Of Nig	Nigeria	Finance	Bank	1.24	84.59	9.17	4.1	15.96	1656.9796
2014	Union Bank Of Nig	Nigeria	Finance	Bank	1	76.25	9.16	3.85	15.29	1294.5854
2015	Union Bank Of Nig	Nigeria	Finance	Bank	1.23	78.31	9.1	4.21	10.87	725.89888
2016	Union Bank Of Nig	Nigeria	Finance	Bank	1.33	76.7	9.02	4.75	7.86	515.58532
2017	Union Bank Of Nig	Nigeria	Finance	Bank	2.63	77.98	9	4.91	12.09	629.16108
2018	Union Bank Of Nig	Nigeria	Finance	Bank	0.61	80.12	9	4.54	10.06	583.57523
2019	Union Bank Of Nig	Nigeria	Finance	Bank	0.71	81.18	9.01	4.69	19.39	589.35348
2020	Union Bank Of Nig	Nigeria	Finance	Bank	-7.83	81.1	9.02	4.79	22.66	567.93414
2021	Union Bank Of Nig	Nigeria	Finance	Bank	9.54	110.37	9.05	5.26	2.19	700.0634
2022	Union Bank Of Nig	Nigeria	Finance	Bank	-20.23	116.48	9.14	4.4	6.25	956.39556
2023	Union Bank Of Nig	Nigeria	Finance	Bank	2.68	87.52	9	2.94	4.68	607.31582
2024	Union Bank Of Nig	Nigeria	Finance	Bank	-20.23	116.48	9.14	4.4	6.25	717.14281
2025	Union Bank Of Nig	Nigeria	Finance	Bank	2.68	87.52	9	2.94	4.68	441.23583
2013	United Bank For Africa	Nigeria	Finance	Bank	1.61	89.68	9.69	2.38	25.06	3934.397
2014	United Bank For Africa	Nigeria	Finance	Bank	1.93	86.99	9.61	2.64	22.07	2294.9216
2015	United Bank For Africa	Nigeria	Finance	Bank	2.06	87.21	9.54	2.68	21.71	65.187264
2016	United Bank For Africa	Nigeria	Finance	Bank	2.17	87.92	9.44	3.23	23.81	1344.526
2017	United Bank For Africa	Nigeria	Finance	Bank	1.73	90.39	9.44	3.24	29.41	1341.2056
2018	United Bank For Africa	Nigeria	Finance	Bank	1.76	91.1	9.42	2.85	27.13	1112.4098

2019	United Bank For Africa	Nigeria	Finance	Bank	2.47	90.75	9.32	3.4	34.32	761.5315
2020	United Bank For Africa	Nigeria	Finance	Bank	-0.49	91.47	9.25	3.14	24.54	652.02982
2021	United Bank For Africa	Nigeria	Finance	Bank	0.04	87.52	9.16	4.53	4.73	541.79048
2022	United Bank For Africa	Nigeria	Finance	Bank	0.17	86.28	9.13	5.36	5.01	562.03095
2023	United Bank For Africa	Nigeria	Finance	Bank	2.76	86.91	9.17	4.16	8.12	525.00271
2024	United Bank For Africa	Nigeria	Finance	Bank	2.1	100	9.01	4.86	12.7	308.95626
2025	United Bank For Africa	Nigeria	Finance	Bank	1.31	94.48	8.95	3.75	9.03	229.40994
2013	Unity Bank	Nigeria	Finance	Bank	0.54	203.27	8.37	8.73	3.76	1.8463934
2014	Unity Bank	Nigeria	Finance	Bank	-9.53	254.75	8.19	13.74	3.63	1.0958871
2015	Unity Bank	Nigeria	Finance	Bank	0.44	83.13	8.69	4.63	10.38	0.725653
2016	Unity Bank	Nigeria	Finance	Bank	1.06	81.37	8.65	4.28	6.22	0.9012636
2017	Unity Bank	Nigeria	Finance	Bank	2.59	81.55	8.62	4.47	1.65	0.9076203
2018	Unity Bank	Nigeria	Finance	Bank	-5.59	93.01	8.61	4.98	2.41	0.811189
2019	Unity Bank	Nigeria	Finance	Bank	1.8	85.05	8.54	6.07	11.98	0.682452
2020	Unity Bank	Nigeria	Finance	Bank	1.03	83.2	8.42	8.42	10.62	0.6611944
2021	Unity Bank	Nigeria	Finance	Bank	4.78	83.19	8.42	9.11	6.66	0.5364091
2022	Unity Bank	Nigeria	Finance	Bank	-6.43	97.24	8.4	6.26	3.1	0.4849445
2023	Unity Bank	Nigeria	Finance	Bank	-3.72	94.43	8.54	4.05	3.55	0.6500399
2024	Unity Bank	Nigeria	Finance	Bank	0.35	84.24	8.31	6.48	20.72	0.2755262
2025	Unity Bank	Nigeria	Finance	Bank	0.35	84.24	8.31	6.48	20.72	0.2577634
2013	Wema Bank	Nigeria	Finance	Bank	0.68	89.59	8.69	3.81	8.62	3.0738709
2014	Wema Bank	Nigeria	Finance	Bank	0.58	87.22	8.59	4.4	0.58	1.5414255
2015	Wema Bank	Nigeria	Finance	Bank	0.6	88.57	8.63	3.92	6.51	2.197736
2016	Wema Bank	Nigeria	Finance	Bank	0.59	88.39	8.6	4.02	14.26	2.5677932
2017	Wema Bank	Nigeria	Finance	Bank	0.62	88.56	8.58	3.67	13.63	1.2990154
2018	Wema Bank	Nigeria	Finance	Bank	0.55	85.7	8.46	4.31	10.82	0.9845246
2019	Wema Bank	Nigeria	Finance	Bank	-2.06	99.48	8.39	5.09	8.03	0.7093983
2020	Wema Bank	Nigeria	Finance	Bank	-1.97	97.08	8.33	6.27	11.14	0.3714931
2021	Wema Bank	Nigeria	Finance	Bank	8.68	92.16	8.3	6.92	3.26	0.2869841
2022	Wema Bank	Nigeria	Finance	Bank	-3.83	123.29	8.29	7.26	3.23	0.2440628
2023	Wema Bank	Nigeria	Finance	Bank	1.83	82	8.15	8.37	25.14	0.2959035
2024	Wema Bank	Nigeria	Finance	Bank	1.83	82	8.15	8.37	25.14	0.3232638
2025	Wema Bank	Nigeria	Finance	Bank	-5.5	82.9	8.08	5.95	24.12	0.243015

