EFFECTS OF TREASURY SINGLE ACCOUNT IMPLEMENTATION ANNOUNCEMENT ON SHARE PRICES OF LISTED DEPOSIT MONEY BANKS IN NIGERIA

BY

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A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE (M.Sc.) IN ACCOUNTING AND FINANCE

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DECLARATION

I declare that this research thesis titled **"Effects of Treasury Single Account Implementation Announcement on Share Prices of Listed Deposit Money Banks in Nigeria"** has been developed by me in the Department of Accounting, Faculty of Administration, Ahmadu Bello University, Zaria. No part of this dissertation has been previously submitted for the award of any degree in any institution of learning in and outside Nigeria. All works consulted have been duly acknowledged in the reference. I take full responsibility for any errors found in the work.

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CERTIFICATION

This dissertation titled **"Effects of Treasury Single Account Implementation Announcement on Share Prices of Listed Deposit Money Banks in Nigeria"** byLawal IBRAHIMmeets the regulations governing the award of Masters of Science (M.Sc) Degree in Accounting and Finance of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literature presentation.

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DEDICATION

This dissertation is dedicated to Almighty Allah (SWT). The Lord of Universe for guiding and seeing me through the successful completion of this program.

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ABSTRACT

This study empirically examines the impact of Treasury Single Account (TSA) implementation announcement of the 9th August 2015 on share prices of Deposit Money Banks (DMBs) in Nigeria. Employing the standard event study methodology on a sample of thirteen out of the sixteen listed DMBs in the Nigerian Stock Exchange that traded on the 9th August 2015; the study was conducted to establish the significance of the TSA implementation announcement on DMBs share prices' cumulative abnormal return on the announcement day,fifteen trading days before the announcementand fifteen trading days after the announcement became public. The study documents a statistically significant cumulative abnormal return of -0.46 before the announcement day, -0.45 0n the announcement day and -0.37on the fifteen trading days after the announcement become public. The study concluded that the TSA implementation announcement led to negative market reaction by investors of DMBs in Nigeria and the negative trend continued for fifteen trading days succeeding the announcement day. It was recommended thatDeposit Money Banks (DMBs) should focus more on their core banking businesses of deposit mobilisation from the private individuals and enterprises rather than depending on government agencies deposit. Also, DMBs should devise new strategies such as increase deposit interest rate and reducing lending rate; as this would entice private enterprises to willingly deposit their money with the banks and would assist in improving their cash balances and intermediation activities.

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CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Deposit Money Banks are the key players in the intermediation of funds from the surplus economic units to the deficit units for investment and development purposes. Thus, the significance of Deposit Money Banks (DMBs) in the Nigerian financial sector cannot be over emphasized. This underscores the need to have a strong and vibrant banking sector, which can assure the sustainability of the financial sector. The market price of share is one of the most vital performance indicators which influences investment decision of investors not only in banks but all kinds of listed organizations. This informs the need to understand its behaviour in response to events and certain announcements. The extant literature is replete with studies (such as:Maku & Atanda 2010, Osisanwo Atanda, 2012, Malhotra & Tandon, 2013, Wiredu, Suleman & Adjartey, 2013,Uddin, Rahman & Hossain, 2013,Almumani, 2014among others.) which show that the market value of firms is linked to many factors, such as earning per share, dividend per share, dividend pay-out ratio and major policy pronouncements such as the treasury single account among others that could affect the fortunes of listed firms.

The share price of any firm is often of significant importance to the firm and shareholders because it is what signals the worth of the firm in the eyes of various stockholders. Additionally, appreciation in share price overtime ultimately determines the gains/loss or returns on investment which shareholders enjoy (Almumani, 2014). This implies that one of thecardinal goals of the firm is to maximise shareholders' wealth, therefore returns on the price of stock remains of constant significant interest to the firms, shareholders and even regulators. In this regard, Mbutor (2010) posited that the stock market tends to signal the level of confidence in the economy in general and the financial system in particular. It

mirrors the strength of the productive sector and anticipations about the stability of the financial system. Persistent increase in the stock indices would encourage banks to increase advances, both for direct investment in the stock market and other productive sectors of the economy. Higher returns on the stock market motivate foreign investors and direct the inflow of foreign portfolio investment to that economy. This on the other hand, will further enhance the capital base of banks and induces additional increases in their intermediation activities which will result to efficient and effective management of the nation's economy (Mbutor ,2010).

Efficient and effective management of a nation's economy as well as federal government banking structure through an arrangement such as the Treasury Single Account (TSA) are vital preconditions for proper control of Government's receipts and payments. This is more so, in most emerging markets and developing nations that lack unified systems for handling government receipts and payments (Akande, 2015). This implies that the absence of unified structure might deprive the Government vis-à-vis the apex monetary authority of a single and consolidated structure/system for effective and efficient control of government revenues and disbursements in various Ministries, Departments and Agencies (MDAs).

In this regard, it was argued that absence of effective cash control system such as the Treasury Single Account (TSA) by a federal government may lead to institutional deficiencies /challenges with its associated cost in several dimensions. Firstly, in most instances, bank accounts with unused cash balances fail to gain market-related compensation. Also, avoidable borrowing costs are incur by the government being uninformed of the unused resources so as to raise funds to cater for the professed cash deficiency. Thirdly, the government unused cash balances may also be utilized by the bank to extend credit since the cash are not idle in the banks. In fact, costs are also imposed on the apex bank by exhausting

the extra liquidity via open market operations activities by the DMBs (Pattanayak &Fainboim, 2010).

On the contrary, Pattanayak andFainboim (2010) further noted that instituting a consolidated/unified system of government bank account through a Treasury Single Account (TSA) will resolve the aforementioned challenges. Thus, TSA establishment should be given topmost priority in any government financial control/management reform as it will assist in enhancing cash management and control. Existence of TSA will also ease superior fiscal and monetary synchronization in addition to improved reconciliation of fiscal banking data which will considerably decrease service cost of debt by the federal government (Pattanayak andFainboim2010). In relation to this, Igbekoyi and Agbaje (2017) noted that it is based on the above motives that the present global revolution in government accounting became vital. More so,the desire to benefit from the global best practices made Nigerian government introduced and implemented the Treasury Single Account (TSA) so as to help in the optimum management of her economy.

Previous studies such as Fama (1970, 1991), Malkiel (2005) and Yalcin (2010) have shown that the extent of responsiveness of stock market to immediately incorporate new information / policy announcement into stock prices determines its efficiency. Therefore, studies on response of stock prices to major events announcement such as the Treasury Single Account implementation can be linked to efficient market hypothesis. Consequently, in an efficient market, current stock prices fully reflect all available information such that there is no way to earn excess return by using this information, such as the Treasury Single Account announcement. Accordingly, Fama (1970) recognized three forms of efficiency in connection with stock market i.e. weak-form of efficiency is said to exist when current price fully incorporates information contained in the past history of prices only, semi-strong when the

current price fully incorporates all publicly available information and strong-form when the current price fully incorporates allexisting information, both public and private (insider). Thus, examining the reactions of deposit money banks' stock prices to Treasury Single Account announcement can be adjudged as a test of the semi-strong form efficiency of the stock market.

Similar to other relevant announcements such as mergers and acquisition, CEOs suspension, dividend, stock split, devaluation and regulatory / policy change among others; event study approach has also been used to study stock price reaction to the announcement of major policy change by the central government. For instance, Ricci (2015) investigated the impact of European Central Bank monetary policy announcements on the stock price of large European Banks using the event methodology. This methodology entails a technique of empirical financial research that permits a researcher to assess the financial impact (positive or negative) of a particular sudden event (announcement) (MacKinlay, 1997; Rao & Sreejith, 2014) on a company's share price. The assessment is usually for a definite event window-i.e. a time period around the day of announcement.

However, Iroegbu (2015) argued that unified structure of government banking, such as the TSA, is an essential factor for efficient management and control of government's cash resources. Such unified banking arrangements should be designed to minimize the cost of government borrowing and maximize the opportunity cost of cash resources which requires that cash received must be available for implementing government's expenditure programmes and making disbursements in a timely manner (Enweagbara, 2015).

Despite the enormous benefits envisaged by the Nigerian President –Muhammadu Buhari and the monetary authority on the 9th of August 2015 Treasury Single Account (TSA)pronouncement, the phenomenon has not received enough attention by researchers.

Consequently, the precise effect the TSA announcement of the 9th August has on financial sectors of the Nigerian economy especially the banking sector to the best of our knowledge has not been thoroughly studied. This study is, therefore, motivated by the importance of examining the reactions / responses of share prices of Deposit Money Banks (DMBs) in Nigeria to the Treasury Single Account announcement, and the dearth of research in the subject area since the announcement was made despite the strategic importance of the banking sector and the dominance of its share trading in the capital market.

This study aims at finding out DMBs investors' response to the TSA implementation announcement by examining the effect of the implementation announcement on the share prices of DMBs on the fifteen trading days before the announcement day, on the announcement date and fifteen trading days succeeding the TSA implementation announcement.

1.2 Statement of the Problem

Stock prices are among the most closely monitored asset prices in the economy and are commonly regarded as being highly sensitive to economic conditions and major policy pronouncement. In the context of the transmission mechanism through the stock market, monetary policy actions in form of major policy shift such as the TSA implementation announcement affect stock prices, which themselves are linked to the real economy through their influence on consumption spending; wealth effect channel, investment spending and balance sheet channel (Goodhart & Hofmann, 2000 and Amihud & Mendelson, 1986).

As posited by Bernanke and Kuttner (2005), stock market is viewed as an independent source of macroeconomic volatility to which policy makers may wish to respond. Stock prices often exhibit pronounced volatility leading to concerns about sustained deviations from their

'fundamental' values that, once not corrected, may have significant adverse consequences for the broader economy.

Thus, this implies that establishing quantitatively the link between major policy pronouncement such as the Treasury Single Account (TSA) Implementation announcement and stock market prices in Nigeria will not only be suitable to the study of stock market returns but will also contribute to a deeper understanding of the conduct of monetary policy pronouncement and of the potential economic impact of policy actions or inactions on the economy at large.

In addition, prior to the TSA implementation announcement of 9th August, 2015, there was a prevailing market price of DMBs shares in the stock market. However, the announcement might have altered the prevailing market price of the shares either positively or negatively depending on the investors' response to the announcement.In each case, giving rise to abnormal return or the market price of the shares remain the same despite the implementation announcement. Hence, the need to investigate investors' response and the extent to which it impacted on the share prices of the DMBs necessitate this study.

In line with the above, the announcement of the Treasury Single Account implementation by the Nigerian federal government on the 9th August, 2015 created an intense debate and a great deal of mix responses and controversies among stakeholders, market analysts and the general populace that federal government could pronounce such a sudden decision without resort to the possible consequences such a pronouncement may have on the liquidity position as well as the share prices of Deposit Money Banks whom are the major custodian of the federal government's Ministries, Departments and Agencies (MDAs) funds and the key player in the implementation of the CBN's monetary policy. For instance, Orekoya (2015) argued that TSA policy by implication would negatively affect the banking industry and a lot of

Nigerians will lose their jobs. Similarly, it was noted that the execution of TSA will lead to a great lost to DMBs, as government funds make up a huge hunk of DMBs deposit. In fact, it was approximated that at the start of the second quarter of 2015, DMBs hold about N2.2 trillion of government funds and the repercussion of this amount leaving this banks can be highly devastating (Starwart, 2015). In the same vain, Salami (2015) also posited that the resultant loss of funding ensuing from TSA execution would make it tricky for the affected banks to maintain assets on their statement of financial position. In fact, ahead of the deadline for compliance with TSA, overnight rates in the interbank market rose from 6.7percent on 14th September to 91 percent by the close of the market on deadline day.

Despite the fact that a number of views as stated above exist on the degree of effects the 9th August, 2015 TSA implementation announcement might had on DMBs stock prices and liquidity position; none of these views to the best of our knowledge has been empirically proven, therefore, they can at best be adjudged as a mere presumption and not an outcome of empirical investigation. Therefore, the need to investigate the investors' reaction to the Treasury Single Account implementation announcement so as to recommend its appropriateness to DMBs investors and other stakeholders that traded around the announcement period necessitates an empirical research. In other words, the study will serve to fill this gap by examining the informational efficiency of the Nigeria stock market with respect to Treasury Single Account implementation announcement of the 9th August, 2015 so as to assist in policy formulation.

1.3 Research Questions

In line with the above statement problem, the study is guided by the following basic questions:

i) does share prices of DMBs in Nigeria exhibit significant cumulative abnormal return from fifteen trading days before the announcement day of the Treasury Single Account implementation in Nigeria?

ii) does share prices of DMBs in Nigeria exhibit significant cumulative abnormal return on the day of Treasury Single Account implementation announcement in Nigeria?

iii) does share prices of DMBs in Nigeria exhibit significant cumulative abnormal return fifteen trading days after the announcement day of Treasury Single Account in Nigeria?

1.4 Objectives of the Study

The main objective of the study is to empirically examine the impact of Treasury Single Account implementation announcement on the share prices of DMBs in Nigeria. Specifically, the study seeks to:

i) Establish the significance of cumulative abnormal return of DMBs fifteen trading days before the announcement of the TSA implementation in Nigeria.

ii) Determine the impact of TSA implementation cumulative abnormal return of DMBs on the announcement date of the Treasury Single Account implementation in Nigeria.

iii) Ascertain the significance of cumulative abnormal return of DMBs fifteen trading days after the announcement of the Treasury Single Account implementation in Nigeria.

1.5 ResearchHypotheses

To attain the above set objective, the study hypothesized as follows:

H_{01}: There is no significant cumulative abnormal return on the shares of DMBs fifteen trading days before the announcement day to the announcement day of TSA implementation in Nigeria [CAR (t−15, t0) =0].

H_{02}: There is no significant cumulative abnormal return on the shares of DMBs on the date of Treasury Single Account implementation announcement in Nigeria.

H_{03} : There is no significant cumulative abnormal return on the shares of DMBs fifteen trading days before the announcement day to fifteen trading days after the announcement day of Treasury Single Account implementation in Nigeria [CAR(t−15, t+15) = 0].

1.6 Significance of the Study

This study empirically revealed the extent of effect the announcement of Treasury Single Account full implementation of the 9th of August, 2015 has on the share prices of listed DMBs in Nigeria. To the best of our knowledge and according to the available literature, no prior study or studies has or have been conducted in Nigeria to measure such effect. The study is expected to be of importance to portfolio managers and investors, regulators, policy makers, and researchers. Thus, the study is useful to these stakeholders in a number of ways as discussed below:

Portfolio managers and investors who are eager in maximising their portfolio return and minimising the associated risks would be interested in discovering opportunities for profit making or otherwise by trading around the Treasury Single Account implementation dates or other major policy pronouncement(s) by the federal government in emerging markets like the Nigeria stock market. This can also assist them in taking investment decisions on further announcements of government policies implementation.

For policy makers and regulatory bodies of the stock market, it will avail them an empirical evidence of the appropriateness or otherwise of the announcement event within the period of the study. Likewise, findings from examining stock price reaction to Treasury Single Account

implementation announcements in an emerging market like that of Nigeria may empirically bring to light the efficiency or otherwise of these markets.

Furthermore, the study would be of major interest to researchers and academia, as it will contribute to the dearth of literature on the subject matter and act as a source of reference for those that may be interested to carry out researches in the area. Finally, this study shall serve as a base for body of literature on Treasury Single Account implementation announcement and share price response of DMBs in Nigeria.

1.7 Scope of the Study

This study centres on the financial industry of the Nigeria economy. Specifically, the banking sector, as it examines DMBs investors' response to the implementation announcement of the TSA policy.The DMBs are seen as the key player in the Nigeria financial sector due to the dominance of their shares trading on the Nigeria Stock Exchange.

Furthermore, studies on the unified management of federal government funds can be linked to the area of public financial management. Devising a unified and effective approach to managing of Federal government cash balances such as the Treasury Single Account implementation ensures effective and efficient management of government finances.

Finally, the study covers periods (-15 to +15 days) around the announcement day. That is, the 31 days event window which constitute 15-days pre-announcement day (fifteen days prior to 9th August, 2015), the 1-dayannouncement day (i.e. (9th August, 2015), and the 15-days post-announcement days constitute the time frame considered in this study. The constituent population of the study is made up of the Sixteen (16) listed DMBs that traded on the floor of the Nigerian Stock Exchange on the announcement day.

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CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This section covers the conceptual issues such as share prices and treasury single account. It further reviews both relevant and related literature in this area. It also discusses factors that determine share prices reactions and the section ended with a review of theoretical framework that underpins the study.

The section reviews researches conducted in Nigeria and elsewhere that are relevant to the study of the effect of Treasury Single Account (TSA) implementation announcement on the share prices of listed DMBs in Nigeria. Although, similar literature is non-existing or very few at best, adequate review is conducted on related researches.

2.2 Concept of Treasury Single Account and its Implementation

Treasury Single Account (TSA) is one of the financial policies implemented by the Federal Government of Nigeria(FGN) to consolidate all inflows from all the Ministries, Departments and Agencies (MDAs) in the country by way of deposit into Deposit Money Banks traceable into a Single Account at the Central Bank of Nigeria (CBN). This implies that Ministries, Departments and Agencies (MDAs) will maintain their individual accounts with the Deposit MoneyBanks, but daily funding of their disbursements are made from the central account which is resident with the CBN, just as their closing cash balances at the end of day are transferred to same central account in the CBN.

According to Onyekpere (2015), TSA is a unified structure of government bank accounts enabling consolidation and optimal utilization of government cash resources. It is a bank account or a set of linked bank accounts through which the government transacts all its receiptsand payments and gets a consolidated view of its cash position at any given time. Similarly, TSA is seen as a public accounting system under which all government revenue,

receipts and income are linked to one single bank account, usually maintained by the country's Central Bank and all payments done through this single linked account as well (Sailendra & Israel 2011).The purpose is primarily to ensure accountability of government revenue, enhancetransparency and avoid misapplication of public funds. The maintenance of a Treasury SingleAccount will help to ensure proper cash management by eliminating idle funds usually leftwith different deposit money banks and in a way enhance reconciliation of revenue collection andpayment (Adeolu 2015).

In the same vein, Yusuf (2016),posited that the TSA is a unified arrangement of government bank accounts aiding consolidation and best utilization of government cash resources.Yusuf further opinedthat the maintenance of Treasury Single Account will help ensure proper cash management by eliminating idle funds usually left with different commercial banks and in a way enhance reconciliation of revenue collection and payment.

In addition, Lienert(2009), opined that a Treasury Single Account (TSA) is a unified structure of government bank accounts that gives a consolidated view of government cash resources. The principal aim of a TSA is to ensure effective cumulative control over government cash balances. The consolidation of cash balances through a TSA aggregate control of cash is also a key element in monetary and budget management (Isa, 2016)

Accordingly, IMF(2010) noted that a full-fledged TSA shares three essential features; firstly, the government banking arrangement should be unified, to enable the ministry of Finance (MoF) (or treasury) to have an oversight responsibility for, over government cash flows in and out of these bank accounts. Secondly, No other government agency operates bank accounts outside the treasury single account arrangement. Lastly, The consolidation of resources should be comprehensive, and encompass all funds both budgetary and extra-budgetary.

IMF (2010), further stressed that central government stands to benefit from implementing and maintaining a Treasury Single Account in any of the following ways: it allows complete and timely information on government revenue in countries withadvanced payment and settlement systems and an Integrated Financial Management Information System (IFMIS) with adequate interfaces with the banking system, this information will be available in real time. As a minimum, required and updated balances should be available daily.

Also, it improves appropriation control. The TSA ensures that the MoF has full control over budget allocations, and strengthens the authority of the budget appropriation. The result of maintaining separate bank accounts is often system, where funds provided for budgetary appropriations are augmented by additional cash resources that become available through various creative, often extra-budgetary, measures.

In addition, TSA improves operational control during budget execution. When the Treasury has full information about cash resources, it can plan and implement budget in an efficient, transparent, and reliable manner. The existence of uncertainty regarding whether the Treasury will have sufficient funds to finance program expenditures may lead to sub-optimal behavior by budget entities, such as exaggerating their estimates for cash needs or channeling costs through off-budget arrangements.

Similarly, TSA enables efficient fund management. A TSA facilitates regular monitoring of government cash balances. It also enables higher quality inflow and out flow outturn analysis to be undertaken (e.g., identifying causal factors of variances and distinguishing causal factors from random variations in cash balances 183)

Furthermore, TSA leads to elimination of bank fees and transaction costs. Reducing the number of bank accounts results in a lower administrative cost for the government for

maintaining these accounts, including the cost associated with bank reconciliation, and reduced banking fees.

In the same vein, TSA facilitates efficient payment mechanisms. A TSA ensures that there is no ambiguity regarding the volume or the location of the government funds, and makes it possible to monitor payment mechanisms precisely. It can result in substantially lower transaction costs because of economies of scale in processing settlements. In establishment of a TSA, it is combined with the elimination of the "float" in the banking and the payment systems, and the introduction of transparent fee and penalty structures for payment services. Many governments have achieved substantial reductions in their real cost of banking services by introducing a TSA.

On a final note, TSA Improves bank reconciliation and quality of fiscal accounting system; it allows for effective reconciliation between the government accounting systems and cash flow statements from the banking system. TSA also eliminates 1 the risk of errors in reconciliation of financial statements and improves the timeliness and quality of the fiscal accounts.

Finally, TSALowers liquidity reserve needs. It reduces the speedy of cash flows through the treasury, thus allowing it to maintain a lower cash reserve/buffer to meet unexpected fiscal volatility.

Therefore, the TSA is a payment system in which all revenues due to the government are paid into a unified account domiciled with the CBN. Its objective is to ensure fiscal discipline and transparent management of the nation's finances. (CBN, 2015). For the purpose of this study, the CBN (2015) conceptualization of Treasury single Account is adopted as a working definition for the study.

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2.3 Concept of Share Prices Reaction

Scholars have differing views on the factors influencing share price reaction in the capital market of both developed and emerging market. This may probably be due to the fact that the level of efficiency differs from one market to the other. More so, certain factors which are not within the reach of individual firms (external) as well as other variables which are firm's specific (internal) also exert some influences in shaping the reaction/movement of share prices.

In line with the above, five schools of thought have been identified by Maku and Atanda (2009) on stock price movement/reaction; these are: the fundamentalist school, the technical school, the random walk hypothesis school, the Behavioural School of finance and macro-economic hypothesis school. The fundamentalist holds that expectation regarding future earnings and the precise rate at which those earnings are discounted determine the worth of a firm's stock. Also, in this school of thought, net present value principles are applied using earnings, dividends, assets and interest rate to ascertain stock prices.

