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Market Risk and Stock Return of Listed Financial Service Firms in Nigeria

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Abstract
The trading financial instruments in the capital market by Financial Service Firms (FSF) have generated return arising from changes in the prices of stock which exposed the firms to market risk. An effective market risk decision remains significant to determining stock return level realized from the volume and value of stock traded. This study examines the effect of market risk on stock return of listed FSF in Nigeria. The population of this study consists of fifty-six (56) financial service firms listed in the Nigerian Stock Exchange Market. In arriving at the sample size of twenty-nine (29) firms the purposive sampling technique and filtering criteria were employed. Data were sourced secondarily from the audited annual report of financial service firms, Nigeria Stock Exchange fact book, and other relevant financial service firms' websites for period of twelve (12) years (2007-2018). Panel multiple regression technique of data analysis was applied using the ordinary least square estimator. The findings of the study revealed that book to market ratio as a proxy of market risk was insignificantly negative on stock return during the period under review. Net interest margin as a proxy of market risk revealed a significant positive effect on stock return during the period of review. Also, the study revealed that control variables of firm size, leverage had significant positive effects on stock return, though; the effect of monetary policy rate was positive but insignificant on stock return. The study concluded that a higher book to market ratio would reduce stock return and to a larger extent the reduction in stock return may not be affected significantly. It also concluded that a higher net interest margin would result to a higher stock return and vice versa. The study recommended that decision-makers and portfolio managers of financial service firms should employ appropriate risk strategies through derivatives, forwards, futures, swaps, options that can mitigate market risk in order to optimize return.
Keywords: Financial Services Firms, Stock Returns, Market Risk, Firms Specific Risk factors, Nigerian Stock exchange.
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1. Introduction

There has been increasing research regarding stock return as a vital reason for investing in firms. Invariably, stock return has remained significant to an investor as the main objective of investing in a firm's common stock. Stock return can be in the form of capital appreciation or depreciation and dividend received. Stock return in the form of capital appreciation or depreciation entails a certain rise or fall in the value of stock based on the rise or fall in share market price. Stock prices are significant metrics to stock return which are determined by the forces of demand and supply and influenced by firm specific factors such as size, leverage, monetary policy rate that explain the behavior of expected stock return. Stock return is affected by variability of stock price changes which could increase or decrease information during a period of time and the dividend to be paid.

Investors are usually concerned about stock return because fluctuations in stock prices which affect the predictability of stock return appear to be influenced by information about the firm or market in totality. Karolyi (2001) posited how the existence of excessive volatility, or "noise," undermines the usefulness of stock prices as a "signal" about the true intrinsic value of a firm; a concept that is core to the paradigm of the informational efficiency of markets. It is true to say that institutional investors are typically interested in minimizing risks associated with their investments, while at the same time attempting to maximize investment returns. Risk arises out of uncertainty. It is the probability of a deviation from an anticipated outcome. The development of financial theories like arbitrage pricing, modern portfolio, capital asset pricing model, and efficient market hypothesis has laid emphasis on risk as a significant predictor of stock return. These theories explain the concern of financial market players over a given level of risk and upon which they adjust their returns expectations. The arbitrage pricing theory (APT) describes that stock return is affected by a series of risk ranging from firm and macro risk factors.

According to Ross (1976), on his Arbitrage Pricing Theory (APT) suggested that return on stock and the increasing importance played by market risk are subject to macroeconomic variables like monetary policy rate or interest rate, inflation, exchange rate, gross domestic product, unemployment rate, domestic savings, stock market liquidity. The activities in a stock market generate returns that give rise to market risk. Market risk is the probability that an overall market will decline by reducing the value of a firm's investment regardless of firm specific characteristics like growth, revenues, earnings, management, and capital structure. In other words, market risk

involves the potential loss of value in assets and liabilities due to changes in market variables like interest rate, foreign exchange rates, commodity prices and equity. Stock market return is systematically affected by the type of information randomly received. According to Gupta and Modise (2013), such influential information involves interest rate.

Interest rate is seen as the cost of capital or an investment. In other words, it is a fixed value of fund received as return from an investment in stock which is expressed in percentage. Changes in interest rate on long term or short term basis is believed to have effect on stock return which is influenced by a change in monetary policy rate or discount rate of a central or reserve bank. According to Bomfim (2001), daily volatility in asset prices could be affected by announcement in change on monetary policy rate. A High interest rate can increase costs for firms across a wide range of measures and lead to lower net interest margin which subsequently lower stock prices. However, gradually rising interest rates might actually be beneficial for the stock market as they may reflect positive trends. Net interest margin basically measures the difference between interests paid and interests received. In other words, it's a measure of return on a firm's investments relative to its interest expenses. The net interest margin of financial firms is directly related to interest rates in the economy. When market interest rates fall, the funding costs of financial service firms fall relative to their interest income, and ultimately, net interest income increases.

Shafana et al. (2013) stated that return from stock is subjected to variations owing to the movement of stock price, which depends on various factors that could be firm specific such as book to market ratio, firm size, leverage and these factors explain the behavior of expected stock returns. The book-to-market ratio assesses a firm's value by comparing book value to market value. The book value is defined by the common shareholder equity, while the market value is defined by market capitalization. The influence of firm size on stock returns remains an empirically contentious issue, previous studies provide varying evidence on the stock returns earned by firms and with small firms earning higher stock return than large firms. However, size and leverage remain a significant factor that explains the behavior of expected stock return. Leverage is commonly described as the use of borrowed funds to create an investment and expect return on that investment. A firm with debt and equity outstanding typically becomes more highly leveraged when the value of the firm falls and vice versa.

The effect of the subprime crisis in 2008 caused huge losses and uncertainties on stock returns and other portfolio investments in financial service firms. In Nigeria, the total market capitalization of the Stock market experienced a decrease from 74.7% in 2007 to 45.8% in 2008 (Onuoha & Nwaiwu, 2016). In addition, the equity market value dropped by a total of ₦2.354 billion between 2014 and 2015. The performance of the Nigerian equities market in 2017 was mixed as the weak sentiment which had persisted since June 2014 lingered into quarter 1 of 2017 (Afrinvest, 2017).

Empirical studies have been conducted on market risk and stock return as few studies have considered firm specific variables such as stock beta, net interest margin, book-to-market ratio to proxy market risk (Handayani, Farlian & Ardian,2019; Osamwonyi & Asein,2012; Morelli, 2007; Badawi, 2017; Muriithi, Muturi & Waweru, 2016; Nurazi & Usman, 2016; Fama & French, 1992; Kassi, Rathnayake, Louembe & Ding, 2019; Agbam, Anyamaobi & Udo, 2018; Gautam, 2017; Akwe, Garba & Dang, 2018). Other studies considered macro-economic variables like foreign exchange rate, inflation, equity pricing. These studies include Mwaurah, Muturi and Waititu (2017), Fahmi, Geetha and Mohidin (2017). The use of different proxies ranging from firm specific to macro-economic variables to measure market risk have provided different research results and reactions. Also, the results from these studies must have been predicated on stock market indices that vary across countries. Nevertheless, the scope of these studies might influence the different findings obtained as a result of significant events that have created market risk in the stock market as well as return on stock. Based on domain differences and variables measurement, country specific, and scope of prior studies, effect of market risk on stock return of listed financial service firms in Nigeria is considered for examined. Based on the study objective the following hypotheses in null form were formulated and tested.