2013	Zenith Bank	Nigeria	Finance	Bank	0.32	8.63	10.77	0.25	1.6	5.9584123
2014	Zenith Bank	Nigeria	Finance	Bank	3.18	85.32	9.75	2.38	17.12	3.5335215
2015	Zenith Bank	Nigeria	Finance	Bank	2.74	85.14	9.68	2.22	14.12	1.6696256
2016	Zenith Bank	Nigeria	Finance	Bank	2.64	85.17	9.6	2.17	19.01	1.5411697
2017	Zenith Bank	Nigeria	Finance	Bank	2.65	85.28	9.57	1.91	20.04	1.4106525
2018	Zenith Bank	Nigeria	Finance	Bank	3.62	80.82	9.42	2.64	22.27	1.0496442
2019	Zenith Bank	Nigeria	Finance	Bank	4.7	78.53	9.33	3.21	15.53	0.7916841
2020	Zenith Bank	Nigeria	Finance	Bank	2.52	79.74	9.29	3.54	11.55	0.5750728
2021	Zenith Bank	Nigeria	Finance	Bank	2.44	76.41	9.19	4.38	9.25	0.3509932
2022	Zenith Bank	Nigeria	Finance	Bank	1.24	79.65	9.22	4.74	7.64	0.2929781
2023	Zenith Bank	Nigeria	Finance	Bank	2.91	80.6	9.25	2.82	13.41	0.2501976
2024	Zenith Bank	Nigeria	Finance	Bank	1.93	88.03	8.99	3.78	59.1	0.1133984
2025	Zenith Bank	Nigeria	Finance	Bank	1.88	83.75	8.79	3.91	58.96	0.0609716

Source: The Nigerian Stock Exchange Fact Book, 2024.

Appendix 2

	CASH	ROA	LEV	ATANG	VDA	FSIZE
Mean	14.08692	1.236923	87.11853	3.773013	613.3516	8.955769
Median	12.29500	1.600000	85.71000	3.495000	1.560168	9.005000
Maximum	59.10000	9.540000	254.7500	13.74000	8027.900	10.77000
Minimum	0.580000	-20.23000	8.630000	0.250000	0.033528	8.030000
Std. Dev.	10.16838	3.389163	19.21380	1.866049	1328.030	0.461723
Skewness	1.635407	-3.627864	5.347631	1.806467	3.057787	0.147907
Kurtosis	7.337619	22.90410	48.31073	8.518872	13.17041	3.392324
Jarque-Bera	191.8356	2917.322	14088.43	282.8231	915.4432	1.569261
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.456288
Sum	2197.560	192.9600	13590.49	588.5900	95682.86	1397.100
Sum Sq. Dev.	16026.37	1780.396	57221.38	539.7315	2.73E+08	33.04421
Observations	156	156	156	156	156	156

	CASH	ROA	LEV	ATANG	VDA	FSIZE
CASH	1	0.14057269651 17427	-0.04027998948 322735	-0.20473128861 56434	-0.03455664611 014971	0.09555833124 63637
ROA	0.14057269651 17427	1	-0.35572712182 99451	-0.18987394099 62842	-0.03754204764 065155	0.13006649628 65754
LEV	-0.04027998948 322735	-0.35572712182 99451	1	0.42051974483 14583	0.02141944683 0412	-0.21550160983 87074
ATANG	-0.20473128861 56434	-0.18987394099 62842	0.42051974483 14583	1	-0.19526740217 27567	0.60123376590 55229
VDA	-0.03455664611 014971	-0.03754204764 065155	0.02141944683 0412	-0.19526740217 27567	1	-0.25371096045 78987
FSIZE	0.09555833124 63637	0.13006649628 65754	-0.21550160983 87074	-0.60123376590 55229	-0.25371096045 78987	1