Contrary to the fundamentalist submission, the technicalist opined that financial or economic data can be used to predict stock price reaction. They are of the view that stock prices tend to follow a specific pattern and that foregoing prices influence current price; likewise, succeeding prices depend on each other. Unlike the fundamentalist and technical school of thoughts, the random-walk hypothesis views stock price movement in terms of a probability distribution of different possible outcomes. The random-walk hypothesis is anchored on the presumption of efficient market which posits that securities instantaneously adjust to reflect the effect of all new information. The proponents of this school posited that stock prices are essentially random and thus, any profitable speculations in the stock market seize to exist.

Similarly, the behavioural school posits that there are three conditions under which market might fail to reflect economic fundamental and when all the three apply, it is predicted that pricing biases in financial market can be both significant and persistent. The first behavioural condition is irrational behaviour. It holds that investors behave irrationally when they don't correctly process all the available information while forming their expectations of a company's future performance. The second is systematic patterns of behaviour, which hold that even if individual investors decided to buy or sell without consulting economic fundamentals, the impact on share prices would be limited. Thirdly, limits to arbitrage in financial markets ascertain that when investors assume that a company's recent excellent performance alone is a signal of future performance; they may start bidding for shares and raise the price. Some investors might also expect a company that surprises the market in one quarter to keep on exceeding expectations.

Finally, the macroeconomic approach seeks to examine the sensitivity of stock prices to changes in macroeconomic variables. The approach posits that stock prices are influenced by changes in money supply, interest rate, inflation and other macroeconomic indicators.

2.4 Factors that Determine Share Prices Reactions

Share price reaction is not self-determining in nature and both extrinsic and intrinsic factors have been documented to exert influence over stock price reactions. Numerous studies have been carried out to identify the determinants of stock prices in different stock markets; i.e. developed and emerging markets. The existing literature strongly supports the reaction of stock prices as a result of firm specific determinants such as dividend, book value, earnings and so on, all of which are internal to a firm; and a vast number of external determinants (market and economic indicators) which includes: interest rate, money supply, inflation etc.

as well as hybrid of both internal and external variables. Below is a review of existing literature based on firm specific determinants, external determinants and hybrid of the two.

Reviewed literature revealed that Malhotra, and Tandon (2013) investigated factors that influence stock prices in the context of National Stock Exchange (NSE) taking a sample of 95 companies for the period of 2007 to 2012 using Linear Regression Model. It was found that firms' book value, earning per share and price-earnings ratio are the major determinants of stock price as they significantly and positively influence firm's stock price while dividend yield has an inverse but significant association with the market price of the firm's stock. However, dividend cover and dividend per share were found not significantly influencing share price movement on the Indian NSE.

In a related study, Mondal and Imran (2010) examined factors influencing the share price of some companies listed in Dhaka Stock Exchange (DSE). Their study revealed that price earnings ratio; stock price rumor; demand for the share; changes in government policies; economic conditions are the most influential internal; external; economic; political; and environmental factors respectively regarding stock price. More so, the study further revealed that 65.0 percent of the variation in stock price in Bangladesh is explained by cash flows, leverage, profitability, growth, market capitalization, and dividend.

Wiredu, Suleman and Adjartey (2013) investigated the effect of macroeconomic variables that explains the variation in stock prices using Cocoa price, Broad Money supply (M2), Gold price, 91-day Treasury bill rate and CPI The results showed that Gold price and the 91 day Treasury bill do not contribute significantly to the stock price. The Cocoa price and the CPI were positively related to the stock price. This means that a unit change in these variables will increase the stock price. The M2 was negatively related to the stock price meaning that a unit change in this variable will result in a decrease in the stock price.

In addition, Maku and Atanda (2010) analyzed the long-run macroeconomic determinants of stock market performance in Nigeria between 1984 and 2007. It was documented that the Nigeria Stock Exchange (NSE) all share index is more responsive to changes in exchange rate, inflation rate, money supply, and real output. While, the entire incorporated macroeconomic variables were found to have simultaneous and significant impact on the Nigerian capital market performance in the long-run. It was concluded that investors should pay close attention to exchange rate, inflation, money supply, and economic growth rather than treasury bill rate in the long-run in their investment decision.

In the same vein, Almumani (2014) examined the quantitative factors that influence share prices for the listed banks in Amman Stock Exchange (ASE) over the period 2005-2011. It was established that earning per share, book value per share, price earnings ratio, and size are significant determinants of share prices for all the banks under consideration. Therefore, it was concluded that these factors posse strong explanatory power and thus, can be used to make accurate future forecasts of stock prices. Consequently, investors are advised to take care of accounting variables of company before investing.

In a similar study, Sunde and Sanderson (2009) analyzed determinants of stock prices in Zimbabwe Stock Exchange using interviews and the archival method as a tool for data collection. It was established that there are economic, political and social factors that determine stock prices in Zimbabwe. However, economic and political factors seem to be the dominant factors in the determination of stock prices. It was concluded that if the stock exchange is to perform well the economic and political situation in the country has to be stable. In other words, the government has to take some deliberate steps to ensure that the economy of the country is well run and also that there is stability politically. This may not be unconnected with the fact that during the time this review was conducted, there were some

political tensions in the country, especially emanating from the redistribution of land to the black Zimbabweans who were marginalized by previous racist colonial governments.

In addition, Ozlen and Ergun (2012) investigated the internal determinants of the stock price movement on sector basis in Istanbul Stock Exchange market (ISE) of Turkey. The variables chosen for consideration are total assets, turnover ratio, dept ratio, current ratio, net profit margin, price to earnings ratio and book value. The result revealed that Book value is found to be the most significant internal determinant of the stock price movements for all sectors; while the impacts of other financial ratios vary for different sectors.

Osisanwo and Atanda (2012) analyzed the determinants of stock market returns in Nigeria using the Ordinary Least Square (OLS) method based on the sourced time series variables from the Central Bank of Nigeria (CBN) between 1984 and 2010.It was found that interest rate, previous stock return levels, money supply and exchange rate are the main determinants of stock returns in Nigeria. It was concluded that the changes in exchange rate of the naira vis-à-vis the US dollar (LEXC) and interest rate (INT) were found to exert significant impact on the growth of the Nigerian Stock Exchange all share index between 1984 and 2010.

Uddin, Rahman and Hossain (2013) studied the determinants of share prices of financial sector companies in the stock market of Bangladesh using data between the years 2005 to 2011. Employing simple and multiple regression analysis, the study revealed Earnings per share (EPS), Net Asset Value (NAV), Net Profit After Tax (NPAT) and Price Earnings ratio (P/E) have strong relationship with stock prices. It can therefore be concluded from the study that EPS, NAV, NPAT and P/E ratio are strong determining factors for price of shares in Bangladesh stock market.

AL- Shubiri (2010) examined factors affecting the equity return of 14 Commercial Banks of Amman Stock Exchange and also identified whether there is a significant relationship between market return of listed commercial banks with some microeconomic factors for the period of 2005-2008. The study employed simple and multiple regression analysis, it documented highly positive significant relationship between market price of stock and net asset value per share; Marke (2013) price of stock, dividend percentage, gross domestic product, and negative significant relationship on inflation and lending interest rate but not always significant on some years of Amman Stock Exchange in Jordan.

Zafar (2013) investigated positive relationship between financial intermediary performance and stock market performance in Pakistan. Using a time series data for the period 1988 – 2008, it was found that foreign direct investment and value traded have positive impact on stock market performance. It was also found that there is a negative relationship between real interest rate and stock market performance, whereas the banking sector development was found to have no significant impact on stock market performance.

Wiredu, Suleman and Adjartey (2013) investigated the effect of macroeconomic variables that explain the variation in stock prices using Cocoa price, Broad Money supply (M2), Gold price, 91-day Treasury bill rate and Cost Price Index (CPI) in Ghanian Stock Exchange. The findings indicated that Gold price and the 91 day Treasury bill do not contribute significantly to the stock price; while the Cocoa price and CPI were positively related to the stock price. This implies that a unit change in these variables will increase the stock price. The M2 was negatively related to the stock price implying that a unit change in this variable will result in a decrease in the stock price

In the same vein, Naveed and Ramzan (2013) analysed impact of size, dividend, profitability, asset growth of 15 Pakistani banks on share price. Employing fixed effect regression model, it was found that just size has a significant impact on share price but coefficient of size and share price is in negative direction. Other variables have statistically insignificant impact on share price. The value of R-square shows that 93% of variance of share price (SP) is explained by these variables, dividend yield (DY), return on asset (ROA), asset growth (AG) and SIZE.

Abdulrahman, Mohammadsidek and Tafri (2009) investigated factors that affect the Malaysian stock market from the macroeconomic perspective. The results revealed that changes in Malaysian stock market index do perform a co integrating relationship with changes in money supply, interest rate, exchange rate, reserves and industrial production index. The lag exclusion test also revealed that all six variables contribute significantly to the co-integrating relationship. This implies that the Malaysian stock market is sensitive to changes in the macroeconomic variables. In addition, considering the variance decomposition analysis, it was further revealed that Malaysian stock market has stronger dynamic interaction with reserves and industrial production index as compared to money supply, interest rate, and exchange rate.

Menike and Prabath (2014)examined the relationship between accounting variables and stockprice on a sample of 100 companies listed in the Colombo Stock Exchange (CSE) in Sri Lanka from 2008 to 2012. Using a single and multiple regressions model; the findings revealed that Earning Per Share (EPS), Dividend Per Share (DPS) and Book Value Per Share (BVPS) were positive and had a significant impact on the stock price in the CSE. It was however concluded that DPS is the most sensitive variable in explaining the stock price movement in the CSE.

Aduda, Mansila and Onsongo (2014) examined the determinants of development in the Nairobi Stock Exchange. Secondary data for the period 2005-2009 was employed to model the factors influencing the development of the Nairobi Stock Exchange (NSE). The findings established that there is relationship between stock market development and macro-economic factors; such as: stock market liquidity, institutional quality, income per capita, domestic savings and bank development. However, regression analysis indicated that no relationship between stock market development and macroeconomic stability –inflation and private capital flows. Hence, it can be concluded that stock market developments is determined by stock market liquidity, institutional quality, income per capita, domestic savings and bank development.

Sharma (2011) studied the empirical relationship between equity share prices and explanatory variables such as: book value per share, dividend per share, earning per share, price earnings ratio, dividend yield, dividend payout, size in terms of sale and net worth for the period 1993-94 to 2008-09. It was documented that earning per share, dividend per share and book value per share has significant impact on the market price of share. The findings also indicated that dividend per share and earnings per share are the strongest determinants of market price in Indian Stock Exchange. It was therefore concluded that the results of the present study supports liberal dividend policy and suggests companies to pay regular dividends

Kaehler, Weber, and Aref (2013)examined the development of the Iraqi Stock Exchange (ISX). Regression analysis was employed and it was found that t the ISX index is mainly determined by exchange rates, interest rates and the general security situation as measured by an index for civilian deaths from violence. It was further revealed that the market still lacks efficiency. While the lack of efficiency is no surprise shortly after the opening of a market, it

is noteworthy that the market is still inefficient after the introduction of electronic trading and an increase in liquidity.

In a nutshell, from the above conceptual review, it became obvious that a number of studies have been undertaken by different researchers in different countries to identify the determinants/factors that affect stock price reaction. Reviewed literatures revealed that movements of stock prices depend on internal/firms' specific/micro factors as well as a divergent of external/ market/macroeconomic fundamental factors. The major internal/firm specific factors reviewed are dividend per share (DPS), earnings per share (EPS) and book value per share (BVPS), dividend yield (DY), return on asset (ROA), asset growth (AG) and firm size (FS), Net asset value (NAV), Net profit after tax (NPAT) and Price earnings ratio (P/E), stock price rumour (SPR); while the major external/macroeconomic factors include: changes in government policies; economic conditions, changes in exchange rate, inflation rate, money supply, real output, interest rate and previous stock return levels among others.

In addition, it is worthy to note that the differing views on determinants of share prices reaction holds to the fact that, the level of market complexity and advancement determines in a no small measure factors that drive price reactions and also the social, economic, political and environmental conditions, such as crisis or boom periods dictates to a large extent specific factors that determine share price reactions whether such factors are firm specific or macroeconomic in nature.

2.5 Review of Empirical Studies

This section reviews empirical studies on the impact of TSA or other similar government policies announcement on the share price of DMBs in Nigeria. However, identifying previous studies in developed or emerging market on TSA announcement and share prices reaction becomes very difficult. Thus, a few studies were reviewed on effect of monitory policy

announcement on share prices reaction because TSA pronouncement is aimed at achieving a robust monetary policy in most nations.

Ekanayake, Rance, and Halkides (2008) investigated the effects of Federal Funds target rate changes announcement on the stock performance of 30 companies listed under the Dow Jones Industrial Average (DJIA) over the years 1996-2007. Using event-study methodology, the DJIA 30 individual stocks were grouped into 8 sectors and the reaction of each sector to changes in the Federal Funds target rate was analysed. Event window of 3 days prior to the event and 3 days after the event was utilized for each sector. It was found that the Average Abnormal returns (AARs) and Cumulative Abnormal Returns (CARs) are mostly positive and significant on the days the Federal Funds target rate was reduced. Likewise, they are mostly negative and significant on the days the Federal Funds target rate was increased. Moreover, When the analysis focused on the event day (AARs and CARs $t = 0$), of the eight sectors, four sectors reacted positively when the Federal Funds target rate was decreased, three sectors reacted positively when there was no change in the funds target rate, while three sectors reacted negatively when the funds target rate was increased. It was therefore concluded that the changes in the Federal Funds target rate are found to have a significant effect on stock prices on and around the event days. Though the analysis of the study was thoroughly done, however, there is no evidence of any diagnostic test such as unit root test, serial correlation and test for the presence of heteroskedasticity, which would have improved the robustness of the result.

Ricci (2015) employed event study methodology on a sample of 28 European Monetary Union Banks for a period of six years- 1997-2013. The study examined the impact of European Central Bank monetary policy announcements on the stock price of large European Banks. It was found that there is strong evidence that restrictive measures (CONTR) in the

form of liquidity drain or end/reduction of monetary easing programs caused a significant negative cumulative abnormal return (CARs) in the stock price of large European banks, irrespective of the investigated period. It was also documented that liquidity provision was accompanied by a negative CARs during the global crisis period and a positive one during the sovereign debt crisis. Aside the fact that the sample used by the study was very small taking in to consideration countries that constitute European Union; the time period under consideration was also characterized by an unprecedented frequency of policy interventions. This might have led to events overlapping and the filtering applied might not have sufficiently taken care of the presence of confounding effects.

In a related study, Vithessonthi and Techarongrojwong (2012) investigated the effect of monetary policy announcement on stock prices in Thailand using a sample of 50 repurchase rate changes over the period from September 2003 through December 2009. The study employed standard event study methodology and it was documented that stock prices respond negatively to the expected change in the repurchase rate. But the unexpected change seems to have no effect on stock returns at the aggregate level, and at the firm level the expected change in the repurchase rates has a negative effect on stock returns while the unexpected change has a positive effect on stock returns. In addition, the effect of the unexpected repurchase rate change on stock returns is statistically insignificant and the evidence suggests that stock prices react asymmetrically to the direction of the repurchase rate movements. Surprisingly, the unexpected repurchase rate change has a negative effect on stock returns when it is considered good news but has a positive effect on stock returns when it is considered bad news. However, a mere look at the study revealed that survey data, which was used to represent market's expectation on the repurchase rate may be grossly inappropriate. Instead, data would have been sourced from the secondary source of the appropriate authority; such as the Bank of Thailand.

Vithessonthi and Techarongrojwong (2013) examined the effect of monetary policy rate announcements on stock prices in Thailand at the firm level from January 2003 to December 2011. Employing the standard event study methodology, it was found that the mean abnormal return on Day 0 is 0.00% and statistically insignificant. This finding provides that on the event date, there is no evidence of significant abnormal returns following the policy rate announcement for the full sample of all announcements. However, the cumulative abnormal returns (CARs) over the event window tested and it was documented that the average CARs for a five-day event window (i.e. from Day −2 to Day 2) is −0.25% and statistically significant at the 1% level, and that the average CARs for a three-day event window (i.e. from Day −1 to Day 1) is -0.07% but is statistically insignificant. It was however concluded that the significant average abnormal returns associated with the 33 of the 66 announcements range from −3.18% to 1.50%, suggesting that the impact of the monetary policy announcement on stock prices, when it matters, is economically significant. A critical look at the analysis revealed that a thorough analysis was conducted but the major shortcoming is that no evidence of diagnostic test such as unit root, heteroskedasticity and test for the absence of autocorrelation were presented in the work.

Wang and Mayes (2012) investigated the responses of aggregate stock price indices of New Zealand, Australia, the UK and the euro area to monetary policy rate announcements using event study methodology for the period of 1999 to 2010. The study established significant negative stock price reactions to monetary policy surprises. Specifically, the period of the study fall within the period of financial crises for the countries involved, it was further documented that the New Zealand (NZ) and Australia (AU) stock market responses are not significantly affected by the financial crisis. However, prior to the crisis, all of the market indices of the four countries/regions (including the ASX200 of AU) react significantly negatively to monetary policy surprises. Conversely, the reactions of the UK and euro area

indices to both expected and surprise components become positive during the crisis period rather than serving its original purpose of stimulating the market, a surprise rate cut causes even more pessimism about economic conditions. Looking critically at the findings, it can be deduced that while there are some similarities between the US and Australia, the euro area, New Zealand and the UK in the response of stock prices to monetary policy surprises, there are also important differences as revealed by the study.

Duran, Ozcanb, Ozlu and Unalmiş (2012) analysed the response of asset prices to monetary policy in Turkey, using the heteroscedasticity-based Generalized Method of Moments (GMM) estimation technique as an alternative to the event study approach. It was documented that increases in the policy rate lead to a decline in stock prices, rises in government bond yields with longer maturities, and an economically insignificant appreciation of the domestic currency. It was concluded that monetary policy transmission in Turkey, an emerging market and a small open economy, works very similarly to that in advanced economies. Also, the results obtained using the GMM was compared with the more widely applied event study method and found that the event study gives biased results in measuring the responses of short-term bond yields and the Turkish lira/euro exchange rate.

Jianyu, Jose and Yun (2009), studied abnormal returns to shareholders of bidder firms around the day of M&A announcement for ten emerging Asian markets (China, India, Hong Kong, Indonesia, Malaysia, the Philippines, Singapore, South Korea, Taiwan, and Thailand). The study adopts standard event study methodology on a sample of 1,477 M&A deals in the ten emerging Asian markets, for the period 2000-2005. An estimation window of 120 (−125, −6) trading days and two-day, three-day or a five-day event window were applied and it was documented that the stock markets have expected positive cumulative abnormal returns in the three different event windows: a two-day (0,1) window, a three-day (-1,+1) window, and

a five-day (-2,+2) window and valuation effects of information leakage about M&A deals are statistically significant

Kucukkocaoglu, Unalmis and Unalmis (2013) examined the impact of monetary policy committee (MPC) announcements on banks' stock returns in Turkey using the heteroscedasticity-based Generalized Method of Moment (GMM) technique on a sample of the period through January 2005 to January 2013 with 99 policy decisions. Two periods were prominent in the study: the conventional monetary policy era which constitutes all the periods prior to May 2010 that are within the study time frame; and the unconventional monetary policy episode - period after May 2010. The study documented that stock returns of all banks that are listed in Istanbul Stock Exchange react significantly to the monetary policy surprises on Monetary Policy Committee (MPC) meeting days prior to May 2010. It was also found that stock returns of banks for which interest payments constitute an important share in their balance sheets react more assertively to the changes in policy rates. Conclusively, the estimation results suggest that since the Central Bank of the Republic of Turkey has started adopting an unconventional monetary policy regime in May 2010, with various instruments and flexible timing, aggregate and individual bank indices have not responded significantly to the surprises on MPC meeting days.

However, the non-significant response of aggregate and individual bank indices during the unconventional monetary policy may probably be due to a number of macroeconomic variables that are not taken into account during this episode.

Moreover, Marfatia (2014) analysed the impact of uncertainty on estimated response of stock returns to U.S. monetary policy surprise. The study adopts Time Varying Parameter (TVP) mode on high frequency daily data from the Federal funds futures market to estimate the response of S&P 500 stock returns to monetary policy surprises. A significant negative

relationship between the level of uncertainty and the time varying response of S&P 500 stock returns to unanticipated changes in the interest rate was documented by the study. Thus, at higher levels of uncertainty the impact of monetary policy shocks on stock markets is lower. It was concluded that the results were robust to different measures of uncertainty. Failure of the study to establish the stationarity (unit root test) of the time series data utilized by the may leads to spurious result.

Additionally, Ogbulu and Uruakpa (2011) examined the nature and magnitude of the relationship between monetary policy and stock prices in the Nigerian capital market and whether changes in monetary policy lead or lag changes in asset prices within the Nigerian context. Employing the techniques of co-integration, error correction mechanism, impulse response function and Granger causality and using quarterly data from 1986:2 to 2011:4.It was found that there is one co-integrating long run dynamic relationship between stock prices and the set of broad money supply, interest rate, foreign exchange rates and inflation. Also, it was documented that broad money supply as an instrument of monetary policy exerts a significant positive impact on stock prices in Nigeria while interest rate reports a weak and insignificant relationship with stock prices.

Besides, a unit-directional causality from stock prices to broad money supply and also from foreign exchange rate to stock prices was also reported. The impulse response and variance decomposition analyses revealed that own shocks from stock prices are the dominant source of variations in the forecast error decomposition. It was concluded that an expansionary monetary policy by way of increasing money supply by the monetary authorities in Nigeria would, all things being equal, lead to a profound impact on asset prices in the stock market.

In a related study, Sasidharan (2009) analysed stock market behaviour on the pre and post announcement days of a change in the monetary policy stance. Trading days for the period from 1996 January to 2008 April were used, and a three days event windows was employed. Also, exploratory data analysis and non-parametric test - Wilcoxon rank sum (Mann-Whitney) test and Wilcoxon signed rank test were utilised for the study. The result revealed a negative return during a contractionary policy announcement and a high positive return, compared to a normal trading day, during an expansionary policy announcement. The day preceding an expansionary policy announcement gives the highest positive returns (0.39%). On the day of an expansionary policy announcement, negative returns of -0.05%, which reverts to a positive 0.07% the next day, was documented. Most likely, this is an indication of overreaction during the run-up towards policy, which is corrected for in the subsequent days. In addition, high negative return was recorded during the day prior to a contractionary policy announcement (-0.29%); while the mean return on the day of a contractionary policy announcement is smaller (-0.12%). Like in expansionary policy, a reversal of sign was witnessed after the day of announcement (0.18%).