Ho_1: Book-to-market ratio has no significant effect on stock return of listed financial service firms in Nigeria.

H_{02}: Net Interest Margin has no significant effect on stock return of listed financial service firms in Nigeria.

This study which covered the period of twelve (12) years from 2007 to 2018 with emphasis on listed financial service firms in Nigeria was based on the significant events that occurred in the financial industry ranging from the global financial crisis in 2008 as well as the Nigerian economic recession in 2014. The study would be relevant to investors, policy makers, and regulatory agencies in understanding the link between market risk and stock return. In addition, this study would be relevant to the academic circle by adding to existing knowledge. Other parts of the research are structured into literature review, methodology, results and discussions, and conclusion and recommendations.

2. Literature Review

In order to examine the effect of market risk on stock return, conceptual framework defining the variables of the study, relevant theories, and empirical studies were discussed. The conceptual framework for the study as depicted

in Figure 1 explained market risk (MKR), book-to-market ratio (BMR), net interest margin (NIM), and stock return (STR).

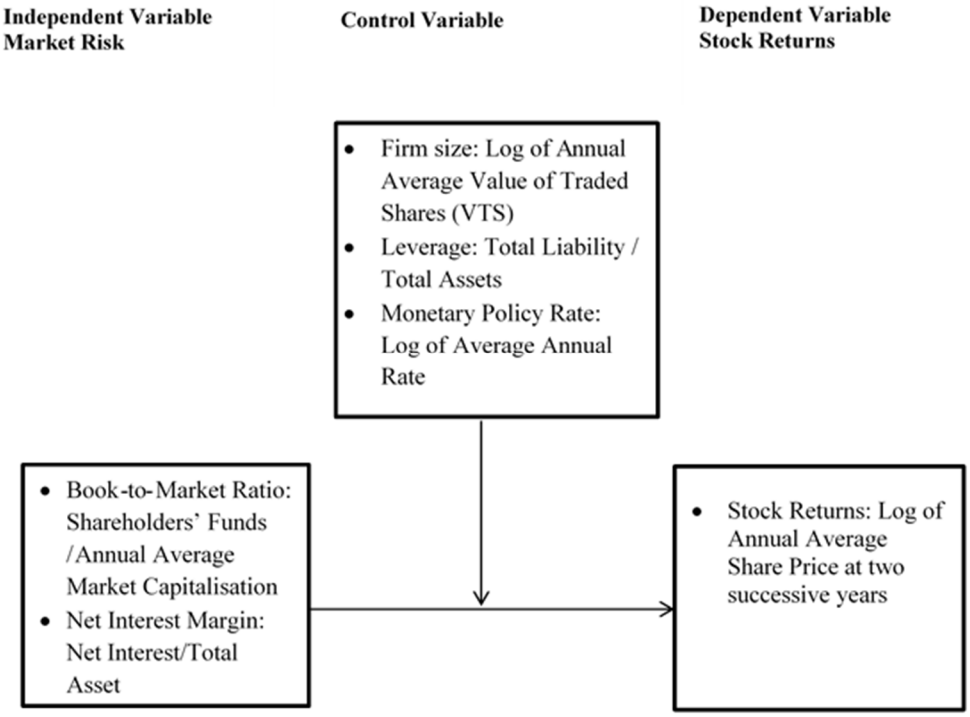

Figure 1
Source: Field Work (2020)

Market risk involves loss resulting from changes in the value of assets and liabilities (including off-balance sheet assets and liabilities) due to fluctuations in risk factors such as interest rates, foreign exchange rates and stock prices (Sukcharoensin, 2013). In other words, market risk is the probability that the value of an investment will be affected due to changes in market factors such as interest rate, foreign exchange rate, and inflation. The relationship between market risk and stock return is a reflection of a firm's asset valuation and investment as the return on stock rises with risk.

Empirical studies have provided measures or indicators of market risk to include firm specific variables of book-to-market ratio which is defined as net total assets or shareholders fund to market capitalization (Kassi, Rathnayake, Louembe & Ding, 2019; Chen et al.,2010; Agbam, Anyamaobi & Okon, 2018; Gautam, 2017; Morelli, 2007; Akwe, Garba & Dang 2018); net interest margin defined as net interest income to total assets or average earning asset (Chaudhry et al., 2008; Badawi, 2017; Muriithi, Muturi & Waweru, 2016; Murazi & Usman, 2016). Other empirical measures of market risk include interest rate risk defined in terms of treasury bill or commercial paper rates (Belke & Poliet, 2004; Mwaurah, 2019), monetary policy rate (Okpara, 2010); foreign exchange risk defined as percentage change in a country's currency rate to a base rate (Mwaurah, 2019); inflation rate defined change in general price level of goods and services on a year-to-year basis (Alagided & Panagiotidis, 2006; Daferighe & Aje, 2009); monetary policy rate defined as the interest rate issued by a central or reserve bank of a country (Abbass, Song, Shah & Aziz, 2019).

The book-to-market ratio (BMR) is a measure used to compare the book value to market value of a firm. The accounting or book value represents net total assets or shareholders fund while market capitalization estimates the market value. A ratio of less than one or more than one denotes an overvalued or undervalued firm respectively. The study of Fama and French (1992) and Chen et al. (2005) both affirmed that book-to-market ratio and firm size are vital market risk factors that predict stock return as well as critical in investment decisions.

According to English (2002), changes in market interest rates impact on the economic value of a firm's assets, liabilities, and off-balance sheet position. Interest rate represents cost of investment or reward for investment. Interest rate remains a determinant of net interest margin (NIM) because when market interest rate increases the firm's funding costs rapidly increases in relation to interest income and consequently net interest margin increases and vice versa. NIM measures how successful a firm is in terms of net return on investment. Empirical studies have provided measures of NIM to include difference between total interest income and total interest paid to total assets (Chaudhry et al., 2000; Reichert & Shyu,2003), and net interest to average earning assets (Badawi, 2017).

Firm size is seen in terms of the value of its financial assets. In other words, it could be seen in terms of the capacity to absorb risk supported by availability of liquid funds. Larger firms are usually more diversified, hence,

associated with more returns and less risk (Serrasqueiro & Nunes, 2008; Yang & Chen, 2009). In addition, large firms have the economies of scale to attract more investment and by extension increase the firm's market share price. Firm size has been measured in different ways to include volume of traded shares (Zaigham,Wang & Ali, 2019), value of total assets, number of employees, and market capitalization (Leledakis, Davidson & Smith, 2004).The study of Llorente, Michaely, Saar and Wang (2002) posited that average daily number of shares traded increase with firm size.