Dependent Variable: CASH
Method: Panel Least Squares
Date: 17/02/25 Time: 07:26
Sample: 2013 2025
Periods included: 13
Cross-sections included: 12
Total panel (balanced) observations: 156

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	21.39397	21.12000	1.012972	0.3127
ROA	0.412185	0.253580	1.625466	0.1062
LEV	0.057781	0.048546	1.190241	0.2358
ATANG	-1.425983	0.581029	-2.454237	0.0153
VDA	-0.000608	0.000626	-0.970165	0.3335
FSIZE	-0.792543	2.209433	-0.358709	0.7203

R-squared	0.067793	Mean dependent var	14.08692
Adjusted R-squared	0.036720	S.D. dependent var	10.16838
S.E. of regression	9.979944	Akaike info criterion	7.476734
Sum squared resid	14939.89	Schwarz criterion	7.594037
Log likelihood	-577.1853	Hannan-Quinn criter.	7.524377
F-statistic	2.181708	Durbin-Watson stat	0.969948
Prob(F-statistic)	0.059130		

Dependent Variable: CASH
Method: Panel Least Squares
Date: 17/02/25 Time: 07:28
Sample: 2013 2025
Periods included: 13
Cross-sections included: 12
Total panel (balanced) observations: 156

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	83.77662	52.31117	1.601505	0.1117
ROA	0.002899	0.288475	0.010050	0.9920
LEV	-0.020073	0.052555	-0.381937	0.7031
ATANG	0.052462	0.713127	0.073566	0.9415
VDA	0.001838	0.000922	1.993148	0.0484
FSIZE	-7.734648	5.548797	-1.393933	0.1658

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.401125	Mean dependent var	14.08692
Adjusted R-squared	0.269090	S.D. dependent var	10.16838
S.E. of regression	8.693281	Akaike info criterion	7.329104
Sum squared resid	9597.788	Schwarz criterion	7.896064

Log likelihood	-542.6701	Hannan-Quinn criter.	7.559379
F-statistic	3.038015	Durbin-Watson stat	1.045758
Prob(F-statistic)	0.000012		

Dependent Variable: CASH
Method: Panel EGLS (Cross-section random effects)
Date: 17/02/25 Time: 07:31
Sample: 2013 2025
Periods included: 13
Cross-sections included: 12
Total panel (balanced) observations: 156
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	33.73927	22.83860	1.477292	0.1417
ROA	0.351661	0.252657	1.391850	0.1660
LEV	0.059909	0.047725	1.255303	0.2113
ATANG	-1.490240	0.610851	-2.439613	0.0159
VDA	-0.000248	0.000694	-0.356611	0.7219
FSIZE	-2.180930	2.402580	-0.907745	0.3655

Effects Specification	S.D.	Rho
Cross-section random	2.279126	0.0532
Idiosyncratic random	9.614388	0.9468

Weighted Statistics

R-squared	0.050747	Mean dependent var	10.70846
Adjusted R-squared	0.019105	S.D. dependent var	9.835924
S.E. of regression	9.741514	Sum squared resid	14234.56
F-statistic	1.603784	Durbin-Watson stat	1.997799
Prob(F-statistic)	0.162437		

Unweighted Statistics

R-squared	0.062940	Mean dependent var	14.08692
Sum squared resid	15017.67	Durbin-Watson stat	0.945768

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	8.992967	5	0.1093

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
ROA	0.230068	0.351661	0.007444	0.1587
LEV	0.064321	0.059909	0.000142	0.7115
ATANG	-1.643516	-1.490240	0.136674	0.6784
VDA	0.000844	-0.000248	0.000000	0.0813
FSIZE	-6.402863	-2.180930	3.614397	0.0264

Cross-section random effects test equation:
Dependent Variable: CASH
Method: Panel Least Squares
Date: 17/02/25 Time: 07:32
Sample: 2013 2025
Periods included: 13
Cross-sections included: 12
Total panel (balanced) observations: 156

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	71.22468	28.78104	2.474708	0.0145
ROA	0.230068	0.266982	0.861735	0.3903
LEV	0.064321	0.049193	1.307528	0.1932
ATANG	-1.643516	0.714012	-2.301805	0.0228
VDA	0.000844	0.000935	0.902623	0.3683
FSIZE	-6.402863	3.063786	-2.089853	0.0385

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.198280	Mean dependent var	14.08692
Adjusted R-squared	0.105996	S.D. dependent var	10.16838
S.E. of regression	9.614388	Akaike info criterion	7.466965
Sum squared resid	12848.67	Schwarz criterion	7.799321
Log likelihood	-565.4233	Hannan-Quinn criter.	7.601954
F-statistic	2.148576	Durbin-Watson stat	1.076988
Prob(F-statistic)	0.009358		