From the above analysis, the high (low) returns prior to an expansionary (contractionary) policy announcement may indicate that markets anticipate the policy stance. Consequently, rational investors might be taking an investment strategy in which they go long (short) in expectation of an expansionary (contractionary) policy announcement; this may induce them to sell (buy) the day after an expansionary (contractionary) policy announcement is made. Finally, in as much as any investment rule can generate excess returns, then the market is inefficient according the Efficient Markets Hypothesis. More so, the study utilised time series data and failed to provide any evidence of unit root test for the stationarity of the data utilised.

Shehu (2011) examined the reactions of Nigeria's stock market to monetary policy innovations during the period of global financial crisis using monthly data over the period January, 2007 to August, 2011. Specifically, stock market return is regressed against major monetary policy instruments: money stock (M1, and M2) and monetary policy rate (MPR). Using the Generalised Autoregressive Conditional Heteroskedastic (GARCH) and Engle Generalised Autoregressive Conditional Heteroskedastic (EGARCH) methodologies; it was found that the unanticipated component of policy innovations on M2 and MPR exerts destabilising effect on NSE's returns, whereas the anticipated component does not. It was observed that wholesome adoption of macroeconomic policies to measure share price reactions for Nigeria Stock Exchange may constitute a serious weakness. Therefore, the varying macro-economic policies may alter the finding of this study. Besides, result using crisis period may not be applicable to relatively stable period.

2.6 Theoretical Framework

A number of underpinning theories were reviewed with the view of linking the major constructs of the study to the theories. Some of these theories include:, Capital Asset Pricing Model (CAMP), Efficient Market Hypothesis (EMH) among others.

2.6.1 **The Capital Asset Pricing Model**

The Capital Asset pricing Model (CAPM) is a model for pricing an individual security or a portfolio. The CAPM was performed by Lintner (1965) and Mossin(1966) these model marks the birth of asset pricing theory. This model is built on the model of portfolio choice developed by Harry Markowitz (1959). The Markowitz model is often known as a "mean-variance model", it describes the relationship between risk and the expected return of an asset under the conditions of market equilibrium in a capital market where all investors undertake optimal portfolio selection. The model assumes investors are not risk takers and that they care

only about the mean and variance of their one-period investment return when choosing among portfolios. As a result this investors tend choose the mean variance efficient portfolios, with the logic that the portfolios will minimize the variance of portfolio return given an expected return and maximize the expected return, given the variance.

Accordingly, the CAPM rests on several assumptions. The most important ones include:

Firstly, all investors are rationally risk-averse individuals whose aim is to maximise the expected utility of their end of period wealth. Therefore, all investors operate on a common single-period planning horizon. Secondly, all investors are price-takers; so that, no investor can influence the market price by the scale of his or her own transactions. Also, Asset markets are frictionless and information is freely and simultaneously available to all investor. Furthermore, all investors have homogeneous expectations about asset returns, this mean that all investors arrive at similar assessments of the probability distribution of returns expected from traded securities. This says that investors will not be trying to beat the market by actively managing their portfolios Distributions of expected returns are normal. All securities are highly divisible, i.e. can be traded in small packages.

2.6.2 **ArbitragePricing Model**

As advocated by Ross (1976a, 1976b), the Arbitrage Pricing Theory (APT) is another model of asset pricing based on the idea that equilibrium market prices should be perfect, in such a way that prices will move to eliminate buying and selling without risks (arbitrage opportunities). The basis of this theory is the analysis of how investors construct efficient portfolios and offers a new approach to explaining the asset prices and also states that the return on any risky asset is a linear combination of various macroeconomic factors that are not explained by this theory. Therefore unlike CAPM model this theory specifies a simple linear relationship between assets, returns and the associated k factors. There are two

empirical testable versions of the APT, the statistical APT and the macro variable APT. However, the macro variable model differs from the statistical factor model mainly because the factors are specified in advance and they are interpretable. The APT equilibrium rests on investors, ability to construct an arbitrage portfolio by simultaneously holding a short and a long position in two different portfolios which offers positive expected return with zero risk and zero net investment.

2.6.3. **Efficient market Hypothesis**

This theory was advocated by Fama (1970, 1991), and according to him "a market in which prices always fully reflect all available information is called strong-form efficient." That is to say, prices adjust quickly and, on average, without bias, to new information. Therefore, the current prices of securities reflect available information at any given point in time. This theory (EMH) suggests that profiting from predicting price movements is very difficult and unlikely. The main reason behind price changes is the arrival of new information which can negatively or positively impact on securities prices. That is to say, the main reason behind price changes is the arrival of new information which can negatively or positively impact on securities prices.

In line with the above, an efficient market can exist if the following conditions hold (Jones, 1993& Shleifer, 2000) as cited in Yalcin(2010):

i. A large number of rational profit maximizing investors exists who actively participate in the market, hence value securities rationally.
ii. If some investors are not rational, their irrational trades are cancelling each other out or rational arbitrageurs eliminate their influence without affecting prices.

iii. Information is costless and widely available to market participants at approximately the same time. Investors react quickly and fully to the new information, causing stock prices to adjust accordingly.

Having reviewed the aforementioned theories, this study was anchored on the strong-form efficient market hypothesis (EMH) as an underpinning theory because it best explained the constructs under investigation.The strong-form EMH explains this study; due to the fact that the announcement of TSA implementation may be seen as an effort by the National government/ policy makers to communicate to the market information at their reach with the expectation that the market will immediately incorporate such information and stock prices will adjust accordingly. Consequently, equity prices of DMBs who are the major custodian of Ministries, Departments and Agencies (MDAs) funds are expected to react to the TSA pronouncement in line with the prediction of the strong-from EMH.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

In this section, the research methods and technique to be adopted in order to achieve the objectives of this study are discussed. Research methodology deals with planning and techniques used in research in order to draw valid conclusions and reporting findings. Areas covered by the section are research design, population and sample of the study, sources and method of data collection for the study, the technique of data analysis and models specification.

3.2 Research Design

A correlational design was employed for the study. This is due to the fact the study intended to establish relationship between the dependent and independent constructs used for the study. A window estimation period and event window will be determined in order to be in line with the convention of conducting research of this nature using event study.

3.3 Population and Sample Size of the Study

The population employed by the study were all the listed 16 Deposit Money Banks (DMBs) in Nigeria that traded on the floor of the Nigeria Stock Exchange (NSE) on the 9thAugust 2015, which was the day the TSA announcement became public. However, the need to give equal chance of being represented to the elements of the population, the study utilized the criteria below to revise the population and thus, the revised population becomes the actual population of the study. Hence, for a bank to be part of the revised population, the following criteria must be fulfilled:

i. Data on daily stock prices must be available for the bank at least for the 120 trading days before the announcement and the 31 trading days of the event window in order to determine the normal return of DMDs share before the announcement.

ii. The bank did not undergo any technical suspension within the 120 trading days (i.e the estimation period) before the announcement day, and the 31 trading day of the event window.

One (Eco bank) out of the 16 banks had to be dropped because it failed to meet up with the first criteria and two other banks (Unity & Wema banks) were also dropped from the remaining fifteen banks because they failed to fulfil the second criteria. Use of the above criteria therefore resulted in a revised population of thirteen (13) DMBs, which became the sample size of the study.

3.4 Sources and Methods of Data Collection

Secondary sources of data were used and daily stock prices were extracted from the website of Cashcraft for all the sampled listed banks for the period under consideration. Likewise, the corresponding Nigeria Stock Exchange (NSE) daily All Share Index (ASI) was collected for the same period. Both the daily series of stock prices of the sample banks and the corresponding NSE ASI were retrieved electronically from the online database of Cashcraft Asset Management Limited.

In addition, the study employed a parameter estimation window of one hundred and twenty trading days ending -15 days prior to the event day i.e. 9th August, 2015; over which the parameters for normal return were estimated. What this implies is that the 120 days to 15 days pre-event window have been used to represent a normal return period prior to the announcement. In line with this, Brown and Warner (1985) posited that a parameter estimation period of 120 days is sufficient when employing daily data to establish normal returns. Also, Peterson (1989) observed that a typical length of the estimation period range from 100 to 300 days for daily studies and from 24 to 60 months for monthly studies.

3.5 Methods and Technique of Data Analysis

The study employed the standard event study methodology advocated by Mackinlay (1997) and reviewed by Rao and Sreejith (2014)where abnormal return is the residual between the observed and predicted return.This methodology establishes whether there is an 'abnormal' stock price effect associated with an unanticipated event. From this analysis the researcher can infer the significance of the event (McWilliams & Siegel, 1997). In this study, the event is defined as the announcement of TSA implementation by the Federal Government of Nigeria on the 9th of August 2015.

An event window of thirty-one trading days, covering fifteen trading days before the announcement, the announcement day and another fifteen trading days after the announcement was employed by the study. In this regard, Peterson (1989) observed that a typical lengths of the event window range from 21 to 121 days for daily studies and from 25 months to 121 months for monthly studies.

Although, it has been established in the literature that the smallest event window is three days that is day 0 (the announcement day), day -1(pre-announcement day) and day +1(post-announcement day); the present studies however employed a larger event window due to the fact that emerging markets like Nigeria are usually known to be less efficient than developed markets and therefore tend to be more sluggish in incorporating new information in stock prices (Afego, 2011). It is thus imperative to choose a reasonably large event window to capture this speed of adjustment.

The daily stock price data collected was converted to daily continuously compounded stock return using the formula below as suggested by Adelegan (2009), Brooks (2008) and Rao and Sreejith, (2014).

$$R_{i,t} = \ln\left[\frac{P_{i,t}}{P_{i,t-1}}\right] \times 100 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where:

$R_{i,t}$ = the return on the security of bank i at time t;

$P_{i,t}$ = the stock price of bank i at time t;

$P_{i,t-1}$ = the stock price of bank i at time t-1; and

ln = the natural logarithm.

The logarithmic conversion of the time series data became imperative in order to keep the effect of outliers under control. The same procedure was also adopted for the NSE ASI to create daily compounded market returns as follows:

$$R_{m,t=} \ln \left[\frac{ASI_t}{ASI_{t-1}}\right] \times 100 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Where:

$R_{m,t=}$ = the return on the market at time t;

ASI_t = the NSE ASI at time t;

ASI_{t-1} = the NSE ASI at time t-1; and

ln = the natural logarithm.

The log daily returns of sample banks and those of the NSE ASI were the main constructs utilized to estimate the model for generating individual bank and market returns. Since the study utilized time series data, the need to subject the daily stock and market return to stationarity test using the Augmented Dickey-Fuller (ADF) test for the presence of unit root becomes inevitable.

The study also employed the market model advocated by Fama, Fisher, Jensen and Roll (1969) and Brown and Warner (1985) to estimate the abnormal returns in the event window. The single factor market model was therefore employed to estimate the return within the event window and the parameter estimation window. The model is presented as follows:

$Ri,t = \alpha + \beta Rm,t + \varepsilon t$ ----------(3)

Where: R*it* = share returns on bank i at time period t

R*mt* = market index returns at time t

α And β = parameters to be estimated

ε*t* = error term

Assuming a constant beta value, the estimated return for bank *i*'s security can be arrived at by substituting the estimated values of α*i* and β*i* over the estimation window in equation (3) above as follows:

$\overline{E}_{i,t} = \hat{\alpha}_i + \hat{\beta}_i R_{m,t}$, ……..(4)

Where:

$\overline{E}_{i,t}$=expected return on bank *i*'s security at time t;

$\hat{\alpha}_i$and_$\hat{\beta}_i$ = estimated parameters based on the estimation window; and

$R_{m,t}$= the market return at time *t*.

The abnormal return (AR) is defined as the difference between equation (3) and equation (4) as shown below:

AR = Ri,t − $\overline{E}_{i,t}$ ……(5)

Once the estimated equation has been ascertained, the actual return on bank *i's* security was calculated as follows:

Ri,t = $\hat{\alpha}_i$+$\hat{\beta}_i$Rm,t + εi,t. ……(6)

Accordingly, the abnormal return on the security of a specific sample bank is simply the residual of the ordinary least square (OLS) after regressing the bank's stock return on the market return. However, for the residuals to be regarded as the abnormal return, the parameters estimated over the estimation window must be incorporated into the equation as shown above.

To improve the informativeness of the analysis of abnormal returns, the average of ARs were taken across the observations for all events N, using the model:

$$AARt = 1 / N \Sigma ARit \quad \ldots\ldots (7)$$

Where:

AARt = average abnormal return at time t

N = number of observations

In view of the fact that the returns were computed from the residuals of the market model, it becomes imperative to ensure that there would be absence of any form of bias from the residuals. To achieve this, the study employed the Breusch-Godfrey test for serial correlation (Godfrey, 1988) to check for the presence of first order serial correlation in the residuals series. Gujarati (2003) posited that serial correlation affects the efficiency of estimated coefficients in a regression model.

Also, Brown and Warner (1985) argued that estimates from OLS using the market model are usually well specified and exhibit no significant mean bias; empirical evidence has however shown that the OLS estimation fails to sufficiently capture ARCH effects in returns series. De Medeiros and Matsumoto (2006) and Brooks (2008) observed that estimating a model that sufficiently captures Auto-Regression Conditional Heteroskedasticity (ARCH) effects is imperative as their presence renders the coefficient estimates inefficient and consequently leads to a downward bias in abnormal returns.

In the same vein, Eminieke (2010) submitted that the Nigerian stock market index return shows significant volatility and the presence of ARCH innovations. As a result, this study employed the Engle (1982) test to check for the presence of ARCH effects in the residuals of the market model over the parameter estimation window and the event window. In a situation

where significant ARCH effects were identified, the OLS market model estimation for the affected sample DMBs were re-estimated using ARCH or Generalize Auto-Regression Conditional Heteroskedaticity (GARCH) models according to their best fits.

Since standard t-test was used to test the significance of cumulative abnormal return, it became vital to ensure that all assumptions concerning the use of the tool are put in place. The standard t-test assumes that individual bank's abnormal returns are normally distributed. Therefore, the normality of residuals is necessary to authenticate t-tests (Agung, 2009). Based on this backdrop, the study employed the Jarque-Bera normality test (Bera & Jarque, 1981) to test for the normality of the abnormal returns. The cumulative abnormal return of bank *i* in the sample for a given period were arrived at by aggregating the abnormal return in a given period. The method is described by the following formula:

$$CAR_{i(to,t1)} = \sum_{t=0}^{n} AR_{i,t} = \sum_{t=0}^{n} \varepsilon_{i,t}$$

Where: $CAR_{i(to,t1)}$ = the cumulative abnormal return of bank *i* from time *t*0 to *t*1,

$AR_{i,t}$ = the abnormal return of bank *i* at time *t*,

$\varepsilon_{i,t}$ = *is* the residual of bank *i* at time *t*;

n = the number of observations.

The null hypothesis of no significant cumulative abnormal return for TSA implementation announcement on the announcement date and fifteen trading days after the announcement day was tested using the t-test for the significance of cumulative abnormal returns. According to Panayides and Gong (2002), the test statistic is simply the ratio of period *t0* to period *t1 CAR* to its estimated standard deviation over the estimation window as shown in the equation below:

t (CAR) = $\frac{CARi\,(t_o,t_1)}{S(AAR_t)}$

t(CAR) = the test statistic for cumulative abnormal return,

CAR(t0, t1) = the cumulative abnormal return of bank $i$from time t0 to time t1

S(AARt) = the standard deviation of average abnormal return over the parameter estimation window.

For the decision criteria, the null hypothesis of no significant cumulative abnormal return would be rejected if the computed t value is greater than the critical value at a given a priori alpha level and vice versa.

CHAPTER FOUR
DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

Thischapter presents and discusses the results of the tests conducted on the data collected for the study. The results are presented using tables. The chapter begins with the stationarity test conducted on the data collected and robustness tests carried out. The descriptive statistics on the data are also presented and analysed; while the abnormal returns and cumulative abnormal results computed and used for the test of the hypotheses formulated, descriptive statistics and then inferential statistics. This is where the analysis of the results to test the hypotheses of the study is conducted. The chapter ends with discussion of findings and policy implication of findings.

4.2 Stationarity Test of Research Data

Ascertaining the stationarity of the respective banks and market return series marked the commencement of the finding analysis. Conducting the test became essential so as to avoid dealing with non-stationary variables that may give rise to spurious results. Table one gives a summary of the results for the unit root test carried out on the thirteen bank stock return series and the thirteen market return series for the respective sample banks using the ADF test. Table 4.1 gives a summary of the results for the unit root test carried out on the thirteen bank stock return series and the thirteen market return series for the respective sample banks using the Augmented Dickey-Fuller(ADF) test.

Table 4.1. ADF Test for Treasury Single Account Announcement Event window and Parameter estimation Period

Variables	Event Window Stationarity Test		Estimation Window Stationarity Test	
	ADF Test Statistic	Order of Integration	ADF Test Statistic	Order of Integration
Access Bank Share Returns	-5.136019***	I(0)	-9.153666***	I(0)
Diamond Bank Share Returns	-3.756865**	I(0)	-11.14893***	I(0)
Equatorial Trust Bank Share Returns	-4.273726***	I(0)	-10.58236***	I(0)
First Bank Share Returns	-5.636959***	I(0)	-9.698967***	I(0)
FCMB Share Returns	-5.593365***	I(0)	-11.05632***	I(0)
Fidelity Bank Share Returns	-4.756652***	I(0)	-8.982194***	I(0)
GTB Share Returns	-3.880286**	I(0)	-8.206168***	I(0)
Skye Bank Share Returns	-3.700501**	I(0)	-9.071156***	I(0)
Stanbic IBTC Share Returns	-6.724009***	I(I)	-12.68574***	I(0)
Sterling Bank Share Returns	-6.218886***	I(0)	-10.57436***	I(0)
UBA Share Returns	-2.715370**	I(0)	-8.647651***	I(0)
UBN Share Returns	-6.481799***	I(0)	-11.34618***	I(0)
Zenith Bank Share Returns	-5.993912***	I(0)	-7.720158***	I(0)

Source: Eviews8.0 Output, 2017
****** and ** connote significance at the 1% and 5% levels respectively.***
NB: All ADF regressions contain an intercept and one lagged difference. D(X) connotes first difference of a variable X

Table 4.1 depicts the summary results obtained from the stationarity test carried out on the variables. It was glaring from the table that all but one (Stanbic IBTC) of the thirteen banks stock return series were found to be stationary at levels. Only Stanbic IBTC bank return series was found to be stationary at first difference. The proof of the stationarity of these thirteen series can be seen from the significance of their respective Augmented Dickey-Fuller (ADF) statistics. Thus, the null hypothesis of the existence of unit root in the stock returns series of all the thirteen sampled banks was rejected at the one and five percent levels respectively. This is because the t-statistic coefficients of all the banks were more than -2.614. This signifies that the return series of these banks were stationary and integrated of the order I(0) and I(I). For the estimation window, all the return series were also found to be stationary at one percent level. This is because the t-statistic coefficients of all the

thirteen banks exceeded -3.484. This implies that all the thirteen banks return series have no unit root problem and are integrated of the order I(0).

As pointed out earlier under the methodology, the abnormal return in the event window for each of the sampled banks was estimated by substituting parameters estimated over the estimation window using the OLS technique (see Appendix I). Therefore, abnormal return for each sampled bank is the residual arrived at from the estimation of equation three (3) over the event window. In line with the assumption of OLS, the residuals estimated for each of the sampled DMBs using the market model were subjected to a number of diagnostic tests such as test for heteroskedastic effects and serial correlation among others.

4.3 Diagnostic Test of Research Data

A number of diagnostic test were carried out, such as the: Test for Serial correlation, test for Heteroskedaticity among others.

4.3.1 Test for Serial Correlation

To ensure that the estimated coefficients in the regression model are very efficient and unbiased, the Breusch-Godfrey test for serial correlation was carried out on the residuals of the estimated market model for each bank in order to certify that the coefficient estimated over the estimation window and the event window are efficient and unbiased. Table 4.2 presents the summary of serial correlation test for both event window and parameter estimation period.

Table 4.2 Summary of Breusch-Godfrey Serial Correlation Test for Event Window and Parameter Estimation Period

Sampled Banks	Event Window Serial Correlation Test		Estimation Window Serial Correlation Test		Null-hypothesis
	F-statistic	Prob. F(5,29)	F-statistic	Prob. F(5,29)	
Access Bank Share Returns	0.121305	0.9865	1.723545	0.1345	Failed to be rejected
Diamond Bank Share Returns	1.073530	0.3996	1.545052	0.1812	Failed to be rejected
Equatorial Trust Bank Share Returns	0.694252	0.6321	2.016464	0.0817	Failed to be rejected
First Bank Share Returns	0.498104	0.7749	1.701506	0.1398	Failed to be rejected
FCMB Share Returns	2.063463	0.1001	1.444723	0.2139	Failed to be rejected
Fidelity Bank Share Returns	1.014419	0.4278	0.975935	0.4355	Failed to be rejected
GTB Share Returns	0.017604	0.9999	0.735067	0.5986	Failed to be rejected
Skye Bank Share Returns	0.524991	0.7553	0.625903	0.6803	Failed to be rejected
Stanbic IBTC Share Returns	1.603202	0.1944	1.636050	0.1560	Failed to be rejected
Sterling Bank Share Returns	1.094599	0.3853	0.469533	0.7983	Failed to be rejected
UBA Share Returns	1.230560	0.3256	1.424387	0.2205	Failed to be rejected
UBN Share Returns	1.308137	0.2890	0.826727	0.5331	Failed to be rejected
Zenith Bank Share Returns	1.004677	0.4333	1.781528	0.1219	Failed to be rejected

Source: Eviews8.0 output, 2017 and researcher's compilation 2017

Table 4.2 revealed thatthe residuals of three out of the thirteen banks in the event window showed evidence of significant serial dependence, while the remaining ten had no traces of autocorrelation. The presence of serial correlation in the residuals of UBA and Diamond Bank were corrected after an autoregressive model of two lag was introduced [AR(2)] and that of Stanbic IBTC bank was corrected after autoregressive model of one lag was introduced [AR(1)]. Thus, the null hypotheses for the absence of serial correlation was failed to be rejected at the five percent (5%) level of significance threshold set for the study.

Similarly, the test for the parameter estimation window model revealed the presence of autocorrelation in five banks out of the thirteen banks. The evidence of serial correlation in the residuals of Equatorial Trust Bank and FCMB were rectified after an autoregressive model of three lag was introduced [AR(3)]. While the presence of serial correlation in the residuals of First Bank and Stanbic IBTC Bank were also corrected after an autoregressive model of one lag was introduced [AR(1)]. Likewise, the evidence of serial correlation in the residuals of Sky Bank was also corrected after an autoregressive model of two lag was introduced [AR(2)] Hence, the null hypotheses for the lack of serial correlation was failed to be rejected at 5% level of significance threshold set for the study.