Leverage indicates the proportion of a firm's assets that is financed by debt against equity (Gautam, 2017). In other words, it provides a measure of overall indebtedness of a firm. Highly leveraged firms follow the maxim that a high risk is associated with greater probability of higher return. In addition, the risk-return trade-off states that the potential return rises with an increase in risk. The relationship between leverage and stock return can be pinned to Modigliani & Miller theorem published in 1958 which proposed that future stocks return should increase with the amount of leverage. Their reasoning is centered on the position that the higher the proportion of debt in a firm, the higher the risk of owning the firm's stock and the more should investors be compensated in terms of returns. Demirovic (2013) identified four indicators of leverage measurement which include total liabilities to total assets, total liabilities to shareholders equity, total debt to total assets, and total debt to shareholders equity.

Changes in interest rate are induced by monetary policy rate (MPR). MPR is an interest rate set by a monetary authority in order to influence the evolution of the main monetary variables in an economy (consumer prices, exchange rate, credit expansion). In other words, it determines the various interest rates in the economy such as lending rate, discount rate, and repurchase rate. More often than not, a central bank of a country use MPR to perform contractive or expansive monetary policy that consequently affects fluctuations in stock return through stock prices. Ioannidis and Kontonikas (2008) argued that stock market returns tend to be higher during periods of expansion and lower during contraction.

Stock return is the gains that an investor generates as dividend and increase or decrease in stock price (capital gains/losses). Financial firms see return as the fundamental reason for investing. One common way of generating stock return is through trading in the secondary market where an investor buys a stock at a lower price and sell at a higher price (Idris & Bala, 2015). It is imperative to affirm that the relative growth or decrease in a stock share price has a corresponding impact on the dividend that a firm pays. Empirical studies like Isa and Yakob (2013) and Gautam (2017) have shown that stock prices are important metrics of stock return.

Empirically, studies that focused on market risk have been influenced by pressures on firms' assets and liabilities positions as well as extreme events that caused financial crises and these events have impacted on stock return. Morelli (2007) empirically examined the explanatory strength of beta, size and book-to-market ratio in explaining cross-sectional stock returns of 300 randomly selected United Kingdom (UK) stocks from 1980 to 2000. Monthly adjusted stock data were collected from the London Share Price Database (LSPD). The results of the study revealed that beta and firm size were not significant risk factors in explaining stock returns over the sample period. The book-to-market ratio was found to be significantly positive. The result confirmed book-to-market ratio as a major risk factor explaining stock returns.

The study of Nurazi and Usman (2016) examined the effect of CAMELS (capital adequacy, asset quality, management quality, earnings, liquidity, sensitivity to market risk) and macroeconomics variables (interest rate, exchange rate, and inflation rate) on stock return of 16 banks in Indonesia Stock Exchange from 2002 to 2011. Pooled Least Squares Model (PLSM) was used in analyzing the data. The result revealed that NIM as a proxy of management quality is insignificantly negative on stock return while interest rate as a macroeconomic variable revealed an insignificant negative effect on stock return.

Gautam (2017) examined the impact of firm specific variables on stock price volatility and stock return of Nepalese commercials banks from 2008 to 2016. This study considered bank specific variables of leverage ratio, market capitalization, asset growth, earning price ratio, dividend yield, and book-to-market ratio as explanatory variables to stock price volatility and stock return as dependent variables. The study employed multiple regression model in analyzing data. The study revealed that book-to-market ratio has a significant negative impact on stock returns. However, the study revealed that leverage and market capitalization had an insignificant positive effect on stock return.

The study of Handayani, Farlian and Ardian (2019) examined the influence of firm size and market risk on stock return of Indonesian high reliable 45 most liquid (LQ45) listed companies from 2015 to 2017. Firm size and market risk (market beta) were employed as independent variables while stock return was used as the dependent variable. The study employed a multiple regression model to analyze panel data. The results of the study revealed that market risk has an insignificant positive effect on stock return while firm size has a significant positive effect on the stock return.

Iskandar (2020) carried out a study to examine the effects of capital adequacy ratio, loan to deposit ratios, and net interest margin on stock return of commercial banks in Indonesia from 2016 to 2018. The study considered 15 banks as sample banks. The study employed the multiple regression model to analyze data obtained. The results showed that net interest margin, capital adequacy ratio, and loan to deposit ratio significantly influence the stock

return of banks shares positively.

The study of Kassi, Rathnayake, Louembe and Ding (2019) examined the effect of market risk on the financial performance of 31 non-financial companies listed on the Casablanca Stock Exchange (CSE) from 2000 to 2016. The study used financial leverage, book-to-market ratio, and gearing ratio as indicators of market risk while return on assets, return on equity and profit margin were representatives of financial performance. The pooled ordinary least square model was used in analyzing data. The finding revealed that book-to-market ratio and financial leverage had a significant negative effect on financial performance. However, gearing ratio revealed a significant positive effect.

Mwaurah, Muturi and Waititu (2017) carried out a study on the influence of financial risk on stock returns on 9 listed banks in Kenya stock market from 2006 to 2015. The study used market risk, credit risk, liquidity risk, and capital risk as independent variables while stock return was used as a dependent variable. Market risk was proxy by rate of change of exchange rate while bank size was used as a control variable. The study adopted a multivariate generalized least square regression model for analysis. The findings of their study revealed that market risk has a significant positive effect on stock return. In a related vein, Muriithi et al. (2016) analyzed the impact of market risk on the financial performance of 43 commercial banks in Kenya from 2005 to 2014. The independent variable of market risk was measured by degree of financial leverage, foreign exchange exposure risk, and interest rate risk (log of net interest margin) while financial performance was proxy by return on equity. The study used a fixed effect model and generalized method of moments to analyse data. Their finding revealed that degree of financial leverage, foreign exchange exposure risk, and interest rate risk (log of net interest margin) had significant negative effect on financial performance.

Osamwonyi and Asein (2012) conducted a study on the effect of market risk on security returns with evidence from the Nigerian Capital Market from 2001 to 2005. The independent variable of market risk was proxy by beta while security returns were proxied by Treasury bill and All Share Market Index. The study employed the Capital Asset Pricing Model (CAPM) to analyse data. Their findings revealed a significant positive effect of market risk on security returns. According to Fama and French (1992) three factor model that consist of beta, size and value explain portfolio market return better than beta as a factor model in CAMP. This is corroborated in the study of Daniel et al. (2002) where they posited that stock betas has little or no ability in explaining the behavior of expected stock returns but firm size and book-to-market ratio play significant role in explaining the behavior of expected stock returns.

The study of Agbam, Anyamaobi and Udo (2018) investigated the significance of beta, firm size and book-to-market ratio in explaining variations in stock returns of 59 randomly selected listed firms on the Nigerian Capital Market from 2012 to 2015. The study employed the Fama and French (1992) multifactor model which explained three risk factors namely market risk, size risk, and value risk. The classical ordinary least square was employed to test the multifactor model. Their findings revealed that the effect of firm size was significantly positive on stock returns while book-to-market ratio was insignificantly negative on stock returns.