4.3.2 Test for Heteroskedaticity

As discussed under the methodology, estimating a model that sufficiently captures ARCH effects is essential in order to estimate efficient coefficients in the abnormal returns. Engle (1982) test of ARCH effects were conducted in the residuals of the market model over the parameter estimation window and the event window. Table 4.3 presented the summary result of the heteroskedascity test conducted.

Table 4.3 depicts the summary of Heteroskedaticity Testfor both event window and parameter estimation period.

Event Window Heteroskedaticity Test			Estimation Window Heteroskedaticity Test		
Sampled Banks	**F-statistic**	**Prob. F(5,29)**	**F-statistic**	**Prob. F(5,29)**	**Null-hypothesis**
Access Bank Share Returns	0.472943	0.7927	1.376077	0.2386	Failed to be rejected
Diamond Bank Share Returns	0.793794	0.5656	1.636273	0.1561	Failed to be rejected
Equatorial Trust Bank Share Returns	0.325527	0.8926	3.206012	0.0907	Failed to be rejected
First Bank Share Returns	1.243837	0.3200	1.219605	0.3046	Failed to be rejected
FCMB Share Returns	0.502970	0.7710	0.498508	0.7768	Failed to be rejected
Fidelity Bank Share Returns	0.605585	0.6963	1.053622	0.3900	Failed to be rejected
GTB Share Returns	0.402119	0.8425	1.220884	0.3039	Failed to be rejected
Skye Bank Share Returns	1.630492	0.1902	1.223578	0.3028	Failed to be rejected
Stanbic IBTC Share Returns	0.295261	0.9106	1.570232	0.1742	Failed to be rejected
Sterling Bank Share Returns	0.511559	0.7648	0.523619	0.7580	Failed to be rejected
UBA Share Returns	2.041421	0.1121	0.489231	0.7837	Failed to be rejected
UBN Share Returns	2.171410	0.0912	0.314524	0.9034	Failed to be rejected
Zenith Bank Share Returns	0.247206	0.9371	1.591424	0.1682	Failed to be rejected

Source: Eviews8.0 output, 2017 and researcher's compilation 2017

Table 4.3presents the ARCH test carried out on the residuals of the sampled banks within the event window. The test revealed the absence of significant ARCH effects in all but one of the banks. This signifies that for the twelve banks, the OLS model was able to suitably estimate

the returns. Therefore, the residuals of twelve banks did not show any sign of ARCH effects. Nevertheless, significant ARCH effects were noticed in the residuals of Union Bank plc in the event window; thus the initial OLS model was replaced with ARCH/GARCH models in order to correct the anomaly. Evidence for re-estimation of the market model for Union Bank revealed that ARCH(1) fitted better than the estimate under GARCH(1,1) using the Akaike Information Criterion.Thus, the null hypotheses for the absence of ARCH effects was failed to be rejected at 5% threshold level of significance set for the study. Consequently, the residuals from the estimate of the ARCH (1) model were considered as the abnormal return of the bank within the event window.

Similarly, the ARCH test carried out on the residuals of the sample banks within the estimation period revealed the absence of significant ARCH effects in eight (8) out of the thirteen sampled banks. This connotes that for the eight banks, the OLS model was able to adequately estimate the returns. Thus, the residuals of eight banks did not show any sign of ARCH effects. However, significant ARCH effects were detected in the residuals of Equatorial Trust Bank, FCMB, UBA, GT Bank and Sky bank in the estimation window. Therefore, the initial OLS model was reinstated with ARCH/GARCH models in order to rectify the anomaly. Evidence for re-estimation of the market model for FCMB, UBA, GT Bank and Sky Bank revealed that GARCH(1,1) fitted better than the estimate under ARCH(1) using the Akaike Information Criterion. Consequently, the residuals from the estimate of the GARCH(1,1) model were considered as the abnormal return of the aforementioned banks within the estimation window. Whereas, for Equatorial Trust Bank, ARCH(1) fitted better than the estimate under GARCH(1,1) using the Akaike Information Criterion. Accordingly, the residuals from the estimate of the ARCH (1) model were considered as the abnormal return of the bank within the estimation window.

Having completed all the diagnostic tests, the individual sample bank abnormal returns were then aggregated across banks to arrive at the abnormal return. Similarly, the abnormal return (AR) was aggregated across time to give cummulative abnormal return (CAR).

Knowing the characteristics of the abnormal and cumulative abnormal returns is very vital and this led to the conduct of descriptive statistics of the returns. Table 4.4 presents the summary descriptive statistics for the event window abnormal return, cummulative abnormal return and estimation window average abnormal return for the thirteen sample banks employed by the study

Table 4.4 Summary Descriptive Statistics of Event Window Abnormal Return, Cummulative Abnormal Return and Estimation Window Average Abnormal Return

Measures	AR%	CAR%	AAR
Mean	-0.011826	-0.492172	0.00023
Maximum	0.236931	0.012039	0.041617
Minimum	-0.182923	-1.183666	-0.026099
Std. Dev.	0.101058	0.377774	0.009163
Skewness	0.414267	-0.410884	1.144584
Kurtosis	3.087957	3.186372	6.962759
Jarque-Bera	0.905423	2.539955	0.871871
Probability	0.635902	0.280838	0.409302
Observation	31	31	120

Source: E-views 8.0 output 2017
Notes: CAR – event window cumulative abnormal return, AR - event window abnormal return, AAR – parameter estimation window average abnormal return

The results for the various descriptive statistic items for abnormal return and cumulative abnormal return could be seen from Table 4.4 above. It can be seen that the mean or average values for the Abnormal Return (AR) and Cumulative Abnormal Return (CAR) series are approximately -0.0118 and-0.4922 respectively. In addition, the standard deviation, which measures the dispersion around the mean, stood at 0.101058 for AR and 0.377774 for CAR. The table equally documented minimum AR and CAR values of -0.182923(or –18.29

percent) and -1.183666(or –118.37 percent) in that order. Conversely, the maximum value documented for AR was 0.236931 (or 23.69 percent), while that of CAR stood at 0.012039 (or 1.20 percent). The comparative margin between the minimum and maximum values of AR and CAR is indicative of the rate of variability among the return series.

Table 4.4 also depicts the skewness of the distribution of AR and CAR. Skewness, which measures the length of the tail of the distribution; the skewness value of 0.414267 signifies that the distribution of AR is positively skewed, and thus has a longer right tail. Similarly, the skewness value of -0.410884 for the distribution of CAR is also evidence that the distribution is negatively skewed and thus has a longer left tail. From the table, the kurtosis value of AR was approximately 3.08 which are above the threshold of three (3) and thus indicating that the distribution exhibits peakedness at the surface and is therefore leptokurtic. In the same vein, the CAR series kurtosis value stood at 3.19 which as well indicate leptokurtosis or peakedness of the distribution at the surface, since the value is also greater than the threshold of three.

As postulated by Brown and Warner (1985) and Ball and Brown (1968), the normality of AR and cumulative abnormal return is a prerequisite for the *t*-test for the significance of CAR. In this regard, the study employed the Jarque-Bera normality test. For the AR series, the table reports an approximate Jarque-Bera value of 0.905which is not significant at all the conventional levels of significant. This leads to the failure to reject the null hypothesis which states that the abnormal return series is normally distributed. Therefore, results from the Jarque-Bera test shows that the AR series is normally distributed. Likewise, Jarque-Bera value of 2.539of CAR series was also statistically non-significant at all the conventional levels, leading to the failure to reject the null hypothesis. This signifies that the CAR series is also normally distributed. In short, it can be concluded that the descriptive statistics proved

that the two variables of interest; AR and CAR are normally distributed and thus, can be suitably used for the t-test as explained under the methodology.

Also,the summary statistics for the parameter estimation window is important because the standard deviation of the AAR is crucial for the test of hypotheses using *t*-test. From table 4.4 it is obvious that the mean or average value for the average abnormal return is approximately 0.00023 and the standard deviation, which measures the dispersion around the mean, stood at 0.009163. The table also documented minimum average abnormal return of -0.0261 (or –2.61 percent). Conversely, the maximum value stood at 0.041617 (or 4.16 percent). The comparative margin between the minimum and maximum values of abnormal return and cumulative abnormal return is suggestive of the rate of variability among the return series.

It could also be seen from the table that the skewness of the distribution of average abnormal return was 1.144584 signifying that the distribution of average abnormal return is positively skewed, and therefore, has a longer right tail. The table also documented a kurtosis of approximately 6.96 which is greater than the threshold of three; this is indicating that the distribution shows peakedness at the surface and is therefore leptokurtic. On the other hand, the AAR Jarque-Bera test for the normality of AAR reports an approximately value of 0.87 which is not statistically significant at all the conventional levels of significant. This leads to the failure to reject the null hypothesis which states that the average abnormal return series is normally distributed. Hence, result from the normality tests shows that the average abnormal return series is normally distributed.

4.4. Abnormal and Cumulative Abnormal Returns for Estimation and Event Windows

To establish the total impact of an event/announcement over a particular period of time, the average abnormal returns for the sample banks is aggregated to obtain the daily Cummulative abnormal returns (CARs). To evaluate abnormal returns, the CAR for daily returns is

computed by summing the CAR of the previous day with prevailing day AR. The first cumulative abnormal return (CAR) is just equal to the abnormal return on day -15. The CAR on day -14 is the sum of the first two abnormal returns; the CAR on day -13 is the sum of the first three and so on. By examining CARs, we can see if there was an over or under reaction to an announcement or not. Table 4.5 presents the abnormal return and cummulative abnormal return over the thirty one days' event window.

Table 4.5. Event Window Abnormal Return and Cumulative Abnormal Return

DAY	AR%	CAR%	DAY	AR%	CAR%
-15	-0.08205	-0.08205	**+1**	-0.16148	-0.60938
-14	0.094092	0.012039	**+2**	-0.15585	-0.76524
-13	-0.0114	0.000639	**+3**	-0.13583	-0.90107
-12	-0.14305	-0.14241	**+4**	-0.07022	-0.97129
-11	0.022123	-0.12028	**+5**	0.014131	-0.95716
-10	0.022246	-0.09804	**+6**	0.011262	-0.9459
-9	0.002362	-0.09568	**+7**	-0.18292	-1.12882
-8	0.041715	-0.05396	**+8**	-0.05484	-1.18367
-7	-0.08929	-0.14325	**+9**	0.026654	-1.15701
-6	-0.03668	-0.17993	**+10**	0.236931	-0.92008
-5	-0.10633	-0.28626	**+11**	0.181938	-0.73814
-4	0.009631	-0.27663	**+12**	0.145385	-0.59276
-3	-0.06261	-0.33924	**+13**	0.099577	-0.49318
-2	-0.06371	-0.40295	**+14**	0.079377	-0.4138
-1	-0.05437	**-0.45731**	**+15**	0.047185	**-0.36662**
0	0.009415	**-0.4479**			

Source: **Microsoft excel, 2007 and researcher's computation**
NOTES; AR – event window abnormal return, CAR – event window cumulative abnormal return.

Table 4.5 revealed that the value of average abnormal return was negative for 9 days and cumulative abnormal return was negative for 13 days before the announcement date. The negative abnormal return persists four days post the announcement day before it become positive which implies that four days after the announcement investors still react negatively to the Treasery Single Account (TSA) Implementation announcement. Conversely, the CAR was negative on the announcement day and all the fifteen days after, which signifies that investors of DMBs in the NSE react negatively to the announcement. The negative CAR for

the fifteen days post announcement day, depicts the extent of negative reaction investors of DMBs in the NSE has on the TSA implementation announcement. In a nutshell, the table revealed that the ARs and CARs for the pre and post event day demonstrate a mixed reaction.

4.5 Test of Hypotheses

To independently assess the impact of the announcement which is tailored along the hypotheses of the study, the hypotheses of the study were tested using the non-parametric *t*-test for the significance of abnormal return over three periods (i.e. day (-15), day (0) and day (+15). In each of the cases, the *t*-statistic intended to ascertain whether the cumulative abnormal return over the period of interest is significantly different from zero. Therefore, the three points at which the significance of cumulative abnormal return was tested include pre-announcement day cumulative abnormal return, announcement day cumulative abnormal return and post-announcement day cumulative abnormal return.

Table 4.6 presents the abnormal returns and cumulative abnormal returns for the fifteen trading days before the announcement day.

Table 4.6AR and CAR before announcement date

Days	AR%	CAR%
-15	-0.08205	-0.08205
-14	0.094092	0.012039
-13	-0.0114	0.000639
-12	-0.14305	-0.14241
-11	0.022123	-0.12028
-10	0.022246	-0.09804
-9	0.002362	-0.09568
-8	0.041715	-0.05396
-7	-0.08929	-0.14325
-6	-0.03668	-0.17993
-5	-0.10633	-0.28626
-4	0.009631	-0.27663
-3	-0.06261	-0.33924
-2	-0.06371	-0.40295
-1	-0.05437	**-0.45731**

Source: Researcher's compilation**,** Microsoft excel, 2007

In order to test for hypothesis **H_{01}:** that there is no significant cumulative abnormal (CAR) return fifteen trading days before the announcement date. Table 4.7 presents the summary of the test statistics for the hypothesis.

Table 4.7 Result for the Test of Hypothesis before the TSA implementation announcement

Details	Value
Cummulative Abnormal Return (Day -15 to Day -1)	-0.45731
Estimation Window standard Deviation of Average Abnormal Return	0.009163
t-Statistic	7.555128
Probability	0.0000***

Source: e-views 8.0 output 2017

****** and ** connote significance at the 1% and 5% levels respectively***

It is evident from table 4.7 that the null hypothesis of no significant cummulative abnormal returns fifteen trading days before the announcement day was tested for the period of day -15 to day -1. It could also be seen from the table that cumulative abnormal return over the period of interest is approximately -0.46 percent and the standard deviation of the average abnormal return over the parameter estimation window is 0.009163. Also, the reported t-statistic of -7.555128 was statistically significant at one perceny level of significant. The result thus, indicated that we have enough basis to reject the null hypothesis which stated that the cumulative abnormal return exhibited by stock prices of DMBs in Nigeria on the fifteen trading days prior to the announcement of the TSA implementation is not significantly different from zero. Hence, hypothesis is hereby rejected.

In the same vein, table 4.8 presents the summary of AR and CAR on the TSA implementation announcement day.

Table 4.8 Date of Announcement AR and CAR

Days	AR%	CAR%
0	0.009163	-0.4479

Source: Researcher's compilation**,** Microsoft excel, 2007

Table 4.8 showed a positive abnormal return and a negative cumulative abnormal return both on the announcement day of TSA implementation announcement. Similarly, to test for **H_{02}:** that there is no significant CAR on the date of TSA implementation announcement in Nigeria. Table 4.9 presents the summary result for the hypothesis tested.

Table 4.9 Result for the Test of Hypothesis on the TSA implementation announcement day

Details	Value
Cummulative Abnormal Return (Day -15 to Day 0)	**-0.4479**
Estimation Window standard Deviation of Average Abnormal Return	0.009163
t-Statistic	-4.965210
Probability	0.0002***

Source: e-views 8.0 output 2017

******` and ** connote significance at the 1% and 5% levels respectively***

It can be seen from table 4.9 that the null hypothesis of no significant cummulative abnormal returns on the announcement day was tested for the period of -15 to day 0. The table also revealed that cumulative abnormal return over the period of interest is approximately -0.45 percent and the standard deviation of the average abnormal return over the parameter estimation window is 0.009163. Also, the reported t-statistic of -4.965210 was statistically significant at the one percent level of significant. The result thus, indicated that we have enough evidence to reject the null hypothesis which stated that the cumulative abnormal return exhibited by stock prices of DMBs in Nigeria on the announcement day of the TSA

implementation is not significantly different from zero. Hence, the null hypothesis is hereby rejected.

Furthermore, table 4.10 depicts the abnormal returns and cumulative abnormal returns for the fifteen trading days after the announcement day.

Table 4.10: **AR and CAR after the announcement date**

Days	**AR%**	**CAR%**
+1	-0.16148	-0.60938
+2	-0.15585	-0.76524
+3	-0.13583	-0.90107
+4	-0.07022	-0.97129
+5	0.014131	-0.95716
+6	0.011262	-0.9459
+7	-0.18292	-1.12882
+8	-0.05484	-1.18367
+9	0.026654	-1.15701
+10	0.236931	-0.92008
+11	0.181938	-0.73814
+12	0.145385	-0.59276
+13	0.099577	-0.49318
+14	0.079377	-0.4138
+15	0.047185	**-0.36662**

Source: Microsoft excel, 2007

Similarly, table 4.11 presents the key statistics from the test of hypothesis three (H_{03}) which stated that there is no significant cumulative abnormal return fifteen trading days after TSA implementation announcement in Nigeria.

Table 4.11 Result for the Test of Hypothesis on the fifteen trading day after the TSA implementation announcement day

Details	Value
Cummulative Abnormal Return (Day -15 to Day +15)	-0.36662
Estimation Window standard Deviation of Average Abnormal Return	0.009163
t-Statistic	-6.155312
Probability	0.0000***

Source: e-views 8.0 output 2017

****** and ** connote significance at the 1% and 5% levels respectively***

Table 4.11 depicted that cumulative abnormal return for the fifteen trading day after the announcement became public is approximately -0.36 percent and the standard deviation of the average abnormal return over the parameter estimation window still remained as 0.009163. Also, the table reported a computed t-value of -6.155312 which is statistically significant at the one percent level. Hence, this showed that the null hypothesis which stated stock prices of DMBs in Nigeria did not exhibit significant cumulative abnormal return fifteen trading days after the announcement day of the TSA implementation is hereby rejected.

4.6 Discussion of Findings

This study empirically investigated impact ofTSA implementation announcement on DMBs stock prices in Nigeria. Findings from the test of the first hypothesis documented the presence of negative and statistically significant cumulative abnormal return of -0.46 percent, fifteen trading day before the announcement became public. This signified that the stock prices of DMBs that traded on the fifteen trading day prior to the announcement reacted negatively to the announcement of the TSA implementation and investors of these banks lost 0.46 percent of the value of their investments and thus considered the announcement as

negative news. The finding of statistically significant negative cumulative abnormal return prior to the announcement day is consistent with the finding of existing studies on policy changes announcement such as Wang and Mayes (2012) Vithessonthi and Techarongrojwong (2013) and contradicts the findings of Ricci (2015), Ekanayake, Rance, and Halkides (2008).

In addition, the second hypothesis of the study further ascertained the presence of negative and statistically significant abnormal return of -0.45percent on the day the announcement of the TSA implementation was made public. This signifies that the stock prices of listed DMBs that traded on the historic day responded negatively to the announcement of the TSA implementation and investors who held stocks of these banks from fifteen trading days prior to the announcement up to the announcement day lost 0.45 percent in the value of their investments. The finding of negative significant cumulative abnormal return on the announcement day is consistent with previous studies on central government policy announcement, such as Wang and Mayes (2012) and Ricci (2015) and contradicts the findings of Ekanayake, Rance, and Halkides (2008) and Vithessonthi and Techarongrojwong (2013).

Also, the third hypothesis of the study also documented proof of the persistence of negative cumulative abnormal return for the fifteen trading days succeeding the announcement day. A statistically significant cumulative abnormal return of approximately –0.37 percent was recorded over the period after the announcement day. This result is an indicator to the persistence of negative market trend in the Nigerian stock market subsequent to the release of the information to the general public. Previous studies on policy change announcement such as Wang and Mayes (2012), Vithessonthi and Techarongrojwong (2013) and Ricci (2015) have also established evidence of the persistence of negative cumulative abnormal return for the period after the announcement day.

4.7 Policy Implication of the Findings

The implication of this study to policy makers and regulatory bodies of the stock market is that the findings of the study will provide them with an empirical parameters as to the suitability or otherwise of the event announcement. Also, the findings of this study had empirically revealed the efficiency or otherwise of the Nigeria market announcement.

Similarly, investors and portfolio managers who are keen in achieving optimal investment mix would be deterredto trading around TSA implementation announcement dates in emerging markets like the Nigeria stock market, since the DMBs investors perceived the implementation announcement as bad news which led to their negative response.

4.8 Theoretical Implication of the Findings

The theoretical implication of the study is the fact that the study documented a negative investors' reaction to the announcement which led to the abnormal loss of approximately -0.46, -0.46 and -0.37 before the announcement day, on the announcement day and after the announcement day, respectively. This is contrary to the underpinning theory upon which the study was anchored which assumed that investors are rational and the market is efficient. Thus, making of abnormal return/lost is virtually impossible. This implied that the efficient market hypothesis is not applicable in all circumstances.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

Treasury Single Account implementation announcement have been investigated in the study, with the eventual aim of documenting the probable effects of the announcement on the DMBs listed on the NSE who traded fifteen trading days prior to the announcement, on the announcement day and fifteen trading days succeeding the TSA announcement.

Findings from the first, second and third hypotheses of the study revealed that investors who held stocks of DMBs in the NSE react negatively to the announcement, and thus, considered the announcement as bad news. These investors lost approximately -0.46%, -0.45% and -0.37% respectively to the value of their shareholdings in the NSE.

5.2 Conclusions

The study was set out to empirically examine impact ofTSA implementation announcement on the share prices of Deposit Money Banks in Nigeria. Having made a thorough analysis, it can be concluded that the evidence of negative cumulative abnormal return on the date of, before and after the announcement day signified that investors and market participants of the Nigerian banking sector in the Nigerian Stock Exchange considered the sudden announcement of the TSA implementation as bad news. Panic of unfavourable market condition due to decreased capital inflow from within and international arena which would translate to decreased return on investment may have accounted for the negative cumulative abnormal return even before the TSA implementation announcement became public. In addition, the persistence of negative cumulative abnormal return for days after the announcement date substantiates that policy makers failed to provide adequate information on the need to implement Treasury Single Account and market participants are full of panic

on the associated consequences of the announcement. This contributes in sustaining the prevailing down-ward trend in the market. This implies that DMBs investors in the NSE sustained lost in their share prices' return up to fifteen trading days succeeding the announcement.

5.3 Recommendations

In line with the findings of the study, the study recommends as follows:

Firstly, since the pre-announcement cumulative abnormal return is negative, monetary authority alongside policy makers should precede future announcement with release of relevant information that would showcase to investors enormous economic and social benefit associated with the TSA implementation.

Secondly, DMBs in Nigeria should focus more on their core banking businesses of deposit mobilisation from the private individuals and enterprises rather than depending on government agencies deposit which may no longer be available because of TSA implementation.

Finally, DMBs in Nigeria should devise new strategies such as increase deposit interest rate and reducing lending rate for the meantime; as this would entice private enterprises to willingly deposit their money with the banks and would assist in improving their cash balances and intermediation activities.