The study of Akwe, Garba and Dang (2018) examined the effect of firm level attributes on stock returns of top twenty-five most capitalized quoted equity firms in Nigeria from 2007 to 2016. Firm size, book-to-market ratio, and price to earnings ratio were representatives of independent variables while stock return was considered as dependent variable. Analysis of data was carried out using multiple regressions. Their findings revealed that the ratio of book-to-market ratio and price to earnings ratio had a significant and insignificant positive effect on stock returns respectively while firm size has an insignificant negative effect on stock returns.

Some studies have used leverage and monetary policy rate to examine their effect on stock return. The study of Uwuigbe, Olowe, Olusegun, and Godswill (2012) used leverage as a determinant of share prices in examining its effect on share price in the Nigeria Stock Exchange market from 2006 to 2010. After regressing the data, their finding revealed that leverage has a significant positive effect on share price. The result of their study was corroborated by the study of Zeitun and Tian (2007) who investigated the effect of capital structure on corporate performance of corporations in Jordan on 167 companies from 1989 to 2003 revealed that leverage has a significant positive effect on stock market performance.

The study of Ekene (2016) investigated the impact of monetary policy rate on stock returns in Nigeria from 2003 to 2014. The study used a six-variable standard VAR model with six lags {consumer price index (CPI), inter-bank rate (IBR), open buy-back (OBB), Treasury bill rate (TBR), exchange rate (XGR), and all share index (ASI)} to measure monetary policy rate. Their result revealed that monetary policy rate was insignificantly positive on stock returns. The study of Osuagwu (2009) investigated the impact of monetary policy variables on the performance of the stock market in Nigeria from 1984 to 2007. The study used the ordinary least squares, co-integration, and error-correction specification models to analyse data. The result revealed that minimum rediscount rate and treasury bills which are direct variables of monetary policy were insignificantly positive on performance of stock market.

Theories relevant to this study include efficient market hypothesis, arbitrage pricing, extreme event. All these theories describe the response of stock return to market risk factors. However, the arbitrage pricing theory forms

the bedrock of the study. This is because market factors that are both firm specific and macroeconomic influence stock return. The Arbitrage Pricing Theory (APT) states that there is a set of underlying sources that influence all stock returns. In other words, APT suggests that market returns which include stock return can be explained in terms of a number of systematic risk factors as well as macroeconomic factors. The APT is a development over the capital asset pricing model that calculates a single beta. APT assumes that a security return is a linear function, not only of one, but also a set of common factors. This is corroborated by Ross (1976) who suggested that other economy-wide factors could also systematically affect the returns for a large number of securities and these factors include information about inflation, interest rates, gross domestic product (GDP), or the unemployment rate. Changes in these factors may affect future firm's earning and result in a change in the measurement of market risk and discounting of future cash flow. Iqbal and Haider (2005) also opined that these set of common factors are interrelated and as the asset sensitivity to each factor increases the risk premium also increases and vice versa.

The emergence of APT into financial literatures has created a platform for empirical studies. Studies like Acikalin, Aktas and Unal (2008), Ali (2013), Ibrahim and Musah (2014), and Kirui, Wawire and Onono (2014) found that APT is useful in relating changes in returns on investments to unanticipated changes in a range of key value drivers that are firm specific and macroeconomic in nature. In addition, their studies support the position that one market factor of beta cannot fully explain the variance in stock return but dependent on other market factors.

3. Methodology

The population of the study consists of fifty-six (56) financial service firms listed in the Nigeria Stock Exchange (appendix A1). The study adopted a purposive sampling technique and filtering criteria to arrive at a sample size that best represents the population. The selection of sample financial service firms in the Nigerian Stock Exchange (NSE) from 2007 to 2018 was based on the availability of data for financial service firms as well as the maintaining of their identity despite change in their status (holding companies) and has been listed before the change was effected. In view of these filtering criteria, a sample size of twenty-nine (29) listed financial service firms which comprises thirteen (13) deposit money banks, fourteen (14) insurance firms, one (1) mortgage bank, and one (1) other financial institution were used (appendix A2).

Secondary data were sourced from audited annual reports of financial service firms to compute market risk indicative ratios, fact books of NSE and websites of other financial institutions (FSL Securities and Global Business News) to make available stock prices for a period of twelve (12) years spanning from 2007 to 2018. The data sourced to represent stock return was collected on a monthly basis in order to arrive at annual average. In addition, the stock price for the month of January 2007 was used as the base share price for the lag year 2006 in order to arrive at the annual average return for the preceding year 2007. This is because some of the firms were listed in 2006; and for uniformity and availability of data. The data for market capitalization of firms were also collected on a monthly basis to arrive at the annual average. Nevertheless, the MPR data were collected on a monthly basis to arrive at the annual average MPR in percentage. The variables used for the study were clearly defined with their measurement as captured in Table 1.

The study used the multiple regression model which captured the effect of the independent variables on the dependent variable. The model is described as follows:

$$STR_{it}=\alpha_0+\beta_1 BMR_{it}+\beta_2 NIM_{it}+\beta_3 FSZ_{it}+\beta_4 LVR_{it}+\beta_5 MPR_{it}+\mathcal{E}_{it}$$ **……Model.** STR is represented as stock return, α_0 as constant term, β as coefficient of independent variable of book-to-market ratio (BMR), net interest margin (NIM), control variables of firm size (FSZ), leverage (LVR), monetary policy rate (MPR), and Ɛ as error term. In testing the normality of data, the Shapiro-Wilki test was used to confirm the data fitness and whether sample data have the skewness and kurtosis of matching a normal distribution. In addition, the objective is to reject the null hypothesis that the data is no different from normal. The study measured the explanatory or predictive power of the regression model and how well the linear regression equation fits the data by employing R-squared. The R-squared or coefficient of determination is the proportion of variance (%) in the dependent variable that can be explained by the independent variable. As a rule of thumb for interpreting the strength of the relationship among the variables, an R-squared value should be equal to or greater than 0.10 in order for the variance explained of a particular endogenous construct to be deemed adequate (Falk and Miller, 1992).