5.4. Limitations of the Study

The study is limited in terms of scope and the methodology adopted. In terms of the scope, only the thirteen sampled listed DMBs that traded on the fateful day the announcement became public were considered. Whereas in terms of methodology, event study methodology depends on the assumption of an efficient market. This assumption is not valid in many

situations. The length of time required for individual investors to respond to event signals is random and therefore, the implication is that markets could exhibit market inefficiencies because prices do not instantly or fully reflect all available information.

5.5. Suggestions for Further Study

This study empirically examined stock responses around treasury single account implementation announcement in Nigeria. However, the findings of the study cannot be generalized to the entire firms listed on the Nigerian Stock Exchange (NSE) due to the fact that the study is specific to the Nigerian banking sector and this constitutes a limitation to the study. Future studies should be conducted on the same phenomenon and the entire firms listed on the NSE should be employed as a domain rather than a specific sector. Furthermore, other related models such as Mean Adjusted Returns, Market Adjusted Returns and Conditional Risk Adjusted Returns among others can also be employed by future researchers on the same issue so as to see if different outcomes would be generated. These therefore constitute a research gap to be filled by future researchers.

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APPENDIX A

EVENT WINDOWSTATIONARITY TEST OUTPUT

Null Hypothesis: ACCESSMKTRTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.043218	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ACCESSMKTRTN)
Method: Least Squares
Date: 01/09/17 Time: 08:14
Sample (adjusted): 4 37
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ACCESSMKTRTN(-1)	-1.020315	0.168836	-6.043218	0.0000
C	0.001781	0.002905	0.613099	0.5441

R-squared	0.532986	Mean dependent var	0.000896
Adjusted R-squared	0.518392	S.D. dependent var	0.024380
S.E. of regression	0.016919	Akaike info criterion	-5.263717
Sum squared resid	0.009160	Schwarz criterion	-5.173932
Log likelihood	91.48320	Hannan-Quinn criter.	-5.233098
F-statistic	36.52048	Durbin-Watson stat	2.018733
Prob(F-statistic)	0.000001		

Null Hypothesis: ACCESSSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.136019	0.0002
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ACCESSSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 08:16

Sample (adjusted): 4 37
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ACCESSSHARTN(-1)	-0.902914	0.175800	-5.136019	0.0000
C	0.000913	0.006159	0.148194	0.8831

R-squared	0.451855	Mean dependent var	0.000345
Adjusted R-squared	0.434725	S.D. dependent var	0.047759
S.E. of regression	0.035908	Akaike info criterion	-3.758703
Sum squared resid	0.041260	Schwarz criterion	-3.668917
Log likelihood	65.89795	Hannan-Quinn criter.	-3.728083
F-statistic	26.37869	Durbin-Watson stat	2.015523
Prob(F-statistic)	0.000013		

Null Hypothesis: DIAMONDMKTRTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.043218	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DIAMONDMKTRTN)
Method: Least Squares
Date: 01/09/17 Time: 08:17
Sample (adjusted): 4 37
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DIAMONDMKTRTN(-1)	-1.020315	0.168836	-6.043218	0.0000
C	0.001781	0.002905	0.613099	0.5441

R-squared	0.532986	Mean dependent var	0.000896
Adjusted R-squared	0.518392	S.D. dependent var	0.024380
S.E. of regression	0.016919	Akaike info criterion	-5.263717
Sum squared resid	0.009160	Schwarz criterion	-5.173932
Log likelihood	91.48320	Hannan-Quinn criter.	-5.233098
F-statistic	36.52048	Durbin-Watson stat	2.018733
Prob(F-statistic)	0.000001		

Null Hypothesis: DIAMONDSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.701835	0.0086
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DIAMONDSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 08:17
Sample (adjusted): 4 37
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DIAMONDSHARTN(-1)	-0.569267	0.153780	-3.701835	0.0008
C	0.000974	0.004634	0.210154	0.8349

R-squared	0.299836	Mean dependent var	-0.000930
Adjusted R-squared	0.277956	S.D. dependent var	0.031602
S.E. of regression	0.026853	Akaike info criterion	-4.339833
Sum squared resid	0.023075	Schwarz criterion	-4.250047
Log likelihood	75.77716	Hannan-Quinn criter.	-4.309213
F-statistic	13.70358	Durbin-Watson stat	1.591473
Prob(F-statistic)	0.000803		

Null Hypothesis: ETISHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.273726	0.0019
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ETISHARTN)
Method: Least Squares
Date: 01/09/17 Time: 08:19
Sample (adjusted): 4 37
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ETISHARTN(-1)	-1.055216	0.246908	-4.273726	0.0002
C	0.004721	0.004849	0.973500	0.3376

R-squared	0.363371	Mean dependent var	0.003756
Adjusted R-squared	0.343476	S.D. dependent var	0.034858
S.E. of regression	0.028244	Akaike info criterion	-4.238847
Sum squared resid	0.025527	Schwarz criterion	-4.149061
Log likelihood	74.06040	Hannan-Quinn criter.	-4.208228
F-statistic	18.26474	Durbin-Watson stat	1.507634
Prob(F-statistic)	0.000161		

Null Hypothesis: FBNSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.636959	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FBNSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 08:19
Sample (adjusted): 4 37
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FBNSHARTN(-1)	-0.904228	0.160411	-5.636959	0.0000
C	0.004933	0.005074	0.972267	0.3382

R-squared	0.498238	Mean dependent var	0.002017
Adjusted R-squared	0.482558	S.D. dependent var	0.040912
S.E. of regression	0.029429	Akaike info criterion	-4.156626
Sum squared resid	0.027715	Schwarz criterion	-4.066840
Log likelihood	72.66264	Hannan-Quinn criter.	-4.126007
F-statistic	31.77531	Durbin-Watson stat	2.016900
Prob(F-statistic)	0.000003		

Null Hypothesis: FCMBSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.593365	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FCMBSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 08:20
Sample (adjusted): 4 37
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FCMBSHARTN(-1)	-1.026344	0.183493	-5.593365	0.0000
C	0.005438	0.006379	0.852475	0.4003

R-squared	0.494357	Mean dependent var	0.002507
Adjusted R-squared	0.478555	S.D. dependent var	0.051333
S.E. of regression	0.037068	Akaike info criterion	-3.695112
Sum squared resid	0.043969	Schwarz criterion	-3.605326
Log likelihood	64.81690	Hannan-Quinn criter.	-3.664492
F-statistic	31.28574	Durbin-Watson stat	1.914152
Prob(F-statistic)	0.000004		

Null Hypothesis: FIDELITYSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.756652	0.0005
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FIDELITYSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 08:21
Sample (adjusted): 4 37
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FIDELITYSHARTN(-1)	-0.819131	0.172207	-4.756652	0.0000
C	0.002939	0.004900	0.599939	0.5528

R-squared	0.414196	Mean dependent var	0.002310
Adjusted R-squared	0.395889	S.D. dependent var	0.036744
S.E. of regression	0.028559	Akaike info criterion	-4.216673
Sum squared resid	0.026100	Schwarz criterion	-4.126887
Log likelihood	73.68345	Hannan-Quinn criter.	-4.186054
F-statistic	22.62574	Durbin-Watson stat	2.056306
Prob(F-statistic)	0.000040		

Null Hypothesis: GTBSHARTN has a unit root

Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.880286	0.0055
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GTBSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 08:21
Sample (adjusted): 5 37
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GTBSHARTN(-1)	-0.768414	0.198030	-3.880286	0.0005
D(GTBSHARTN(-1))	0.215465	0.176335	1.221909	0.2313
C	0.001699	0.004647	0.365574	0.7172

R-squared	0.353389	Mean dependent var	0.000975
Adjusted R-squared	0.310281	S.D. dependent var	0.032117
S.E. of regression	0.026673	Akaike info criterion	-4.323826
Sum squared resid	0.021343	Schwarz criterion	-4.187779
Log likelihood	74.34312	Hannan-Quinn criter.	-4.278050
F-statistic	8.197865	Durbin-Watson stat	2.022399
Prob(F-statistic)	0.001444		

Null Hypothesis: SKYSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.700501	0.0086
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SKYSHARTN)
Method: Least Squares
Date: 01/09/19 Time: 08:22
Sample (adjusted): 4 37
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SKYSHARTN(-1)	-0.598018	0.161605	-3.700501	0.0008

C	-0.001930	0.006629	-0.291054	0.7729

R-squared	0.299685	Mean dependent var	0.000492
Adjusted R-squared	0.277800	S.D. dependent var	0.045265
S.E. of regression	0.038467	Akaike info criterion	-3.620997
Sum squared resid	0.047351	Schwarz criterion	-3.531211
Log likelihood	63.55695	Hannan-Quinn criter.	-3.590377
F-statistic	13.69371	Durbin-Watson stat	1.933676
Prob(F-statistic)	0.000806		

Null Hypothesis: D(STANBICSHARTN) has a unit root AT 1ST DIFF.
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.724009	0.0000
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(STANBICSHARTN,2)
Method: Least Squares
Date: 01/09/17 Time: 08:23
Sample (adjusted): 6 37
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(STANBICSHARTN(-1))	-2.028452	0.301673	-6.724009	0.0000
D(STANBICSHARTN(-1),2)	0.322367	0.173769	1.855149	0.0738
C	0.001765	0.004678	0.377320	0.7087

R-squared	0.800774	Mean dependent var	-0.001650
Adjusted R-squared	0.787035	S.D. dependent var	0.057132
S.E. of regression	0.026365	Akaike info criterion	-4.344471
Sum squared resid	0.020159	Schwarz criterion	-4.207058
Log likelihood	72.51153	Hannan-Quinn criter.	-4.298922
F-statistic	58.28181	Durbin-Watson stat	1.860833
Prob(F-statistic)	0.000000		

Null Hypothesis: STERLINGSHARTN has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.218886	0.0000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(STERLINGSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 08:24
Sample (adjusted): 5 37
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STERLINGSHARTN(-1)	-1.689956	0.271746	-6.218886	0.0000
D(STERLINGSHARTN(-1))	0.391184	0.171058	2.286857	0.0294
C	-0.001014	0.003028	-0.334778	0.7401

R-squared	0.668553	Mean dependent var	0.000403
Adjusted R-squared	0.646457	S.D. dependent var	0.029201
S.E. of regression	0.017363	Akaike info criterion	-5.182477
Sum squared resid	0.009044	Schwarz criterion	-5.046431
Log likelihood	88.51087	Hannan-Quinn criter.	-5.136702
F-statistic	30.25617	Durbin-Watson stat	2.095929
Prob(F-statistic)	0.000000		

Null Hypothesis: UBASHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.715370	0.0819
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UBASHARTN)
Method: Least Squares
Date: 01/09/17 Time: 08:25
Sample (adjusted): 4 37
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UBASHARTN(-1)	-0.369161	0.135952	-2.715370	0.0106
C	0.001032	0.004841	0.213214	0.8325

R-squared	0.187265	Mean dependent var	0.001032
Adjusted R-squared	0.161867	S.D. dependent var	0.030831
S.E. of regression	0.028226	Akaike info criterion	-4.240145
Sum squared resid	0.025494	Schwarz criterion	-4.150359
Log likelihood	74.08246	Hannan-Quinn criter.	-4.209525
F-statistic	7.373233	Durbin-Watson stat	1.608457
Prob(F-statistic)	0.010582		

Null Hypothesis: UBNSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.481799	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UBNSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 08:25
Sample (adjusted): 4 37
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UBNSHARTN(-1)	-1.099631	0.169649	-6.481799	0.0000
C	0.009844	0.005467	1.800777	0.0812

R-squared	0.567648	Mean dependent var	0.001242
Adjusted R-squared	0.554137	S.D. dependent var	0.046309
S.E. of regression	0.030922	Akaike info criterion	-4.057679
Sum squared resid	0.030597	Schwarz criterion	-3.967893
Log likelihood	70.98055	Hannan-Quinn criter.	-4.027060
F-statistic	42.01372	Durbin-Watson stat	2.064625
Prob(F-statistic)	0.000000		

Null Hypothesis: ZENITHSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.993912	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ZENITHSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 08:26
Sample (adjusted): 4 37
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ZENITHSHARTN(-1)	-0.800502	0.133553	-5.993912	0.0000

C	0.003473	0.004401	0.789264	0.4358

R-squared	0.528906	Mean dependent var	0.003526
Adjusted R-squared	0.514184	S.D. dependent var	0.036814
S.E. of regression	0.025660	Akaike info criterion	-4.430764
Sum squared resid	0.021070	Schwarz criterion	-4.340978
Log likelihood	77.32298	Hannan-Quinn criter.	-4.400144
F-statistic	35.92698	Durbin-Watson stat	1.788155
Prob(F-statistic)	0.000001		

APPENDIX B
ESTIMATION WINDOWSTATIONARITY TEST OUTPUT

Null Hypothesis: ACESSMKTRTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.173919	0.0000
Test critical values:	1% level	-3.484198	
	5% level	-2.885051	
	10% level	-2.579386	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ACESSMKTRTN)
Method: Least Squares
Date: 01/09/17 Time: 14:34
Sample (adjusted): 4 126
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ACESSMKTRTN(-1)	-0.601357	0.083826	-7.173919	0.0000
C	0.000138	0.001046	0.132315	0.8950

R-squared	0.298409	Mean dependent var	-0.000117
Adjusted R-squared	0.292611	S.D. dependent var	0.013779
S.E. of regression	0.011589	Akaike info criterion	-6.061400
Sum squared resid	0.016251	Schwarz criterion	-6.015674
Log likelihood	374.7761	Hannan-Quinn criter.	-6.042826
F-statistic	51.46512	Durbin-Watson stat	1.901794
Prob(F-statistic)	0.000000		

Null Hypothesis: ACESSSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.153666	0.0000
Test critical values:	1% level	-3.484198	
	5% level	-2.885051	
	10% level	-2.579386	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ACESSSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 14:36
Sample (adjusted): 4 126
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

ACESSSHARTN(-1)	-0.825642	0.090198	-9.153666	0.0000
C	1.47E-05	0.002513	0.005836	0.9954

R-squared	0.409150	Mean dependent var	0.000616
Adjusted R-squared	0.404267	S.D. dependent var	0.036102
S.E. of regression	0.027865	Akaike info criterion	-4.306782
Sum squared resid	0.093950	Schwarz criterion	-4.261056
Log likelihood	266.8671	Hannan-Quinn criter.	-4.288208
F-statistic	83.78959	Durbin-Watson stat	1.924656
Prob(F-statistic)	0.000000		

Null Hypothesis: DIAMONDMKTRTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.173919	0.0000
Test critical values:	1% level	-3.484198	
	5% level	-2.885051	
	10% level	-2.579386	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DIAMONDMKTRTN)
Method: Least Squares
Date: 01/09/17 Time: 14:37
Sample (adjusted): 4 126
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DIAMONDMKTRTN(-1)	-0.601357	0.083826	-7.173919	0.0000
C	0.000138	0.001046	0.132315	0.8950

R-squared	0.298409	Mean dependent var	-0.000117
Adjusted R-squared	0.292611	S.D. dependent var	0.013779
S.E. of regression	0.011589	Akaike info criterion	-6.061400
Sum squared resid	0.016251	Schwarz criterion	-6.015674
Log likelihood	374.7761	Hannan-Quinn criter.	-6.042826
F-statistic	51.46512	Durbin-Watson stat	1.901794
Prob(F-statistic)	0.000000		

Null Hypothesis: DIAMONDSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.14893	0.0000
Test critical values:	1% level	-3.484198	
	5% level	-2.885051	
	10% level	-2.579386	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DIAMONDSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 14:46
Sample (adjusted): 4 126
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DIAMONDSHARTN(-1)	-1.020092	0.091497	-11.14893	0.0000
C	-0.000358	0.002750	-0.130196	0.8966

R-squared	0.506724	Mean dependent var	0.000472
Adjusted R-squared	0.502647	S.D. dependent var	0.043236
S.E. of regression	0.030492	Akaike info criterion	-4.126609
Sum squared resid	0.112498	Schwarz criterion	-4.080883
Log likelihood	255.7865	Hannan-Quinn criter.	-4.108035
F-statistic	124.2987	Durbin-Watson stat	1.988334
Prob(F-statistic)	0.000000		

Null Hypothesis: ETISHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.58236	0.0000
Test critical values:	1% level	-3.484198	
	5% level	-2.885051	
	10% level	-2.579386	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ETISHARTN)
Method: Least Squares
Date: 01/09/17 Time: 14:47
Sample (adjusted): 4 126
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ETISHARTN(-1)	-0.968161	0.091488	-10.58236	0.0000
C	0.002387	0.002212	1.079137	0.2827

R-squared	0.480656	Mean dependent var	-0.000163
Adjusted R-squared	0.476364	S.D. dependent var	0.033695
S.E. of regression	0.024382	Akaike info criterion	-4.573783
Sum squared resid	0.071935	Schwarz criterion	-4.528057
Log likelihood	283.2877	Hannan-Quinn criter.	-4.555209
F-statistic	111.9864	Durbin-Watson stat	1.980157
Prob(F-statistic)	0.000000		

Null Hypothesis: FBNSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.698967	0.0000
Test critical values:	1% level	-3.484198	
	5% level	-2.885051	
	10% level	-2.579386	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FBNSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 14:49
Sample (adjusted): 4 126
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FBNSHARTN(-1)	-0.872965	0.090006	-9.698967	0.0000
C	9.97E-05	0.002169	0.045951	0.9634

R-squared	0.437392	Mean dependent var	4.46E-05
Adjusted R-squared	0.432743	S.D. dependent var	0.031939
S.E. of regression	0.024056	Akaike info criterion	-4.600770
Sum squared resid	0.070019	Schwarz criterion	-4.555043
Log likelihood	284.9473	Hannan-Quinn criter.	-4.582196
F-statistic	94.06996	Durbin-Watson stat	2.007021
Prob(F-statistic)	0.000000		

Null Hypothesis: FCMBSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.05632	0.0000
Test critical values:	1% level	-3.484198	
	5% level	-2.885051	
	10% level	-2.579386	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FCMBSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 14:50
Sample (adjusted): 4 126
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

FCMBSHARTN(-1)	-1.041700	0.094218	-11.05632	0.0000
C	0.002798	0.002480	1.128418	0.2614

R-squared	0.502553	Mean dependent var	0.000564
Adjusted R-squared	0.498442	S.D. dependent var	0.038700
S.E. of regression	0.027408	Akaike info criterion	-4.339860
Sum squared resid	0.090893	Schwarz criterion	-4.294133
Log likelihood	268.9014	Hannan-Quinn criter.	-4.321286
F-statistic	122.2422	Durbin-Watson stat	1.925893
Prob(F-statistic)	0.000000		

Null Hypothesis: FIDELITYSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.982194	0.0000
Test critical values:	1% level	-3.484198	
	5% level	-2.885051	
	10% level	-2.579386	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FIDELITYSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 14:51
Sample (adjusted): 4 126
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FIDELITYSHARTN(-1)	-0.800078	0.089074	-8.982194	0.0000
C	0.001154	0.002818	0.409340	0.6830

R-squared	0.400039	Mean dependent var	-3.93E-19
Adjusted R-squared	0.395081	S.D. dependent var	0.040141
S.E. of regression	0.031220	Akaike info criterion	-4.079371
Sum squared resid	0.117939	Schwarz criterion	-4.033644
Log likelihood	252.8813	Hannan-Quinn criter.	-4.060797
F-statistic	80.67981	Durbin-Watson stat	2.001007
Prob(F-statistic)	0.000000		

Null Hypothesis: GTBSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.206168	0.0000
Test critical values:	1% level	-3.484198	
	5% level	-2.885051	
	10% level	-2.579386	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GTBSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 14:52
Sample (adjusted): 4 126
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GTBSHARTN(-1)	-0.704861	0.085894	-8.206168	0.0000
C	0.001066	0.002678	0.398174	0.6912

R-squared	0.357549	Mean dependent var	-0.000463
Adjusted R-squared	0.352239	S.D. dependent var	0.036814
S.E. of regression	0.029629	Akaike info criterion	-4.183976
Sum squared resid	0.106226	Schwarz criterion	-4.138249
Log likelihood	259.3145	Hannan-Quinn criter.	-4.165402
F-statistic	67.34120	Durbin-Watson stat	1.901234
Prob(F-statistic)	0.000000		

Null Hypothesis: SKYSHARTN has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.071156	0.0000
Test critical values:	1% level	-3.484653	
	5% level	-2.885249	
	10% level	-2.579491	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SKYSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 14:53
Sample (adjusted): 5 126
Included observations: 122 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SKYSHARTN(-1)	-1.049452	0.115691	-9.071156	0.0000
D(SKYSHARTN(-1))	0.250164	0.088884	2.814503	0.0057
C	-0.000355	0.003014	-0.117661	0.9065

R-squared	0.452408	Mean dependent var	-0.000271
Adjusted R-squared	0.443205	S.D. dependent var	0.044610
S.E. of regression	0.033287	Akaike info criterion	-3.942999
Sum squared resid	0.131857	Schwarz criterion	-3.874047
Log likelihood	243.5229	Hannan-Quinn criter.	-3.914993
F-statistic	49.15760	Durbin-Watson stat	2.064683
Prob(F-statistic)	0.000000		

Null Hypothesis: STANBICSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.68574	0.0000
Test critical values:	1% level	-3.484198	
	5% level	-2.885051	
	10% level	-2.579386	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(STANBICSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 14:54
Sample (adjusted): 4 126
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STANBICSHARTN(-1)	-1.136939	0.089623	-12.68574	0.0000
C	-0.001500	0.002087	-0.718756	0.4737

R-squared	0.570812	Mean dependent var	0.000313
Adjusted R-squared	0.567265	S.D. dependent var	0.035101
S.E. of regression	0.023090	Akaike info criterion	-4.682694
Sum squared resid	0.064512	Schwarz criterion	-4.636968
Log likelihood	289.9857	Hannan-Quinn criter.	-4.664120
F-statistic	160.9279	Durbin-Watson stat	2.010309
Prob(F-statistic)	0.000000		

Null Hypothesis: STERLINGSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.57436	0.0000
Test critical values:	1% level	-3.484198	
	5% level	-2.885051	
	10% level	-2.579386	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(STERLINGSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 14:54
Sample (adjusted): 4 126
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STERLINGSHARTN(-1)	-0.953542	0.090175	-10.57436	0.0000
C	-0.000784	0.002024	-0.387452	0.6991

R-squared	0.480279	Mean dependent var	-0.000431
Adjusted R-squared	0.475983	S.D. dependent var	0.031008
S.E. of regression	0.022447	Akaike info criterion	-4.739233
Sum squared resid	0.060966	Schwarz criterion	-4.693506
Log likelihood	293.4628	Hannan-Quinn criter.	-4.720659
F-statistic	111.8171	Durbin-Watson stat	1.988116
Prob(F-statistic)	0.000000		