Table 1
Variable, Definition, Measurement, and Sources

Type of Variable	Variable	Variable Measurement	Description	Source
Dependent	Stock Return	$Rt = Ln\left(\frac{Pt}{P_{t-1}}\right)$ where Rt is annual average stock return at time t, where Pt & P_{t-1} are annual average price of stock at two successive years t and t-1 respectively.	Natural Logarithm of the annual average stock price at two successive years of sample firms listed on the NSE.	Isa & Yakob (2013)
Independent	Book-to-Market Ratio	BMR=Shareholders' Funds /Annual Average Market Capitalisation Where BMR is book-to –market ratio	Book-to-Market ratio measured annually of sample firms listed on the NSE	Chen et al. (2005)
Independent	Net Interest Margin	NIM= Net Interest/Total Asset Where NIM is net interest margin, net interest is difference between interest income and interest expense	Ratio of net interest (interest income less interest expense) to total asset of sample firms listed on the NSE measured annually	Mwaurah *et al.* (2017)
Control	Firm Size	$VTS = Ln\left(\frac{VTS1 + VTS2}{2}\right)$ Where VTS is Value of Traded Shares (Naira), Where VTS is Value of Traded Shares (Naira), where VTS 1 & VTS 2 are closing share price by traded volume in January and December for a period respectively	Natural Logarithm Average Annual Value of Traded Share of sample firms listed on the NSE measured annualy	Chan & Fong (2000)
Control	Leverage	Total Liabilities to Total Assets	Ratio of Total Liabilities to Total Assets of sample firms listed on the NSE measured annually	Demirovic (2013)
Control	Monetary Policy Rate	MPR= Ln of Annual Average MPR in percentage; Where MPR is monetary policy rate	Log of Annual Average MPR measured annually.	Okpara (2010)

Source: Authors' Compilation, 2020

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Test for multicollinearity was performed to check the high level of intercorrelation among the explanatory variables such that their effects cannot be separated. Multicollinearity was measured by variance inflation factors (VIF) and tolerance. The study considered the rule of thumb of VIF value not exceeding 4.0 or tolerance value less than 0.2 to conclude absence of multicollinearity (Hair et al.,2010). Nevertheless, the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity was performed to determine whether the variance of the errors from a regression is dependent on the values of the explanatory variables. The decision rule established the rejection of the null hypothesis (homoscedasticity) with p-value less than level of significance at 5% (Hair et al.,2010). To establish the panel effect of data, an F-test and Wald Chi^2 test were conducted to determine the suitability of the

fixed effects model and random-effects model respectively. The choice of using either the fixed-effect or random effect model for the study was determined by the Hausman test.

4. Results and Discussions

The results and discussions for the study were based on the tables as explained below.

Table 2

Descriptive Statistics

Variables	Mean	SD	Min	Max	Obs
STR	1.0401	0.6827	0.1200	7.6400	348
BMR	2.1697	2.7557	-2.7286	19.9694	348
NIM	0.2743	0.7197	-0.6692	8.2549	348
FSZ	24.3215	8.8419	8.0400	39.1200	348
LVR	0.5193	0.1604	0.2194	0.6820	348
MPR	0.1092	0.0248	0.0608	0.1400	348

Source: STATA OUTPUT (Appendix B)

The result in Table 2 revealed that the average value of stock return of sample firms was 1.0401 within a period of 12 years. In other words, the change in stock price contributed to a stock return of 104.01% with a deviation of 68.27%. The minimum rate of stock return was 12% and a maximum rate of 764%. According to Kassi, Rathnayake, Louembe & Ding (2019) a ratio of less than one denotes an overvalued firm while a rate of more than one indicates an undervalued firm. Within the period of review, book-to-market ratio revealed that financial service firms were undervalued as compared to the average return on stock. The average net interest margin of the firms was 27.43% with a deviation of 71.97%. The average firm size of the firms in terms of market capitalization stood at N24.32 Billion Naira with a deviation of 8.84 Billion Naira. The result further revealed that financial service firms leveraged on debts by 51.93% over equity of 48.07%.

The study also tested for normality of data and the result is revealed in Table 3.

Table 3

Normality Test

Variables	W	V	Z	P-Values	Obs
STR	0.6377	88.077	10.587	0.0000	348
BMR	0.6032	96.468	10.802	0.0000	348
NIM	0.3309	162.649	12.037	0.0000	348
FSZ	0.9766	5.684	4.108	0.0002	348
LVR	0.8183	44.162	8.955	0.0000	348
MPR	0.9480	12.633	5.996	0.0000	348

Source: STATA OUTPUT (Appendix B)

The Shapiro-Wilk (W) test was conducted to check the normality of the data. Table 3 revealed that data from the variables of the models are non-normally distributed because the P-values of all the variables are significant at the level of 1% (p-values of 0.0000).

The study tested for suitability of the model and the result is stated in Table 4.

Table 4

Robust OLS Regression Model Summary

Variables	Statistics	P-Values
R Square	0.2765	
F-Statistics	27.67	0.0000
Hausman Chi2	2.55	0.7693
Hettest: Chi2	91.28	0.0000
Mean VIF	1.12	
Random Effect (LM) Test: Chi2	0.00	1.0000

Source: STATA OUTPUT (Appendix B)

The classical regression assumptions of Ordinary Least Square (OLS) on panel data require the model to be fit and unbiased for a valid inferences and conclusions. As such, this study subjected the model to fixed and random effects regression, OLS, and other robustness tests to achieve a reliable result as revealed in Table 4. The test for heteroskedasticity was employed using the Breuch Pagan/Cook-Weisberg test which revealed Chi^2 of 91.28 with a p-value of 0.0000 indicating the presence of heteroskedasticity in the panel data. The assumption of constant variance of the error term (homocedasticity) is not supported and as a result OLS estimators may not be best linear unbiased estimators (BLUE). However, this is corrected using robust OLS (heteroskedasticity corrected standard errors). The Hausman specification test of Chi^2 2.55 with a p-value of 0.7693 suggested the suitability of random effect model for the study. A further test on the result of a random effect test by employing the Breusch and Pagan

Lagrangian Multiplier Test for random effects revealed that there is no statistical significant variance among the units in the panel (Chibar2 of 0.00 with a p-value of 1.0000). Therefore, the OLS regression model was deemed suitable for the study.

A mean variable inflation factor of 1.12 as revealed in Table 4 suggested the absence of perfect multicolinearity among the explanatory variables. This agreed with the rule of thumb of VIF not exceeding 4. The R-squared of 0.2765 in Table 4 revealed that the model explained 27.65% of the total variations in the dependent variable. The result from Table 4 further revealed that the model is fit from the F-Statistic of 27.67 which is statistically significant at 1% level of significance (as indicated by the P-value of 0.0000).

Hypotheses Testing

The hypotheses formulated for the study are tested and analysed using the results in Table 5.

Table 5

Robust OLS Estimators

Variables	Coefficients	P-Values
BMR	-0.0319	0.131
NIM	0.1493	0.037
FSZ	0.0701	0.000
LVR	2.8847	0.000
MPR	1.8366	0.468
CONSTANT	-1.5480	0.000

Source: STATA OUTPUT (Appendix B)

H_{01}: Book-to-Market Ratio has no significant effect on Stock Return of Listed Financial Service Firms in Nigeria

The result of hypothesis test revealed an insignificant negative effect of book-to-market ratio (BMR) on stock return of financial service firms with a coefficient of -0.0319 and p-value of 0.131 at 5% significance level. The result obtained from the regression estimators supported the study of Agbam et al. (2018), though the study of Gautam (2017) and Kassi et al. (2019) revealed a significant negative effect. However, the result did not support the study of Morelli (2017) and Akwe et al. (2018) which found a positive effect of book-to-market ratio on stock return. Therefore, the result supported the null hypothesis that there is no significant effect between book-to-market ratio and stock return. The result revealed that the higher the book-market ratio the lower the stock return and vice versa (Wang & Xu, 2004; Arshad et al., 2015).

H_{02}: Net Interest Margin has no significant effect on Stock Return of Listed Financial Service Firms in Nigeria

The result of the hypothesis test revealed a significant positive effect of net interest margin on stock return of financial service firms with a coefficient of 0.1493 and p-value of 0.037 at 5% significance level. The result obtained from the regression estimators supported the study of Iskandar (2020), though the study of Akwe et al. (2018) revealed an insignificant positive effect. According to Iskandar (2020), a firm's financial performance through improved net interest margin increases stock return for investors. However, the result did not support the study of Gautam (2017), Muriithi et al. (2016), and Nurazi & Usman (2016) who revealed that net interest margin had a negative effect on stock returns.

The Controlling Effect of Firm Size, Leverage, and Monetary Policy Rate on Stock Return of Listed Financial Service Firms in Nigeria

The result of hypothesis test revealed a significance positive effect of firm size on stock return of financial service firms with a coefficient of 0.0701 and p-value of 0.000 at 5% significant level. The result obtained from the regression estimators supports the study of Handayani et al. (2019) and Agbam et al. (2018). The effect of leverage on stock return was significantly positive with a coefficient of 2.8847 and p-value of 0.000 at 5% significance level. The result obtained from the regression estimators supports the study of Uwuigbe et al. (2012) and Zeitun & Tian (2007). The result supported the assertion that the higher the leverage the higher the return on stock for leveraged firms operating in a favourable economic condition. The effect of monetary policy rate was insignificantly positive on stock return with a coefficient of 1.8366 and p-value of 0.468 at 5% significance level. The result obtained from the regression estimators supports the study of Ekene (2016) and Osuagwu (2009). The insignificant effect could be as a result of the form of market efficiency and the equity culture in the stock market. In addition, the result explained that an increase or decrease in MPR has less effect on the prices of shares.

5. Conclusion and Recommendations

The study examined the effect of market risk on stock return of listed financial service firms in Nigeria with controlling effect of firm size, leverage, and monetary policy rate. The study concluded that book-to-market ratio (BMR) revealed an insignificant negative effect on stock return. This is an indication that a higher BMR will result in a lower stock return. Also, the study concluded that net interest margin (NIM) significantly and positively affects stock return. The result is an indication that stock return reacts to growth in firms' NIM. Apparently, the arbitrage

pricing theory supports the assumptions that firm specific factors other than beta, affect stock return.

Considering the conclusion established from the findings of the study, some recommendations were made. Market risk is systematic in nature that investors cannot eliminate through a diversified portfolio. However, it can be reduced through hedging strategy. Therefore, decision-makers and portfolio managers of financial service firms should employ appropriate risk strategies through derivatives, forwards, futures, swaps, options that can mitigate market risk. Investing firms should continuously review their net interest margin which is a significant factor of performance as the higher the value the higher the return.

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Appendix A1: ***Population Frame of the Study***

SN	Deposit Money Banks	DL	DOI	SN	Listed Insurance Companies (Ticker)	DL	DOI
1.	Access Bank Plc (Access)	18/11/98	8/2/89	1.	African Alliance Insurance Plc (Afrinsure)	17/9/09	6/5/60
2.	Diamond Bank Plc	27/5/05	20/12/90	2.	Aiico Insurance Plc (Aiico)	31/12/89	14/7/70
3.	EcoBank Transnational Incorporated	11/9/06	3/10/85	3.	Axamansard Insurance Plc (Mansard)	19/11/09	23/6/89
4.	Fidelity Bank Plc	17/5/05	19/11/87	4.	Consolidated Hallmark Insurance Plc (Chiplc)	22/2/08	2/8/91
5.	First Bank Nigeria Holding Plc	26/11/12	13/8/12	5.	Continental Reinsurrance Plc (Continsure)	30/5/07	24/4/85
6.	First City Monument Bank Plc	21/12/04	20/4/82	6.	Cornerstone Insurance Plc (Cornerst)	13/8/97	26/7/91
7.	Guaranty Trust Bank Plc	9/9/96	20/7/90	7.	Goldlink Insurance Plc (Goldinsure)	12/2/08	8/9/93
8.	Jaiz Bank Plc	9/1/17	1/4/03	8.	Great Nigerian Insurance Plc (Gni) *	2005	24/2/1960
9.	Stanbic IBTC Bank Plc	23/11/12	14/3/12	9.	Guinea Insurance Plc (Guineans)	1/1/90	3/12/58
10.	Sterling Bank Plc	2/1/06	25/11/04	10.	International Energy Insurance Plc (Intenegins)	13/7/07	28/3/69
11.	Union Bank of Nigeria Plc	1917	1971	11.	Lasaco Assurance Plc (Lasaco)	20/12/79	20/12/79
12.	United Bank of Africa Plc	31/3/70	23/2/61	12.	Law Union And Rock Insurance Plc (Lawunion)	9/7/90	17/6/69

13.	Unity Bank Plc	22/12/05	27/4/05	13.	Linkage Assurance Plc (Linkassure)	18/11/03	26/3/91
14.	Wema Bank Plc	13/2/90	2/5/45	14.	Mutual Benefits Assurance (MBenefit)	28/5/02	18/4/95
15.	Zenith Bank Plc	21/10/04	30/5/90	15.	NEM Insurance Plc (Nem)	5/9/90	2/4/70
SN	**Mortgage Banks**			16.	Niger Insurance Plc (Nigerins)	1/9/93	29/8/62
1.	Abbey Mortgage Bank Plc	21/10/08	26/8/91	17.	Prestige Assurance Plc (Prestige)	3/12/90	6/1/70
2.	African Prudential Plc (Afriprud)	11/1/13	23/3/06	18.	Regency Assurance Plc (Regalins)	27/5/08	16/6/93
3.	Aso Savings & Loans Plc (Aso Savings)	25/4/08	9/11/95	19.	Sovereign Trust Insurance Plc (Sovrenins)	29/11/06	26/2/80
4.	Infinity Trust Mortgage Bank Plc (Infinity)	11/12/13	1/1/92	20.	Staco Insurance Plc (Staco)	25/6/7	10/7/91
5.	Resort Savings & Loans Plc (Regalins)	23/11/09	17/6/92	21.	Standard Alliance Insurance Plc (Stdinsure)	19/12/03	28/7/81
6.	Omoluabi Mortgage Bank Plc (Omomobnk)	14/11/14	9/3/99	22.	Sunu Assurances Nigeria Plc (Sunuassur)	18/7/07	3/12/84
7.	Union Homes Savings and Loans Plc (Unhomes)	24/4/06	6/11/92	23.	Unic Diversified Holdings Plc (Unic)	11/9/15	2/4/65
SN	**Micro Finance Banks**			24.	Universal Insurance Plc (Univinsure)	11/2/08	1/3/61
1.	Fortis Micro Finance Bank Plc (Fortis MFB)	20/6/12	18/6/7	25.	Veritas Kapital Assurance Plc (Veritaskap)	17/12/09	8/8/3
2.	NPF Micro Finance Bank Plc (NPFM crfbk)	1/12/10	19/5/93	26.	Wapic Insurance Plc (Wapic)	1990	14/3/58
SN	**Other Financial Institutions**						
1.	Custodian Investment Plc (Custodian)	12/6/07	22/8/91				
2.	Deap Capital Mgt & Trust Plc (DeaCap)	17/12/07	5/6/02				
3.	Nigeria Energy Sector Fund (NESF)	18/6/99	26/10/98				
4.	Royal Exchange Plc (Royalex)	3/12/90	18/7/89				
5.	United Capital Plc (UCAP)	1/11/13	14/3/02				
6.	Value Alliance Value Fund Plc (Valuefund)	27/7/11	2010				