Null Hypothesis: UBASHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.647651	0.0000
Test critical values:	1% level	-3.484198	
	5% level	-2.885051	
	10% level	-2.579386	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UBASHARTN)
Method: Least Squares
Date: 01/09/17 Time: 14:55
Sample (adjusted): 4 126
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UBASHARTN(-1)	-0.760359	0.087927	-8.647651	0.0000
C	0.000790	0.002872	0.275237	0.7836

R-squared	0.381965	Mean dependent var	-0.000206
Adjusted R-squared	0.376857	S.D. dependent var	0.040316
S.E. of regression	0.031825	Akaike info criterion	-4.041002
Sum squared resid	0.122553	Schwarz criterion	-3.995275
Log likelihood	250.5216	Hannan-Quinn criter.	-4.022428
F-statistic	74.78186	Durbin-Watson stat	1.948928
Prob(F-statistic)	0.000000		

Null Hypothesis: UBNSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.34618	0.0000
Test critical values:	1% level	-3.484198	
	5% level	-2.885051	
	10% level	-2.579386	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UBNSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 14:56
Sample (adjusted): 4 126
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UBNSHARTN(-1)	-1.017554	0.089683	-11.34618	0.0000
C	-0.000523	0.002440	-0.214226	0.8307

R-squared	0.515488	Mean dependent var	-0.000397
Adjusted R-squared	0.511484	S.D. dependent var	0.038714
S.E. of regression	0.027059	Akaike info criterion	-4.365482
Sum squared resid	0.088594	Schwarz criterion	-4.319755
Log likelihood	270.4771	Hannan-Quinn criter.	-4.346908
F-statistic	128.7358	Durbin-Watson stat	1.997507
Prob(F-statistic)	0.000000		

Null Hypothesis: ZENITHSHARTN has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.720158	0.0000
Test critical values:	1% level	-3.484198	
	5% level	-2.885051	
	10% level	-2.579386	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ZENITHSHARTN)
Method: Least Squares
Date: 01/09/17 Time: 14:57
Sample (adjusted): 4 126
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

ZENITHSHARTN(-1)	-0.659576	0.085436	-7.720158	0.0000
C	2.27E-05	0.002643	0.008592	0.9932

R-squared	0.330014	Mean dependent var	-0.000130
Adjusted R-squared	0.324477	S.D. dependent var	0.035669
S.E. of regression	0.029316	Akaike info criterion	-4.205219
Sum squared resid	0.103993	Schwarz criterion	-4.159492
Log likelihood	260.6210	Hannan-Quinn criter.	-4.186645
F-statistic	59.60083	Durbin-Watson stat	1.893278
Prob(F-statistic)	0.000000		

APPENDIX C
EVENT WINDOW SERIAL CORRELATION TEST OUTPUT

ACCESS

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.121305	Prob. F(5,28)	0.9865
Obs*R-squared	0.742081	Prob. Chi-Square(5)	0.9806

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 08:31
Sample: 3 37
Included observations: 35
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.82E-06	0.005620	-0.001392	0.9989
ACCESSMKTRTN	-0.019823	0.371552	-0.053351	0.9578
RESID(-1)	-0.006215	0.189586	-0.032784	0.9741
RESID(-2)	0.119839	0.191962	0.624283	0.5375
RESID(-3)	0.059090	0.195532	0.302202	0.7647
RESID(-4)	0.009395	0.203108	0.046258	0.9634
RESID(-5)	-0.072268	0.194724	-0.371127	0.7133

R-squared	0.021202	Mean dependent var	-1.35E-18
Adjusted R-squared	-0.188540	S.D. dependent var	0.030448
S.E. of regression	0.033195	Akaike info criterion	-3.796003
Sum squared resid	0.030853	Schwarz criterion	-3.484933
Log likelihood	73.43005	Hannan-Quinn criter.	-3.688622
F-statistic	0.101087	Durbin-Watson stat	1.965465
Prob(F-statistic)	0.995661		

DIAMOND AR(2)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.073530	Prob. F(5,24)	0.3996
Obs*R-squared	6.031550	Prob. Chi-Square(5)	0.3032

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 08:34
Sample: 5 37
Included observations: 33
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003468	0.009919	0.349621	0.7297
DIAMONDMKTRTN	0.121376	0.249608	0.486266	0.6312
AR(1)	0.565914	0.443145	1.277040	0.2138
AR(2)	-0.055470	0.348088	-0.159356	0.8747

RESID(-1)	-0.650916	0.520981	-1.249406	0.2236
RESID(-2)	-0.143181	0.522483	-0.274039	0.7864
RESID(-3)	-0.387806	0.308928	-1.255329	0.2214
RESID(-4)	0.097218	0.261595	0.371634	0.7134
RESID(-5)	-0.035824	0.243896	-0.146881	0.8845

R-squared	0.182774	Mean dependent var	7.58E-15
Adjusted R-squared	-0.089634	S.D. dependent var	0.023662
S.E. of regression	0.024700	Akaike info criterion	-4.337008
Sum squared resid	0.014642	Schwarz criterion	-3.928870
Log likelihood	80.56063	Hannan-Quinn criter.	-4.199682
F-statistic	0.670956	Durbin-Watson stat	1.995905
Prob(F-statistic)	0.711805		

ETI

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.694252	Prob. F(5,28)	0.6321
Obs*R-squared	3.860479	Prob. Chi-Square(5)	0.5697

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 08:39
Sample: 3 37
Included observations: 35
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.002970	0.005210	-0.570145	0.5731
ETIMKTRTN	0.063403	0.275334	0.230275	0.8196
RESID(-1)	-0.499084	0.284351	-1.755168	0.0902
RESID(-2)	-0.124747	0.296596	-0.420596	0.6773
RESID(-3)	-0.155225	0.292985	-0.529805	0.6004
RESID(-4)	-0.224059	0.296306	-0.756176	0.4559
RESID(-5)	0.016861	0.287906	0.058563	0.9537

R-squared	0.110299	Mean dependent var	7.93E-19
Adjusted R-squared	-0.080351	S.D. dependent var	0.026043
S.E. of regression	0.027070	Akaike info criterion	-4.203957
Sum squared resid	0.020517	Schwarz criterion	-3.892887
Log likelihood	80.56924	Hannan-Quinn criter.	-4.096575
F-statistic	0.578544	Durbin-Watson stat	1.517391
Prob(F-statistic)	0.744152		

FBN

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.498104	Prob. F(5,28)	0.7749
Obs*R-squared	2.858863	Prob. Chi-Square(5)	0.7217

Test Equation:
Dependent Variable: RESID
Method: Least Squares

Date: 01/09/17 Time: 08:41
Sample: 3 37
Included observations: 35
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.38E-05	0.005328	0.011980	0.9905
FBNMKTRTN	-0.022219	0.321830	-0.069040	0.9454
RESID(-1)	-0.076782	0.189342	-0.405519	0.6882
RESID(-2)	0.064834	0.186774	0.347127	0.7311
RESID(-3)	0.170436	0.183437	0.929122	0.3608
RESID(-4)	0.221277	0.186410	1.187041	0.2452
RESID(-5)	-0.054536	0.190072	-0.286923	0.7763

R-squared	0.081682	Mean dependent var	9.91E-20
Adjusted R-squared	-0.115101	S.D. dependent var	0.029800
S.E. of regression	0.031469	Akaike info criterion	-3.902800
Sum squared resid	0.027728	Schwarz criterion	-3.591731
Log likelihood	75.29901	Hannan-Quinn criter.	-3.795419
F-statistic	0.415087	Durbin-Watson stat	1.874538
Prob(F-statistic)	0.862679		

FCMB

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.063463	Prob. F(5,28)	0.1001
Obs*R-squared	9.424095	Prob. Chi-Square(5)	0.0933

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 08:44
Sample: 3 37
Included observations: 35
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000194	0.005261	0.036811	0.9709
FCMBMKTRTN	0.051657	0.325157	0.158868	0.8749
RESID(-1)	-0.107189	0.195698	-0.547726	0.5882
RESID(-2)	0.015284	0.179118	0.085329	0.9326
RESID(-3)	0.008918	0.180313	0.049460	0.9609
RESID(-4)	0.483519	0.182463	2.649963	0.0131
RESID(-5)	-0.183045	0.207984	-0.880093	0.3863

R-squared	0.269260	Mean dependent var	-2.38E-18
Adjusted R-squared	0.112673	S.D. dependent var	0.032791
S.E. of regression	0.030889	Akaike info criterion	-3.939989
Sum squared resid	0.026715	Schwarz criterion	-3.628919
Log likelihood	75.94980	Hannan-Quinn criter.	-3.832607
F-statistic	1.719552	Durbin-Watson stat	2.010298
Prob(F-statistic)	0.153278		

FIDELITY

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.014419	Prob. F(5,28)	0.4278
Obs*R-squared	5.367766	Prob. Chi-Square(5)	0.3727

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 08:46
Sample: 3 37
Included observations: 35
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000349	0.004758	0.073377	0.9420
FIDELITYMKTRTN	0.152823	0.294919	0.518185	0.6084
RESID(-1)	-0.054422	0.194718	-0.279491	0.7819
RESID(-2)	0.084102	0.195105	0.431057	0.6697
RESID(-3)	0.378950	0.190112	1.993302	0.0561
RESID(-4)	0.146710	0.197316	0.743525	0.4634
RESID(-5)	-0.084269	0.197738	-0.426164	0.6732

R-squared	0.153365	Mean dependent var	-1.39E-18
Adjusted R-squared	-0.028057	S.D. dependent var	0.027659
S.E. of regression	0.028044	Akaike info criterion	-4.133237
Sum squared resid	0.022021	Schwarz criterion	-3.822168
Log likelihood	79.33166	Hannan-Quinn criter.	-4.025856
F-statistic	0.845349	Durbin-Watson stat	2.030707
Prob(F-statistic)	0.546055		

GT

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.017604	Prob. F(5,28)	0.9999
Obs*R-squared	0.109680	Prob. Chi-Square(5)	0.9998

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 08:49
Sample: 3 37
Included observations: 35
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.38E-06	0.004198	-0.000328	0.9997
GTBMKTRTN	0.023431	0.266860	0.087801	0.9307
RESID(-1)	-0.033506	0.197540	-0.169616	0.8665
RESID(-2)	0.000288	0.189718	0.001515	0.9988
RESID(-3)	0.008522	0.190463	0.044742	0.9646
RESID(-4)	0.017725	0.191302	0.092656	0.9268
RESID(-5)	0.045825	0.195496	0.234405	0.8164

R-squared	0.003134	Mean dependent var	-5.70E-19
Adjusted R-squared	-0.210480	S.D. dependent var	0.022523
S.E. of regression	0.024780	Akaike info criterion	-4.380681

Sum squared resid	0.017194	Schwarz criterion	-4.069611
Log likelihood	83.66191	Hannan-Quinn criter.	-4.273299
F-statistic	0.014670	Durbin-Watson stat	1.969732
Prob(F-statistic)	0.999983		

SKY

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.524991	Prob. F(5,28)	0.7553
Obs*R-squared	2.999955	Prob. Chi-Square(5)	0.7000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 08:52
Sample: 3 37
Included observations: 35
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.89E-05	0.006667	0.007330	0.9942
SKYMKTRTN	-0.042968	0.450730	-0.095330	0.9247
RESID(-1)	0.235197	0.192454	1.222096	0.2319
RESID(-2)	0.131793	0.194333	0.678182	0.5032
RESID(-3)	-0.028810	0.199618	-0.144327	0.8863
RESID(-4)	0.009875	0.202020	0.048880	0.9614
RESID(-5)	0.003928	0.199927	0.019645	0.9845

R-squared	0.085713	Mean dependent var	-1.31E-18
Adjusted R-squared	-0.110206	S.D. dependent var	0.037372
S.E. of regression	0.039377	Akaike info criterion	-3.454398
Sum squared resid	0.043416	Schwarz criterion	-3.143329
Log likelihood	67.45197	Hannan-Quinn criter.	-3.347017
F-statistic	0.437493	Durbin-Watson stat	1.976913
Prob(F-statistic)	0.847452		

STANBIC AR(1)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.603202	Prob. F(5,26)	0.1944
Obs*R-squared	8.012236	Prob. Chi-Square(5)	0.1556

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 08:54
Sample: 4 37
Included observations: 34
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002852	0.007042	0.405044	0.6888
STANBICMKTRTN	0.090366	0.266046	0.339662	0.7368
AR(1)	1.499807	1.093016	1.372172	0.1817
RESID(-1)	-1.746023	1.134430	-1.539119	0.1359
RESID(-2)	-0.247610	0.469825	-0.527025	0.6026
RESID(-3)	0.007850	0.263779	0.029759	0.9765
RESID(-4)	-0.039129	0.206137	-0.189819	0.8509
RESID(-5)	0.000959	0.205806	0.004658	0.9963

R-squared	0.235654	Mean dependent var	7.54E-16
Adjusted R-squared	0.029869	S.D. dependent var	0.024972
S.E. of regression	0.024596	Akaike info criterion	-4.370148
Sum squared resid	0.015729	Schwarz criterion	-4.011004
Log likelihood	82.29251	Hannan-Quinn criter.	-4.247669
F-statistic	1.145144	Durbin-Watson stat	1.997668
Prob(F-statistic)	0.366706		

STERLING

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.094599	Prob. F(5,28)	0.3853
Obs*R-squared	5.722669	Prob. Chi-Square(5)	0.3341

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 21:46
Sample: 3 37
Included observations: 35
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000649	0.003365	0.192886	0.8484
STERLINGMKTRTN	0.058313	0.194116	0.300404	0.7661
RESID(-1)	-0.325556	0.198413	-1.640799	0.1120
RESID(-2)	-0.376380	0.220993	-1.703131	0.0996
RESID(-3)	-0.119790	0.231322	-0.517849	0.6086
RESID(-4)	0.073566	0.219696	0.334853	0.7402
RESID(-5)	0.089928	0.204881	0.438928	0.6641

R-squared	0.163505	Mean dependent var	-3.97E-19
Adjusted R-squared	-0.015744	S.D. dependent var	0.019117
S.E. of regression	0.019267	Akaike info criterion	-4.884023
Sum squared resid	0.010394	Schwarz criterion	-4.572954
Log likelihood	92.47041	Hannan-Quinn criter.	-4.776642
F-statistic	0.912166	Durbin-Watson stat	1.910323

Prob(F-statistic)	0.500659

UBA AR(2)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.230560	Prob. F(5,24)	0.3256
Obs*R-squared	6.733783	Prob. Chi-Square(5)	0.2412

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 03:20
Sample: 5 37
Included observations: 33
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002994	0.009338	0.320656	0.7512
UBAMKTRTN	0.100248	0.224786	0.445973	0.6596
AR(1)	0.371663	0.281112	1.322119	0.1986
AR(2)	-0.132589	0.286699	-0.462467	0.6479
RESID(-1)	-0.519039	0.340573	-1.524019	0.1406
RESID(-2)	-0.295966	0.314780	-0.940234	0.3565
RESID(-3)	0.129047	0.269663	0.478551	0.6366
RESID(-4)	0.125206	0.218427	0.573219	0.5718
RESID(-5)	-0.144572	0.217473	-0.664782	0.5125

R-squared	0.204054	Mean dependent var	9.33E-15
Adjusted R-squared	-0.061261	S.D. dependent var	0.023378
S.E. of regression	0.024083	Akaike info criterion	-4.387595
Sum squared resid	0.013920	Schwarz criterion	-3.979456
Log likelihood	81.39531	Hannan-Quinn criter.	-4.250269
F-statistic	0.769100	Durbin-Watson stat	1.943417
Prob(F-statistic)	0.632916		

UBN

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.308137	Prob. F(5,28)	0.2890
Obs*R-squared	6.627660	Prob. Chi-Square(5)	0.2498

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 03:25
Sample: 3 37
Included observations: 35
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.49E-05	0.004615	0.005405	0.9957
UBNMKTRTN	0.045570	0.315664	0.144363	0.8862

RESID(-1)	-0.324432	0.188972	-1.716825	0.0971
RESID(-2)	-0.024852	0.192493	-0.129105	0.8982
RESID(-3)	-0.112952	0.194077	-0.581998	0.5652
RESID(-4)	-0.381768	0.207973	-1.835663	0.0770
RESID(-5)	-0.097893	0.231614	-0.422654	0.6758

R-squared	0.189362	Mean dependent var	-1.26E-18
Adjusted R-squared	0.015654	S.D. dependent var	0.027350
S.E. of regression	0.027135	Akaike info criterion	-4.199111
Sum squared resid	0.020617	Schwarz criterion	-3.888041
Log likelihood	80.48444	Hannan-Quinn criter.	-4.091730
F-statistic	1.090114	Durbin-Watson stat	1.960974
Prob(F-statistic)	0.392426		

ZENITH

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.004677	Prob. F(5,28)	0.4333
Obs*R-squared	5.324061	Prob. Chi-Square(5)	0.3776

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 03:33
Sample: 3 37
Included observations: 35
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000836	0.005081	-0.164490	0.8705
ZENITHMKTRTN	0.320386	0.337456	0.949416	0.3505
RESID(-1)	-0.108216	0.185420	-0.583630	0.5641
RESID(-2)	0.164196	0.178518	0.919776	0.3655
RESID(-3)	0.213648	0.182416	1.171215	0.2514
RESID(-4)	-0.015149	0.182294	-0.083104	0.9344
RESID(-5)	-0.382531	0.194116	-1.970634	0.0587

R-squared	0.152116	Mean dependent var	1.33E-18
Adjusted R-squared	-0.029573	S.D. dependent var	0.029413
S.E. of regression	0.029845	Akaike info criterion	-4.008762
Sum squared resid	0.024940	Schwarz criterion	-3.697692
Log likelihood	77.15334	Hannan-Quinn criter.	-3.901381
F-statistic	0.837231	Durbin-Watson stat	1.852413
Prob(F-statistic)	0.551729		

APPENDIX D

ESTIMATION WINDOW SERIAL CORRELATION TEST OUTPUT

ACESS

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.723545	Prob. F(5,117)	0.1345
Obs*R-squared	8.506745	Prob. Chi-Square(5)	0.1304

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 15:02
Sample: 3 126
Included observations: 124
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.00E-05	0.002458	0.020322	0.9838
ACESSMKTRTN	0.000637	0.214784	0.002964	0.9976
RESID(-1)	0.134393	0.098794	1.360340	0.1763
RESID(-2)	-0.219804	0.097663	-2.250647	0.0263
RESID(-3)	0.077306	0.098467	0.785100	0.4340
RESID(-4)	-0.022438	0.096238	-0.233154	0.8160
RESID(-5)	-0.104888	0.095424	-1.099176	0.2739

R-squared	0.068603	Mean dependent var	4.48E-19
Adjusted R-squared	0.020839	S.D. dependent var	0.027645
S.E. of regression	0.027356	Akaike info criterion	-4.304981
Sum squared resid	0.087556	Schwarz criterion	-4.145771
Log likelihood	273.9088	Hannan-Quinn criter.	-4.240306
F-statistic	1.436288	Durbin-Watson stat	1.980232
Prob(F-statistic)	0.206586		

DIAMOND

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.545052	Prob. F(5,117)	0.1812
Obs*R-squared	7.680338	Prob. Chi-Square(5)	0.1748

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 15:21
Sample: 3 126
Included observations: 124
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000151	0.002322	-0.065123	0.9482
DIAMONDMKTRTN	-0.114645	0.192608	-0.595221	0.5528
RESID(-1)	-0.141182	0.096056	-1.469793	0.1443
RESID(-2)	-0.213197	0.095033	-2.243408	0.0268
RESID(-3)	-0.117322	0.096491	-1.215889	0.2265
RESID(-4)	-0.085661	0.094862	-0.903012	0.3684
RESID(-5)	-0.115264	0.094685	-1.217331	0.2259

R-squared	0.061938	Mean dependent var	5.60E-19
Adjusted R-squared	0.013832	S.D. dependent var	0.026023
S.E. of regression	0.025843	Akaike info criterion	-4.418788
Sum squared resid	0.078137	Schwarz criterion	-4.259579
Log likelihood	280.9649	Hannan-Quinn criter.	-4.354113
F-statistic	1.287543	Durbin-Watson stat	1.995932
Prob(F-statistic)	0.268300		

ETI AR(1-3)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.016464	Prob. F(5,111)	0.0817
Obs*R-squared	10.07546	Prob. Chi-Square(5)	0.0731

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 15:43
Sample: 6 126
Included observations: 121
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000122	0.001686	0.072178	0.9426
ETIMKTRTN	-0.045692	0.167970	-0.272027	0.7861
AR(1)	0.816624	2.017636	0.404743	0.6864
AR(2)	-1.288547	1.987124	-0.648449	0.5180
AR(3)	0.171749	0.508209	0.337950	0.7360
RESID(-1)	-0.794583	2.011158	-0.395087	0.6935
RESID(-2)	1.250978	1.985693	0.629996	0.5300
RESID(-3)	-0.195717	0.519881	-0.376465	0.7073
RESID(-4)	0.173326	0.360505	0.480786	0.6316
RESID(-5)	-0.494530	0.359694	-1.374862	0.1719

R-squared	0.083268	Mean dependent var	1.13E-14
Adjusted R-squared	0.008939	S.D. dependent var	0.022659
S.E. of regression	0.022558	Akaike info criterion	-4.666462
Sum squared resid	0.056482	Schwarz criterion	-4.435405

Log likelihood	292.3210	Hannan-Quinn criter.	-4.572621
F-statistic	1.120258	Durbin-Watson stat	2.003537
Prob(F-statistic)	0.354545		

FBN (AR 1)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.701506	Prob. F(5,115)	0.1398
Obs*R-squared	8.472568	Prob. Chi-Square(5)	0.1320

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 17:58
Sample: 4 126
Included observations: 123
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.70E-05	0.002009	-0.033357	0.9734
FBNMKTRTN	-0.011417	0.147322	-0.077494	0.9384
AR(1)	-0.216068	0.695343	-0.310737	0.7566
RESID(-1)	0.219847	0.700970	0.313633	0.7544
RESID(-2)	0.116634	0.125070	0.932551	0.3530
RESID(-3)	0.064337	0.091389	0.703994	0.4829
RESID(-4)	0.074086	0.090971	0.814397	0.4171
RESID(-5)	-0.232564	0.090896	-2.558574	0.0118

R-squared	0.068883	Mean dependent var	2.29E-15
Adjusted R-squared	0.012206	S.D. dependent var	0.019543
S.E. of regression	0.019423	Akaike info criterion	-4.981838
Sum squared resid	0.043386	Schwarz criterion	-4.798931
Log likelihood	314.3830	Hannan-Quinn criter.	-4.907542
F-statistic	1.215361	Durbin-Watson stat	2.018429
Prob(F-statistic)	0.299972		