Source: Generated by author from the Central Bank of Nigeria Official Website and Nigerian Stock Exchange website.
Notes: DL represents Date of Listing; DOI represents Date of Incorporation.
*: Delisted in 2018
**: Name change but retained identity

APPENDIX A2: ***Sample Size Frame of the Study***

S/N	Listed Financial Service Firms	Industry
1.	Access Bank Plc	Banking
2.	Diamond Bank Plc	Banking
3.	EcoBank Transnational Incorporated	Banking
4.	Fidelity Bank Plc	Banking
5.	First Bank Nigeria Holding	Banking
6.	First City Monument Bank Plc	Banking
7.	Guaranty Trust Bank Plc	Banking
8.	Sterling Bank Plc	Banking
9.	Union Bank of Nigeria Plc	Banking
10.	United Bank For Africa Plc	Banking
11.	Unity Bank Plc	Banking
12.	Wema Bank Plc	Banking
13.	Zenith Bank Plc	Banking
14	Aiico Insurance Plc (Aiico)	Insurance
15.	Cornerstone Insurance Plc (Cornerst)	Insurance
16	Guinea Insurance Plc (Guineans)	Insurance
17.	Lasaco Assurance Plc (Lasaco)	Insurance
18.	Law Union And Rock Insurance Plc (Lawunion)	Insurance
19.	Linkage Assurance Plc (Linkassure)	Insurance
20.	Mutual Benefits Assurance (MBenefit)	Insurance
21.	NEM Insurance Plc (Nem)	Insurance
22.	Niger Insurance Plc (Nigerins)	Insurance
23.	Prestige Assurance Plc (Prestige)	Insurance
24.	Sovereign Trust Insurance Plc (Sovrenins)	Insurance
25.	Standard Alliance Insurance Plc (Stdinsure)	Insurance
26.	Unic Diversified Holdings Plc (Unic)	Insurance
27.	Wapic Insurance Plc (Wapic)	Insurance
28.	Union Homes Savings and Loans Plc (Unhomes)	Mortgage Bank
29.	Royal Exchange Plc (Royalex)	Other Financial Institutions

Source: Author's Compilation (2020).

APPENDIX A3: Summary of Raw Data

Firm	Year	STR "N"	Book-To-Mkt Ratio	Net Int. Margin Ratio	FSZ "N'M"	LVR Ratio
Access	2007	1.84	0.2676	0.0546	512.8165	1.3733
Access	2008	0.95	1.2182	0.0251	15.9995	0.8338
Access	2009	0.42	1.8812	0.0466	963.5730	0.7393
Access	2010	1.28	1.2016	0.0495	1,730.6600	0.7821
Access	2011	0.81	1.4130	0.0535	2,492.9900	0.8030
Access	2012	1.04	1.8869	0.0561	1,340.5200	0.8432
Access	2013	1.44	1.1725	0.0391	23,999.5600	0.8561
Access	2014	0.83	1.5137	0.0447	1,847.1400	0.8617
Access	2015	0.64	2.8608	0.0373	2,468.9200	0.8506
Access	2016	0.92	3.0055	0.0375	1,216.8150	0.8645
Access	2017	1.70	1.6435	0.0376	2,559.6650	0.8671
Access	2018	1.16	1.5791	0.0274	7,659.2800	0.8889
Diamond	2007	1.43	0.1024	0.0509	290.5485	0.8274
Diamond	2008	0.95	0.5985	0.0377	82.7950	0.8061
Diamond	2009	0.48	1.3213	0.0380	51.8600	0.8209
Diamond	2010	1.05	1.0157	0.0897	1,242.7000	0.7869
Diamond	2011	0.65	0.4226	0.0980	1,542.1800	0.8720
Diamond	2012	0.60	2.0119	0.0843	845.0250	0.7869
Diamond	2013	2.17	1.3466	0.0731	2,302.9350	0.8979
Diamond	2014	0.98	6.7307	0.0778	1,647.9000	0.8825
Diamond	2015	0.58	2.6818	0.0821	685.0800	0.8662
Diamond	2016	0.40	7.9694	0.0642	490.0500	0.8729