FCMB

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.444723	Prob. F(5,111)	0.2139
Obs*R-squared	7.393256	Prob. Chi-Square(5)	0.1930

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 18:01
Sample: 6 126
Included observations: 121
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	-6.57E-05	0.002360	-0.027845	0.9778
FCMBMKTRTN	-0.043591	0.161490	-0.269928	0.7877
AR(1)	0.498914	1.533821	0.325275	0.7456
AR(2)	-0.601552	1.369361	-0.439294	0.6613
AR(3)	-0.028228	0.737440	-0.038278	0.9695
RESID(-1)	-0.446572	1.548395	-0.288410	0.7736
RESID(-2)	0.760211	1.282640	0.592692	0.5546
RESID(-3)	-0.249259	0.525298	-0.474511	0.6361
RESID(-4)	-0.252969	0.386534	-0.654453	0.5142
RESID(-5)	0.257283	0.339243	0.758402	0.4498

R-squared	0.061101	Mean dependent var	1.92E-17
Adjusted R-squared	-0.015026	S.D. dependent var	0.024567
S.E. of regression	0.024751	Akaike info criterion	-4.480862
Sum squared resid	0.068001	Schwarz criterion	-4.249805
Log likelihood	281.0922	Hannan-Quinn criter.	-4.387021
F-statistic	0.802624	Durbin-Watson stat	1.874597
Prob(F-statistic)	0.614639		

FIDELITY

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.975935	Prob. F(5,117)	0.4355
Obs*R-squared	4.964565	Prob. Chi-Square(5)	0.4202

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 11:24
Sample: 3 126
Included observations: 124
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.53E-05	0.002588	-0.009764	0.9922
FIDELITYMKTRTN	0.061246	0.210888	0.290422	0.7720
RESID(-1)	0.023744	0.092857	0.255702	0.7986
RESID(-2)	-0.146636	0.092568	-1.584087	0.1159
RESID(-3)	0.085754	0.092408	0.927997	0.3553
RESID(-4)	-0.130827	0.092085	-1.420724	0.1581
RESID(-5)	-0.006518	0.092900	-0.070158	0.9442

R-squared	0.040037	Mean dependent var	1.44E-18
Adjusted R-squared	-0.009192	S.D. dependent var	0.028680
S.E. of regression	0.028811	Akaike info criterion	-4.201311
Sum squared resid	0.097120	Schwarz criterion	-4.042101
Log likelihood	267.4813	Hannan-Quinn criter.	-4.136636
F-statistic	0.813279	Durbin-Watson stat	2.009796
Prob(F-statistic)	0.561677		

GTB

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.735067	Prob. F(5,117)	0.5986
Obs*R-squared	3.776593	Prob. Chi-Square(5)	0.5820

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 11:28
Sample: 3 126
Included observations: 124
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.76E-05	0.001766	-0.009968	0.9921
GTBMKTRTN	0.019095	0.142403	0.134093	0.8936
RESID(-1)	-0.040203	0.092631	-0.434012	0.6651
RESID(-2)	-0.026021	0.092581	-0.281059	0.7792
RESID(-3)	-0.143274	0.091714	-1.562194	0.1209
RESID(-4)	0.038489	0.092610	0.415605	0.6785
RESID(-5)	0.074529	0.092955	0.801772	0.4243

R-squared	0.030456	Mean dependent var	-4.20E-19
Adjusted R-squared	-0.019264	S.D. dependent var	0.019467
S.E. of regression	0.019654	Akaike info criterion	-4.966265
Sum squared resid	0.045195	Schwarz criterion	-4.807056
Log likelihood	314.9084	Hannan-Quinn criter.	-4.901591
F-statistic	0.612556	Durbin-Watson stat	1.926042
Prob(F-statistic)	0.719868		

SKY AR(1-2)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.625903	Prob. F(5,113)	0.6803
Obs*R-squared	3.287713	Prob. Chi-Square(5)	0.6557

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 11:34
Sample: 5 126
Included observations: 122
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.12E-05	0.002594	0.027446	0.9782
SKYMKTRTN	-0.009998	0.225943	-0.044249	0.9648
AR(1)	0.763773	2.324768	0.328537	0.7431
AR(2)	-0.020958	0.772534	-0.027129	0.9784
RESID(-1)	-0.806059	2.325702	-0.346587	0.7295
RESID(-2)	-0.110323	0.624625	-0.176623	0.8601
RESID(-3)	0.048772	0.575395	0.084763	0.9326

RESID(-4)	-0.056610	0.173552	-0.326185	0.7449
RESID(-5)	0.002981	0.157365	0.018945	0.9849

R-squared	0.026948	Mean dependent var	6.07E-16
Adjusted R-squared	-0.041940	S.D. dependent var	0.029768
S.E. of regression	0.030385	Akaike info criterion	-4.078802
Sum squared resid	0.104330	Schwarz criterion	-3.871948
Log likelihood	257.8069	Hannan-Quinn criter.	-3.994784
F-statistic	0.391189	Durbin-Watson stat	1.982886
Prob(F-statistic)	0.923367		

STANBIC –AR(1)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.636050	Prob. F(5,115)	0.1560
Obs*R-squared	8.168278	Prob. Chi-Square(5)	0.1472

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 11:49
Sample: 4 126
Included observations: 123
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.90E-05	0.001641	-0.035935	0.9714
STANBICMKTRTN	-0.141837	0.155100	-0.914487	0.3624
AR(1)	-0.829281	0.756597	-1.096067	0.2753
RESID(-1)	0.781628	0.764060	1.022994	0.3085
RESID(-2)	-0.368369	0.172037	-2.141213	0.0344
RESID(-3)	-0.051125	0.099495	-0.513845	0.6083
RESID(-4)	-0.132323	0.095473	-1.385969	0.1684
RESID(-5)	-0.119104	0.096270	-1.237184	0.2185

R-squared	0.066409	Mean dependent var	1.25E-16
Adjusted R-squared	0.009581	S.D. dependent var	0.021698
S.E. of regression	0.021594	Akaike info criterion	-4.769995
Sum squared resid	0.053623	Schwarz criterion	-4.587088
Log likelihood	301.3547	Hannan-Quinn criter.	-4.695699
F-statistic	1.168607	Durbin-Watson stat	2.028815
Prob(F-statistic)	0.326278		

STARLING

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.469533	Prob. F(5,117)	0.7983
Obs*R-squared	2.439179	Prob. Chi-Square(5)	0.7856

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 11:52
Sample: 3 126

Included observations: 124
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.25E-05	0.001903	0.043343	0.9655
STERLINMKTRTN	0.014721	0.156639	0.093980	0.9253
RESID(-1)	-0.028184	0.093219	-0.302339	0.7629
RESID(-2)	-0.080189	0.092954	-0.862683	0.3901
RESID(-3)	-0.061870	0.093306	-0.663085	0.5086
RESID(-4)	-0.107904	0.093057	-1.159548	0.2486
RESID(-5)	-0.011525	0.095623	-0.120525	0.9043

R-squared	0.019671	Mean dependent var	5.04E-19
Adjusted R-squared	-0.030602	S.D. dependent var	0.020861
S.E. of regression	0.021178	Akaike info criterion	-4.816900
Sum squared resid	0.052476	Schwarz criterion	-4.657690
Log likelihood	305.6478	Hannan-Quinn criter.	-4.752225
F-statistic	0.391277	Durbin-Watson stat	1.974671
Prob(F-statistic)	0.883381		

UBA

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.424387	Prob. F(5,117)	0.2205
Obs*R-squared	7.114939	Prob. Chi-Square(5)	0.2122

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 12:05
Sample: 3 126
Included observations: 124
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000157	0.002404	-0.065223	0.9481
UBAMKTRTN	-0.054622	0.195776	-0.279004	0.7807
RESID(-1)	0.070685	0.093080	0.759401	0.4491
RESID(-2)	-0.185577	0.092844	-1.998811	0.0479
RESID(-3)	-0.072203	0.094289	-0.765764	0.4454
RESID(-4)	-0.133280	0.093759	-1.421522	0.1578
RESID(-5)	-0.006361	0.095303	-0.066742	0.9469

R-squared	0.057379	Mean dependent var	1.62E-18
Adjusted R-squared	0.009039	S.D. dependent var	0.026852
S.E. of regression	0.026730	Akaike info criterion	-4.351240
Sum squared resid	0.083598	Schwarz criterion	-4.192030
Log likelihood	276.7769	Hannan-Quinn criter.	-4.286565
F-statistic	1.186989	Durbin-Watson stat	1.977572
Prob(F-statistic)	0.318034		

UBN

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.826727	Prob. F(5,117)	0.5331

Obs*R-squared	4.231448	Prob. Chi-Square(5)	0.5166

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 12:09
Sample: 3 126
Included observations: 124
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.11E-05	0.002353	0.008972	0.9929
UBNMKTRTN	0.038014	0.194855	0.195088	0.8457
RESID(-1)	-0.038679	0.092385	-0.418679	0.6762
RESID(-2)	0.104631	0.092365	1.132807	0.2596
RESID(-3)	-0.082327	0.095141	-0.865313	0.3886
RESID(-4)	0.050863	0.094240	0.539717	0.5904
RESID(-5)	-0.067181	0.095046	-0.706823	0.4811

R-squared	0.034125	Mean dependent var	-1.55E-18
Adjusted R-squared	-0.015407	S.D. dependent var	0.025988
S.E. of regression	0.026187	Akaike info criterion	-4.392278
Sum squared resid	0.080237	Schwarz criterion	-4.233068
Log likelihood	279.3212	Hannan-Quinn criter.	-4.327603
F-statistic	0.688939	Durbin-Watson stat	1.991814
Prob(F-statistic)	0.658935		

ZENITH

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.781528	Prob. F(5,117)	0.1219
Obs*R-squared	8.772678	Prob. Chi-Square(5)	0.1185

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/09/17 Time: 12:12
Sample: 3 126
Included observations: 124
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000101	0.002588	0.038939	0.9690
ZENITHMKTRTN	-0.349194	0.294292	-1.186556	0.2378
RESID(-1)	0.279735	0.118748	2.355694	0.0202
RESID(-2)	-0.077304	0.099219	-0.779130	0.4375
RESID(-3)	-0.052091	0.095184	-0.547269	0.5852
RESID(-4)	0.110435	0.094466	1.169044	0.2448
RESID(-5)	0.024509	0.093677	0.261636	0.7941

R-squared	0.070747	Mean dependent var	7.34E-19
Adjusted R-squared	0.023093	S.D. dependent var	0.029138
S.E. of regression	0.028799	Akaike info criterion	-4.202123
Sum squared resid	0.097041	Schwarz criterion	-4.042914
Log likelihood	267.5316	Hannan-Quinn criter.	-4.137449
F-statistic	1.484606	Durbin-Watson stat	2.011798
Prob(F-statistic)	0.189350		

APPENDIX E
EVENT WINDOW HETEROSKEDATICITY TEST OUTPUT

ACCESS

Heteroskedasticity Test: ARCH

F-statistic	0.472943	Prob. F(5,24)	0.7927
Obs*R-squared	2.690773	Prob. Chi-Square(5)	0.7475

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 08:31
Sample (adjusted): 8 37
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001190	0.000548	2.170935	0.0401
RESID^2(-1)	0.212346	0.202660	1.047797	0.3052
RESID^2(-2)	-0.175316	0.206783	-0.847824	0.4049
RESID^2(-3)	-0.060772	0.209487	-0.290099	0.7742
RESID^2(-4)	-0.075748	0.205970	-0.367761	0.7163
RESID^2(-5)	-0.096345	0.204129	-0.471980	0.6412

R-squared	0.089692	Mean dependent var	0.000981
Adjusted R-squared	-0.099955	S.D. dependent var	0.001641
S.E. of regression	0.001721	Akaike info criterion	-9.714465
Sum squared resid	7.11E-05	Schwarz criterion	-9.434226
Log likelihood	151.7170	Hannan-Quinn criter.	-9.624814
F-statistic	0.472943	Durbin-Watson stat	1.943846
Prob(F-statistic)	0.792669		

DIAMOND

Heteroskedasticity Test: ARCH

F-statistic	0.793794	Prob. F(5,22)	0.5656
Obs*R-squared	4.279384	Prob. Chi-Square(5)	0.5099

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 08:37
Sample (adjusted): 10 37
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000737	0.000321	2.295593	0.0316
RESID^2(-1)	-0.105443	0.214815	-0.490857	0.6284
RESID^2(-2)	-0.391355	0.223271	-1.752825	0.0936
RESID^2(-3)	0.103178	0.231643	0.445417	0.6604

RESID^2(-4)	-0.045707	0.223389	-0.204608	0.8398
RESID^2(-5)	0.015666	0.225206	0.069561	0.9452

R-squared	0.152835	Mean dependent var	0.000513
Adjusted R-squared	-0.039702	S.D. dependent var	0.000410
S.E. of regression	0.000418	Akaike info criterion	-12.53482
Sum squared resid	3.84E-06	Schwarz criterion	-12.24935
Log likelihood	181.4875	Hannan-Quinn criter.	-12.44755
F-statistic	0.793794	Durbin-Watson stat	1.991261
Prob(F-statistic)	0.565638		

ETI

Heteroskedasticity Test: ARCH

F-statistic	0.325527	Prob. F(5,24)	0.8926
Obs*R-squared	1.905328	Prob. Chi-Square(5)	0.8621

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 08:40
Sample (adjusted): 8 37
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001278	0.000876	1.459580	0.1574
RESID^2(-1)	0.612779	1.429744	0.428594	0.6720
RESID^2(-2)	-0.556739	1.348577	-0.412835	0.6834
RESID^2(-3)	-1.049922	1.413475	-0.742795	0.4648
RESID^2(-4)	-0.601472	0.969829	-0.620184	0.5410
RESID^2(-5)	-0.316936	1.002424	-0.316170	0.7546

R-squared	0.063511	Mean dependent var	0.000687
Adjusted R-squared	-0.131591	S.D. dependent var	0.002209
S.E. of regression	0.002349	Akaike info criterion	-9.092387
Sum squared resid	0.000132	Schwarz criterion	-8.812148
Log likelihood	142.3858	Hannan-Quinn criter.	-9.002736
F-statistic	0.325527	Durbin-Watson stat	1.146886
Prob(F-statistic)	0.892601		

FBN

Heteroskedasticity Test: ARCH

F-statistic	1.243837	Prob. F(5,24)	0.3200
Obs*R-squared	6.174076	Prob. Chi-Square(5)	0.2896

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 08:42
Sample (adjusted): 8 37
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000602	0.000491	1.224983	0.2325
RESID^2(-1)	0.155951	0.197314	0.790370	0.4371
RESID^2(-2)	-0.155088	0.201933	-0.768018	0.4500
RESID^2(-3)	-0.146880	0.193072	-0.760749	0.4542
RESID^2(-4)	0.048631	0.193819	0.250909	0.8040
RESID^2(-5)	0.268319	0.180763	1.484366	0.1507

R-squared	0.205803	Mean dependent var	0.000778
Adjusted R-squared	0.040345	S.D. dependent var	0.001235
S.E. of regression	0.001209	Akaike info criterion	-10.42037
Sum squared resid	3.51E-05	Schwarz criterion	-10.14014
Log likelihood	162.3056	Hannan-Quinn criter.	-10.33072
F-statistic	1.243837	Durbin-Watson stat	1.937790
Prob(F-statistic)	0.319955		

FCMB

Heteroskedasticity Test: ARCH

F-statistic	0.502970	Prob. F(5,24)	0.7710
Obs*R-squared	2.845406	Prob. Chi-Square(5)	0.7238

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 08:45
Sample (adjusted): 8 37
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001585	0.000584	2.713019	0.0121
RESID^2(-1)	0.069357	0.216855	0.319829	0.7519
RESID^2(-2)	-0.238539	0.214329	-1.112961	0.2767
RESID^2(-3)	-0.139837	0.219673	-0.636570	0.5304
RESID^2(-4)	0.046197	0.214608	0.215263	0.8314
RESID^2(-5)	-0.187217	0.214457	-0.872981	0.3913

R-squared	0.094847	Mean dependent var	0.001128
Adjusted R-squared	-0.093727	S.D. dependent var	0.001239
S.E. of regression	0.001296	Akaike info criterion	-10.28291
Sum squared resid	4.03E-05	Schwarz criterion	-10.00267
Log likelihood	160.2436	Hannan-Quinn criter.	-10.19325
F-statistic	0.502970	Durbin-Watson stat	1.759197
Prob(F-statistic)	0.770997		

FIDELITY

Heteroskedasticity Test: ARCH

F-statistic	0.605585	Prob. F(5,24)	0.6963
Obs*R-squared	3.360887	Prob. Chi-Square(5)	0.6445

Test Equation:
Dependent Variable: RESID^2

Method: Least Squares
Date: 01/09/17 Time: 08:47
Sample (adjusted): 8 37
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000870	0.000379	2.297348	0.0306
RESID^2(-1)	0.095626	0.200084	0.477929	0.6370
RESID^2(-2)	-0.248756	0.195675	-1.271271	0.2158
RESID^2(-3)	0.083833	0.200486	0.418151	0.6796
RESID^2(-4)	0.042974	0.196592	0.218595	0.8288
RESID^2(-5)	-0.145572	0.200135	-0.727370	0.4740

R-squared	0.112030	Mean dependent var	0.000734
Adjusted R-squared	-0.072964	S.D. dependent var	0.000803
S.E. of regression	0.000832	Akaike info criterion	-11.16806
Sum squared resid	1.66E-05	Schwarz criterion	-10.88782
Log likelihood	173.5208	Hannan-Quinn criter.	-11.07841
F-statistic	0.605585	Durbin-Watson stat	2.016316
Prob(F-statistic)	0.696288		

GT

Heteroskedasticity Test: ARCH

F-statistic	0.402119	Prob. F(5,24)	0.8425
Obs*R-squared	2.318972	Prob. Chi-Square(5)	0.8035

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 08:50
Sample (adjusted): 8 37
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000466	0.000272	1.714405	0.0993
RESID^2(-1)	-0.047284	0.204497	-0.231219	0.8191
RESID^2(-2)	0.260868	0.206666	1.262272	0.2190
RESID^2(-3)	-0.016699	0.211573	-0.078929	0.9377
RESID^2(-4)	-0.054659	0.208235	-0.262487	0.7952
RESID^2(-5)	-0.082340	0.208367	-0.395167	0.6962

R-squared	0.077299	Mean dependent var	0.000495
Adjusted R-squared	-0.114930	S.D. dependent var	0.000668
S.E. of regression	0.000705	Akaike info criterion	-11.49859
Sum squared resid	1.19E-05	Schwarz criterion	-11.21835
Log likelihood	178.4789	Hannan-Quinn criter.	-11.40894
F-statistic	0.402119	Durbin-Watson stat	1.738474
Prob(F-statistic)	0.842477		

SKY

Heteroskedasticity Test: ARCH

F-statistic	1.630492	Prob. F(5,24)	0.1902

Obs*R-squared	7.606689	Prob. Chi-Square(5)	0.1793

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 08:52
Sample (adjusted): 8 37
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000647	0.000711	0.910737	0.3715
RESID^2(-1)	0.200453	0.183578	1.091924	0.2857
RESID^2(-2)	-0.139761	0.180484	-0.774369	0.4463
RESID^2(-3)	0.168360	0.169259	0.994689	0.3298
RESID^2(-4)	-0.203519	0.165060	-1.232998	0.2295
RESID^2(-5)	0.421281	0.170430	2.471874	0.0209

R-squared	0.253556	Mean dependent var	0.001319
Adjusted R-squared	0.098047	S.D. dependent var	0.001965
S.E. of regression	0.001866	Akaike info criterion	-9.553090
Sum squared resid	8.36E-05	Schwarz criterion	-9.272850
Log likelihood	149.2963	Hannan-Quinn criter.	-9.463439
F-statistic	1.630492	Durbin-Watson stat	2.305386
Prob(F-statistic)	0.190156		

STANBIC

Heteroskedasticity Test: ARCH

F-statistic	0.295261	Prob. F(5,23)	0.9106
Obs*R-squared	1.749157	Prob. Chi-Square(5)	0.8826

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 08:55
Sample (adjusted): 9 37
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000438	0.000146	3.004738	0.0063
RESID^2(-1)	-0.040385	0.094092	-0.429207	0.6718
RESID^2(-2)	-0.022897	0.092181	-0.248396	0.8060
RESID^2(-3)	-0.042388	0.089327	-0.474532	0.6396
RESID^2(-4)	-0.066491	0.083219	-0.798990	0.4325
RESID^2(-5)	-0.017130	0.083962	-0.204025	0.8401

R-squared	0.060316	Mean dependent var	0.000323
Adjusted R-squared	-0.143963	S.D. dependent var	0.000516
S.E. of regression	0.000552	Akaike info criterion	-11.98501
Sum squared resid	7.00E-06	Schwarz criterion	-11.70212
Log likelihood	179.7826	Hannan-Quinn criter.	-11.89641
F-statistic	0.295261	Durbin-Watson stat	2.015365
Prob(F-statistic)	0.910579		

STERLING

Heteroskedasticity Test: ARCH

F-statistic	0.511559	Prob. F(5,24)	0.7648
Obs*R-squared	2.889313	Prob. Chi-Square(5)	0.7170

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 21:49
Sample (adjusted): 8 37
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000291	0.000190	1.534064	0.1381
RESID^2(-1)	0.204192	0.199760	1.022190	0.3169
RESID^2(-2)	-0.045121	0.201709	-0.223695	0.8249
RESID^2(-3)	-0.017314	0.201106	-0.086093	0.9321
RESID^2(-4)	-0.166744	0.192602	-0.865744	0.3952
RESID^2(-5)	0.198348	0.192852	1.028500	0.3140

R-squared	0.096310	Mean dependent var	0.000354
Adjusted R-squared	-0.091958	S.D. dependent var	0.000651
S.E. of regression	0.000680	Akaike info criterion	-11.57162
Sum squared resid	1.11E-05	Schwarz criterion	-11.29138
Log likelihood	179.5743	Hannan-Quinn criter.	-11.48197
F-statistic	0.511559	Durbin-Watson stat	1.931914
Prob(F-statistic)	0.764764		

UBA

Heteroskedasticity Test: ARCH

F-statistic	2.041421	Prob. F(5,22)	0.1121
Obs*R-squared	8.873784	Prob. Chi-Square(5)	0.1142

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 03:23
Sample (adjusted): 10 37
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000243	0.000195	1.245697	0.2260
RESID^2(-1)	0.496469	0.171870	2.888630	0.0085
RESID^2(-2)	-0.049549	0.188619	-0.262695	0.7952
RESID^2(-3)	-0.056953	0.185528	-0.306978	0.7617

RESID^2(-4)	-0.046101	0.184685	-0.249622	0.8052
RESID^2(-5)	0.054647	0.166863	0.327499	0.7464

R-squared	0.316921	Mean dependent var	0.000472
Adjusted R-squared	0.161676	S.D. dependent var	0.000723
S.E. of regression	0.000662	Akaike info criterion	-11.61555
Sum squared resid	9.64E-06	Schwarz criterion	-11.33008
Log likelihood	168.6178	Hannan-Quinn criter.	-11.52828
F-statistic	2.041421	Durbin-Watson stat	1.204912
Prob(F-statistic)	0.112110		

UBN ARCH(0/1) FAILED TO BE REJECTED AT 5%

Heteroskedasticity Test: ARCH

F-statistic	2.171410	Prob. F(5,24)	0.0912
Obs*R-squared	9.344208	Prob. Chi-Square(5)	0.0961

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Date: 01/09/17 Time: 03:29
Sample (adjusted): 8 37
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.090589	0.430840	2.531309	0.0183
WGT_RESID^2(-1)	0.031885	0.201621	0.158142	0.8757
WGT_RESID^2(-2)	0.408271	0.185508	2.200827	0.0376
WGT_RESID^2(-3)	-0.275375	0.165370	-1.665202	0.1089
WGT_RESID^2(-4)	-0.389093	0.170860	-2.277268	0.0320
WGT_RESID^2(-5)	0.096966	0.185940	0.521489	0.6068

R-squared	0.311474	Mean dependent var	0.920111
Adjusted R-squared	0.168031	S.D. dependent var	0.979570
S.E. of regression	0.893489	Akaike info criterion	2.789490
Sum squared resid	19.15973	Schwarz criterion	3.069730
Log likelihood	-35.84235	Hannan-Quinn criter.	2.879141
F-statistic	2.171410	Durbin-Watson stat	1.952919
Prob(F-statistic)	0.091165		

ZENITH

Heteroskedasticity Test: ARCH

F-statistic	0.247206	Prob. F(5,24)	0.9371
Obs*R-squared	1.469362	Prob. Chi-Square(5)	0.9166

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 03:34
Sample (adjusted): 8 37
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000840	0.000424	1.980485	0.0592
RESID^2(-1)	-0.031106	0.205366	-0.151467	0.8809
RESID^2(-2)	-0.194406	0.205786	-0.944700	0.3542
RESID^2(-3)	-0.093341	0.205097	-0.455110	0.6531
RESID^2(-4)	-0.022392	0.205124	-0.109162	0.9140
RESID^2(-5)	0.031253	0.127674	0.244790	0.8087

R-squared	0.048979	Mean dependent var	0.000644
Adjusted R-squared	-0.149151	S.D. dependent var	0.001173
S.E. of regression	0.001257	Akaike info criterion	-10.34275
Sum squared resid	3.79E-05	Schwarz criterion	-10.06251
Log likelihood	161.1412	Hannan-Quinn criter.	-10.25310
F-statistic	0.247206	Durbin-Watson stat	1.975031
Prob(F-statistic)	0.937124		

APPENDIX F
ESTIMATION WINDOW HETEROSKEDATICITY TEST OUTPUT

ACESS

Heteroskedasticity Test: ARCH

F-statistic	1.376077	Prob. F(5,113)	0.2386
Obs*R-squared	6.829858	Prob. Chi-Square(5)	0.2336

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 15:04
Sample (adjusted): 8 126
Included observations: 119 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000578	0.000199	2.901536	0.0045
RESID^2(-1)	0.052396	0.094239	0.555992	0.5793
RESID^2(-2)	0.225910	0.094419	2.392627	0.0184
RESID^2(-3)	0.016037	0.096870	0.165548	0.8688
RESID^2(-4)	-0.001977	0.094483	-0.020925	0.9833
RESID^2(-5)	-0.055989	0.094397	-0.593120	0.5543

R-squared	0.057394	Mean dependent var	0.000754
Adjusted R-squared	0.015686	S.D. dependent var	0.001674
S.E. of regression	0.001661	Akaike info criterion	-9.913517
Sum squared resid	0.000312	Schwarz criterion	-9.773393
Log likelihood	595.8543	Hannan-Quinn criter.	-9.856617
F-statistic	1.376077	Durbin-Watson stat	1.973707
Prob(F-statistic)	0.238568		

DIAMOND

Heteroskedasticity Test: ARCH

F-statistic	1.636273	Prob. F(5,113)	0.1561
Obs*R-squared	8.034093	Prob. Chi-Square(5)	0.1544

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 15:25
Sample (adjusted): 8 126
Included observations: 119 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000516	0.000145	3.564291	0.0005
RESID^2(-1)	0.100285	0.097484	1.028732	0.3058
RESID^2(-2)	0.091677	0.097558	0.939710	0.3494
RESID^2(-3)	0.212364	0.095547	2.222621	0.0282
RESID^2(-4)	-0.077097	0.097585	-0.790050	0.4312
RESID^2(-5)	-0.064533	0.097425	-0.662388	0.5091

R-squared	0.067513	Mean dependent var	0.000690

Adjusted R-squared	0.026253	S.D. dependent var	0.001005
S.E. of regression	0.000991	Akaike info criterion	-10.94575
Sum squared resid	0.000111	Schwarz criterion	-10.80562
Log likelihood	657.2719	Hannan-Quinn criter.	-10.88885
F-statistic	1.636273	Durbin-Watson stat	1.937561
Prob(F-statistic)	0.156100		

ETI (ARCH/GARCH)

Heteroskedasticity Test: ARCH

F-statistic	3.206012	Prob. F(5,110)	0.0907
Obs*R-squared	14.75431	Prob. Chi-Square(5)	0.0115

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Date: 01/09/17 Time: 16:41
Sample (adjusted): 11 126
Included observations: 116 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.899229	0.246378	3.649789	0.0004
WGT_RESID^2(-1)	-0.133207	0.093524	-1.424318	0.1572
WGT_RESID^2(-2)	0.188207	0.094249	1.996901	0.0483
WGT_RESID^2(-3)	0.288752	0.092365	3.126210	0.0023
WGT_RESID^2(-4)	-0.041772	0.094739	-0.440922	0.6601
WGT_RESID^2(-5)	-0.195177	0.093899	-2.078594	0.0400

R-squared	0.127192	Mean dependent var	1.004348
Adjusted R-squared	0.087519	S.D. dependent var	1.785299
S.E. of regression	1.705386	Akaike info criterion	3.955799
Sum squared resid	319.9176	Schwarz criterion	4.098226
Log likelihood	-223.4363	Hannan-Quinn criter.	4.013616
F-statistic	3.206012	Durbin-Watson stat	2.065478
Prob(F-statistic)	0.009680		

FBN

Heteroskedasticity Test: ARCH

F-statistic	1.219605	Prob. F(5,112)	0.3046
Obs*R-squared	6.092965	Prob. Chi-Square(5)	0.2973

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 17:59
Sample (adjusted): 9 126
Included observations: 118 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000242	9.59E-05	2.526139	0.0129
RESID^2(-1)	0.032177	0.093085	0.345670	0.7302

RESID^2(-2)	0.059435	0.092674	0.641334	0.5226
RESID^2(-3)	0.023458	0.092789	0.252812	0.8009
RESID^2(-4)	0.097571	0.092633	1.053308	0.2945
RESID^2(-5)	0.172645	0.093049	1.855420	0.0662

R-squared	0.051635	Mean dependent var	0.000394
Adjusted R-squared	0.009298	S.D. dependent var	0.000697
S.E. of regression	0.000694	Akaike info criterion	-11.65897
Sum squared resid	5.39E-05	Schwarz criterion	-11.51809
Log likelihood	693.8791	Hannan-Quinn criter.	-11.60177
F-statistic	1.219605	Durbin-Watson stat	1.995882
Prob(F-statistic)	0.304610		

FCMB ARCH/GARC 1-1

Heteroskedasticity Test: ARCH

F-statistic	0.498508	Prob. F(5,110)	0.7768
Obs*R-squared	2.570254	Prob. Chi-Square(5)	0.7659

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Date: 01/09/17 Time: 18:04
Sample (adjusted): 11 126
Included observations: 116 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.883177	0.264668	3.336927	0.0012
WGT_RESID^2(-1)	0.084586	0.098481	0.858906	0.3923
WGT_RESID^2(-2)	-0.094539	0.103377	-0.914506	0.3625
WGT_RESID^2(-3)	0.055205	0.099180	0.556611	0.5789
WGT_RESID^2(-4)	0.069069	0.098986	0.697764	0.4868
WGT_RESID^2(-5)	-0.007321	0.099182	-0.073814	0.9413

R-squared	0.022157	Mean dependent var	0.988296
Adjusted R-squared	-0.022290	S.D. dependent var	1.715977
S.E. of regression	1.734997	Akaike info criterion	3.990226
Sum squared resid	331.1235	Schwarz criterion	4.132654
Log likelihood	-225.4331	Hannan-Quinn criter.	4.048044
F-statistic	0.498508	Durbin-Watson stat	1.851900
Prob(F-statistic)	0.776783		

FIDELITY

Heteroskedasticity Test: ARCH

F-statistic	1.053622	Prob. F(5,113)	0.3900
Obs*R-squared	5.300713	Prob. Chi-Square(5)	0.3803

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 11:24
Sample (adjusted): 8 126

Included observations: 119 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000604	0.000178	3.386604	0.0010
RESID^2(-1)	0.112701	0.094033	1.198524	0.2332
RESID^2(-2)	0.147703	0.094642	1.560652	0.1214
RESID^2(-3)	0.044699	0.095547	0.467816	0.6408
RESID^2(-4)	0.003497	0.094531	0.036998	0.9706
RESID^2(-5)	-0.019292	0.093900	-0.205457	0.8376

R-squared	0.044544	Mean dependent var	0.000849
Adjusted R-squared	0.002267	S.D. dependent var	0.001187
S.E. of regression	0.001186	Akaike info criterion	-10.58820
Sum squared resid	0.000159	Schwarz criterion	-10.44808
Log likelihood	635.9979	Hannan-Quinn criter.	-10.53130
F-statistic	1.053622	Durbin-Watson stat	1.996680
Prob(F-statistic)	0.390006		

GT –ARCH/GARCH (1-1)

Heteroskedasticity Test: ARCH

F-statistic	1.220884	Prob. F(5,113)	0.3039
Obs*R-squared	6.099070	Prob. Chi-Square(5)	0.2967

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Date: 01/09/17 Time: 11:30
Sample (adjusted): 8 126
Included observations: 119 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.027729	0.258984	3.968308	0.0001
WGT_RESID^2(-1)	0.161543	0.094374	1.711734	0.0897
WGT_RESID^2(-2)	0.026169	0.094738	0.276221	0.7829
WGT_RESID^2(-3)	-0.053582	0.094700	-0.565815	0.5726
WGT_RESID^2(-4)	-0.139188	0.094703	-1.469731	0.1444
WGT_RESID^2(-5)	0.065630	0.094083	0.697579	0.4869

R-squared	0.051253	Mean dependent var	1.093694
Adjusted R-squared	0.009273	S.D. dependent var	1.756094
S.E. of regression	1.747933	Akaike info criterion	4.003849
Sum squared resid	345.2454	Schwarz criterion	4.143973
Log likelihood	-232.2290	Hannan-Quinn criter.	4.060749
F-statistic	1.220884	Durbin-Watson stat	1.967994
Prob(F-statistic)	0.303947		

SKY ARCH/GARCH(1-1)

Heteroskedasticity Test: ARCH

F-statistic	1.223578	Prob. F(5,111)	0.3028
Obs*R-squared	6.111730	Prob. Chi-Square(5)	0.2955

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Date: 01/09/17 Time: 11:36
Sample (adjusted): 10 126
Included observations: 117 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.876702	0.236872	3.701161	0.0003
WGT_RESID^2(-1)	-0.073663	0.095129	-0.774350	0.4404
WGT_RESID^2(-2)	0.151650	0.095069	1.595145	0.1135
WGT_RESID^2(-3)	0.148200	0.095269	1.555598	0.1227
WGT_RESID^2(-4)	-0.084131	0.095360	-0.882247	0.3795
WGT_RESID^2(-5)	-0.003640	0.095391	-0.038163	0.9696

R-squared	0.052237	Mean dependent var	1.017558
Adjusted R-squared	0.009545	S.D. dependent var	1.405155
S.E. of regression	1.398433	Akaike info criterion	3.558502
Sum squared resid	217.0733	Schwarz criterion	3.700152
Log likelihood	-202.1724	Hannan-Quinn criter.	3.616011
F-statistic	1.223578	Durbin-Watson stat	1.995517
Prob(F-statistic)	0.302834		

STANBIC

Heteroskedasticity Test: ARCH

F-statistic	1.570232	Prob. F(5,112)	0.1742
Obs*R-squared	7.729897	Prob. Chi-Square(5)	0.1718

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 11:50
Sample (adjusted): 9 126
Included observations: 118 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000437	0.000110	3.970245	0.0001
RESID^2(-1)	0.200395	0.093656	2.139685	0.0346
RESID^2(-2)	-0.065270	0.094558	-0.690263	0.4915
RESID^2(-3)	-0.075734	0.094448	-0.801857	0.4243
RESID^2(-4)	0.150141	0.094555	1.587873	0.1151
RESID^2(-5)	-0.118797	0.093652	-1.268492	0.2073

R-squared	0.065508	Mean dependent var	0.000480
Adjusted R-squared	0.023789	S.D. dependent var	0.000737
S.E. of regression	0.000728	Akaike info criterion	-11.56253

Sum squared resid	5.94E-05	Schwarz criterion	-11.42165
Log likelihood	688.1892	Hannan-Quinn criter.	-11.50533
F-statistic	1.570232	Durbin-Watson stat	2.025636
Prob(F-statistic)	0.174245		

STERLING

Heteroskedasticity Test: ARCH

F-statistic	0.523619	Prob. F(5,113)	0.7580
Obs*R-squared	2.694678	Prob. Chi-Square(5)	0.7469

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 11:53
Sample (adjusted): 8 126
Included observations: 119 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000368	0.000110	3.331846	0.0012
RESID^2(-1)	-0.029163	0.093955	-0.310391	0.7568
RESID^2(-2)	-0.019578	0.093966	-0.208353	0.8353
RESID^2(-3)	0.136470	0.093135	1.465299	0.1456
RESID^2(-4)	0.053300	0.094014	0.566940	0.5719
RESID^2(-5)	0.027048	0.093721	0.288600	0.7734

R-squared	0.022644	Mean dependent var	0.000440
Adjusted R-squared	-0.020601	S.D. dependent var	0.000738
S.E. of regression	0.000746	Akaike info criterion	-11.51442
Sum squared resid	6.29E-05	Schwarz criterion	-11.37430
Log likelihood	691.1082	Hannan-Quinn criter.	-11.45752
F-statistic	0.523619	Durbin-Watson stat	1.976095
Prob(F-statistic)	0.757967		

UBA

Heteroskedasticity Test: ARCH

F-statistic	0.489231	Prob. F(5,113)	0.7837
Obs*R-squared	2.521454	Prob. Chi-Square(5)	0.7733

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Date: 01/09/17 Time: 12:07
Sample (adjusted): 8 126
Included observations: 119 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.986509	0.256760	3.842143	0.0002
WGT_RESID^2(-1)	-0.013860	0.093971	-0.147494	0.8830
WGT_RESID^2(-2)	-0.055470	0.093916	-0.590637	0.5559
WGT_RESID^2(-3)	0.123041	0.092866	1.324921	0.1879
WGT_RESID^2(-4)	-0.039998	0.093536	-0.427621	0.6697

WGT_RESID^2(-5)	-0.009806	0.093869	-0.104462	0.9170

R-squared	0.021189	Mean dependent var	0.992107
Adjusted R-squared	-0.022122	S.D. dependent var	1.589002
S.E. of regression	1.606481	Akaike info criterion	3.835074
Sum squared resid	291.6285	Schwarz criterion	3.975198
Log likelihood	-222.1869	Hannan-Quinn criter.	3.891974
F-statistic	0.489231	Durbin-Watson stat	2.000966
Prob(F-statistic)	0.783713		

UBN

Heteroskedasticity Test: ARCH

F-statistic	0.314524	Prob. F(5,113)	0.9034
Obs*R-squared	1.633392	Prob. Chi-Square(5)	0.8972

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 12:10
Sample (adjusted): 8 126
Included observations: 119 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000609	0.000173	3.510586	0.0006
RESID^2(-1)	-0.039327	0.093975	-0.418480	0.6764
RESID^2(-2)	0.063836	0.093876	0.680000	0.4979
RESID^2(-3)	-0.030120	0.094745	-0.317909	0.7511
RESID^2(-4)	0.070967	0.094522	0.750798	0.4543
RESID^2(-5)	0.038237	0.093971	0.406901	0.6849

R-squared	0.013726	Mean dependent var	0.000678
Adjusted R-squared	-0.029914	S.D. dependent var	0.001131
S.E. of regression	0.001148	Akaike info criterion	-10.65210
Sum squared resid	0.000149	Schwarz criterion	-10.51198
Log likelihood	639.8001	Hannan-Quinn criter.	-10.59520
F-statistic	0.314524	Durbin-Watson stat	1.952707
Prob(F-statistic)	0.903372		

ZENITH

Heteroskedasticity Test: ARCH

F-statistic	1.591424	Prob. F(5,113)	0.1682
Obs*R-squared	7.828372	Prob. Chi-Square(5)	0.1660

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/09/17 Time: 12:12
Sample (adjusted): 8 126
Included observations: 119 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	0.000632	0.000209	3.019494	0.0031
RESID^2(-1)	-0.003362	0.093929	-0.035789	0.9715
RESID^2(-2)	0.196178	0.093826	2.090882	0.0388
RESID^2(-3)	0.177532	0.094292	1.882799	0.0623
RESID^2(-4)	-0.039905	0.093935	-0.424810	0.6718
RESID^2(-5)	-0.071536	0.093965	-0.761300	0.4481

R-squared	0.065785	Mean dependent var	0.000856
Adjusted R-squared	0.024448	S.D. dependent var	0.001624
S.E. of regression	0.001604	Akaike info criterion	-9.983310
Sum squared resid	0.000291	Schwarz criterion	-9.843186
Log likelihood	600.0070	Hannan-Quinn criter.	-9.926410
F-statistic	1.591424	Durbin-Watson stat	1.967769
Prob(F-statistic)	0.168170		

APPENDIX G
PARAMETER ESTIMATION WINDOW RESULTS REPRESENTATIONS
ESTIMATION WINDOW COEFFICIENTS

Access	ACESSSHARTN = -0.00048395588871 + 0.436387647646*ACESSMKTRTN	OLS
Diamond	DIAMONDSHARTN = -0.000867756070336 + 1.23696470945*DIAMONDMKTRTN	OLS
Eti	ETISHARTN = 0.00243060372967 + 0.7105881701*ETIMKTRTN + [AR(1)=-0.0874893774739,AR(2)=-0.0737819849201,AR(3)=-0.0980598273521] GARCH = 6.88181258301e-05 + 0.480017422939*RESID(-1)^2 + 0.491973891128*GARCH(-1)	ARCH /GACH
FBNH	FBNSHARTN = -0.000221275464775 + 1.15043644176*FBNMKTRTN + [AR(1)=0.123403073475]	OLS
FCMB	FCMBSHARTN = 0.000772523825768 + 0.485302299876*FCMBMKTRTN + [AR(1)=-0.186166296905,AR(2)=-0.0735284694376,AR(3)=0.162559428397] GARCH = 9.14485424977e-05 + 0.492503628172*RESID(-1)^2 + 0.444029744901*GARCH(-1)	ARCH /GARCH
Fidelity	FIDELITYSHARTN = 0.00109307810851 + 1.06017861029*FIDELITYMKTRTN	OLS
GT	GTBSHARTN = 0.00249634418081 + 1.60471345628*GTBMKTRTN GARCH = -2.9445429997e-07 - 0.0469707701836*RESID(-1)^2 + 1.03391386281*GARCH(-1)	ARCH /GARCH
SKYE	SKYSHARTN = -0.00254865753532 + 1.1043864485*SKYMKTRTN + [AR(1)=0.0749127441583,AR(2)=-0.178877851272] GARCH = 0.000202326608391 + 0.276104267768*RESID(-1)^2 + 0.488079820901*GARCH(-1)	ARCH /GARCH
STANBIC	STANBICSHARTN = -0.00151576755417 + 0.563410907782*STANBICMKTRTN + [AR(1)=-0.190445695565]	OLS
STERLING	STERLINGSHARTN = -0.000734887005091 + 0.674465014397*STERLINMKTRTN	OLS
UBA	UBASHARTN = 0.000814553142486 + 1.53332211614*UBAMKTRTN	ARCH

	GARCH = 7.63086170514e-05 + 0.15689364354*RESID(-1)^2 + 0.743662073128*GARCH(-1)	/GARCH
UBN	UBNSHARTN = -0.000327082214363 + 0.642477068619*UBNMKTRTN	
ZENITH	ZENITHSHARTN = -7.09016377893e-05 + 0.831536705874*ZENITHMKTRTN	

APPENDIX H

HYPOTHESES TEST OUTPUT FOR THE DATE, BEFORE AND AFTER THE ANNOUNCEMENT

TSA Pre Announcement day T-test

Hypothesis Testing for PRECAR
Date: 02/10/18 Time: 15:07
Sample: 1 15
Included observations: 15
Test of Hypothesis: Mean = -0.457310
Assuming Std. Dev. = 0.009163

Sample Mean = -0.177687
Sample Std. Dev. = 0.143343

Method	Value	Probability
Z-statistic	118.1898	0.0000
t-statistic	7.555128	0.0000

TSA Announcement day T-test

Hypothesis Testing for CAR
Date: 02/10/18 Time: 15:11
Sample: 1 16
Included observations: 16
Test of Hypothesis: Mean = -0.447900
Assuming Std. Dev. = 0.009163

Sample Mean = -0.787002
Sample Std. Dev. = 0.273183

Method	Value	Probability
Z-statistic	-148.0310	0.0000
t-statistic	-4.965195	0.0002

TSA post Announcement day

Hypothesis Testing for CAR
Date: 02/10/18 Time: 15:18
Sample: 1 16
Included observations: 16
Test of Hypothesis: Mean = -0.366620
Assuming Std. Dev. = 0.009163

Sample Mean = -0.787002
Sample Std. Dev. = 0.273183

Method	Value	Probability
Z-statistic	-183.5128	0.0000
t-statistic	-6.155312	0.0000