Firm	Year	STR "N"	Book-To-Mkt Ratio	Net Int. Margin Ratio	FSZ "N'M"	LVR Ratio
Diamond	2017	0.77	6.7307	0.0795	471.9500	0.8740
Diamond	2018	1.55	0.4964	0.0971	3,923.1400	0.9793
ECOBank	2007	1.11	34822.3510	0.0426	21.0790	0.8820
ECOBank	2008	1.56	0.3147	0.0425	5.5960	0.9266
ECOBank	2009	1.93	0.0012	0.0002	2.5180	0.9236
ECOBank	2010	0.64	1.3581	0.0643	1,113.4050	0.8524
ECOBank	2011	0.85	1.6138	0.0055	991.2250	0.9305
ECOBank	2012	0.78	11.1797	0.0558	1,289.5450	0.8760
ECOBank	2013	1.32	156628.0000	0.0608	5,144.7500	0.8855
ECOBank	2014	1.14	1.4187	0.0998	3,967.5600	0.8544
ECOBank	2015	1.17	1.4198	0.1236	4,044.7400	0.8284
ECOBank	2016	0.74	2.5061	0.2263	248.6050	0.8122
ECOBank	2017	1.02	2.4093	0.0518	1,231.7350	0.9032
ECOBank	2018	1.36	2.1370	0.1711	642.9000	0.8681
Fidelity	2007	2.16	0.2375	0.0406	148.2710	0.8630
Fidelity	2008	0.94	0.8484	0.0414	23.1310	0.7452
Fidelity	2009	0.33	1.5500	0.0302	11.8225	0.7020
Fidelity	2010	0.89	1.7846	0.0530	556.6737	0.7050
Fidelity	2011	0.88	2.2193	0.0414	912.5150	0.8021
Fidelity	2012	0.70	2.9405	0.0403	430.2700	0.8234
Fidelity	2013	1.83	1.9286	0.0285	1,154.3800	0.8488
Fidelity	2014	0.77	3.5248	0.0411	374.5400	0.8542
Fidelity	2015	0.71	3.8502	0.0494	351.9900	0.8510
Fidelity	2016	1.44	6.2427	0.0477	142.6000	0.8572
Fidelity	2017	0.83	3.6867	0.0494	1,021.3450	0.8540
Fidelity	2018	1.73	2.4805	0.0405	2,078.7850	0.8870
First Bank	2007	1.09	77351.0000	0.1825	603.469	0.9082
First Bank	2008	0.89	96257.0000	0.1388	281.0855	0.7698
First Bank	2009	0.45	317488.0000	0.2049	2,469.3485	0.8209
First Bank	2010	0.74	340735.0000	0.2270	5,919.5900	0.8295
First Bank	2011	0.90	377244.0000	0.2267	14,265.8000	0.8707
First Bank	2012	1.04	1.4510	0.2248	3,730.2250	0.8728
First Bank	2013	1.41	0.6238	0.1912	6,393.8100	0.8978
First Bank	2014	0.76	1.3075	0.1815	7,758.7850	8.7935
First Bank	2015	0.58	1.8039	0.1850	3,690.2600	0.8611
First Bank	2016	0.50	4.0605	0.2000	1,204.2100	0.8770
First Bank	2017	1.54	2.4729	0.2404	3,958.4200	0.8713
First Bank	2018	1.89	1.4423	0.1652	10,424.6050	0.9047
FCMB	2007	2.00	0.4930	0.0361	214.5075	0.8817
FCMB	2008	1.00	1.4117	0.0442	92.4985	0.7140
FCMB	2009	0.43	1.9248	0.0313	749.3925	0.7205
FCMB	2010	1.06	1.3991	0.0354	1,080.1850	0.7518
FCMB	2011	0.77	1.6694	0.0520	658.7150	0.8049
FCMB	2012	0.69	2.5777	0.0412	456.4800	0.8547
FCMB	2013	1.23	1.8404	0.0573	2,492.2200	0.8575
FCMB	2014	0.90	2.0012	0.5521	1,048.0750	0.0060
FCMB	2015	0.66	2.5978	0.4942	827.7900	0.0079
FCMB	2016	0.45	1.1526	0.5293	819.4300	0.0096
FCMB	2017	1.06	4.7962	0.5358	491.1650	0.0151
FCMB	2018	1.78	2.8476	0.5465	2,979.3950	0.0127
GTB	2007	1.19	0.1445	0.0687	729.3375	0.9008
GTB	2008	0.85	0.5410	0.1806	328.5800	0.8045
GTB	2009	0.48	0.9010	0.3574	2,305.5045	0.8152
GTB	2010	1.04	0.5501	0.2908	5,251.5850	0.8074
GTB	2011	1.14	0.5429	0.1856	5,732.2800	0.8455
GTB	2012	1.15	0.5294	0.2277	4,568.6800	0.8232
GTB	2013	1.51	0.4342	0.1806	7,820.1250	0.8269

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GTB	2014	1.04	0.5250	0.1561	12,800.6250	0.8308
GTB	2015	0.90	0.5673	0.1814	10,416.9050	0.8219
GTB	2016	0.86	0.7979	0.2059	3,213.5400	0.8187
GTB	2017	1.62	0.5255	0.2036	9,960.6050	0.7952
GTB	2018	1.19	0.4155	0.1715	16,432.1400	0.8113
Sterling	2007	1.55	31272.0210	0.0419	16.0885	0.8164
Sterling	2008	0.89	1.9892	0.0475	48.6335	0.8721
Sterling	2009	0.27	1.2959	0.0606	5.6240	0.7923
Sterling	2010	1.25	1.0475	0.0555	188.2000	0.8944
Sterling	2011	0.85	1.6248	0.0331	320.8050	0.9185
Sterling	2012	0.73	2.2332	0.0412	116.2950	0.9196
Sterling	2013	2.24	1.4994	0.0506	1,002.3800	0.9103
Sterling	2014	0.83	1.7021	0.0522	667.3550	0.8973
Sterling	2015	0.89	1.6392	0.0495	743.0550	0.8805
Sterling	2016	0.61	2.6336	0.0674	72.4750	0.8969
Sterling	2017	0.70	2.7816	0.0469	138.9250	0.9049
Sterling	2018	1.81	1.7089	0.0511	653.2050	0.9096
Union	2007	1.32	66770.0000	0.0944	514.0370	0.8441
Union	2008	0.98	125263.0000	0.0607	58.8935	0.8773
Union	2009	0.41	253910.0000	0.0299	203.0375	1.2756
Union	2010	1.58	-135894.0000	0.0515	414.1100	1.1706
Union	2011	0.55	13.3740	0.0266	3,022.4450	0.7837
Union	2012	0.44	2.3800	0.0708	131.8250	0.8063
Union	2013	1.82	1.2299	0.0625	208.8200	0.7871
Union	2014	0.89	1.4832	0.0708	94.9250	1.2906
Union	2015	0.88	1.7462	0.0701	139.2950	1.3043
Union	2016	0.60	0.1294	0.0074	1,737.0750	1.2872
Union	2017	1.19	2.7027	0.0614	169.1450	1.3142
Union	2018	1.03	0.9922	0.0453	399.3700	1.1780
UBA	2007	1.20	0.3934	0.0381	563.2610	0.8505
UBA	2008	0.78	0.4464	0.0469	308.2430	0.8762
UBA	2009	0.31	0.9969	0.0775	3,692.4455	0.8660
UBA	2010	0.68	0.7434	0.0437	2,345.4550	0.8700
UBA	2011	0.61	1.0298	0.0337	2,953.4250	0.8906
UBA	2012	0.77	2.0488	0.0387	1,111.9150	0.8860
UBA	2013	2.11	0.9980	34.3535	4,384.7600	0.8830
UBA	2014	0.88	1.7940	0.0351	2,518.3450	0.8795
UBA	2015	0.62	2.1794	0.0464	1,106.0950	0.8474
UBA	2016	0.97	2.7382	0.0428	1,568.9300	0.8461
UBA	2017	1.99	1.1965	0.0451	2,939.4600	0.8627
UBA	2018	1.25	1.0634	0.0380	5,238.8950	0.8985
Unity	2007	1.01	0.2851	0.0297	137.7090	0.8424
Unity	2008	0.88	0.2325	0.0459	140.7490	0.9484
Unity	2009	0.27	0.3721	0.0649	6.6850	0.9720
Unity	2010	6.96	1.6592	0.0541	125.2950	0.8553
Unity	2011	0.84	0.6686	0.0605	228.1250	0.8825
Unity	2012	0.58	2.8539	0.0638	28.2500	0.8700
Unity	2013	1.24	1.2762	0.0747	904.8750	0.9301
Unity	2014	0.79	1.3048	0.1100	96.7750	0.8155
Unity	2015	0.54	3.9798	0.0972	1,016.6950	0.8137
Unity	2016	0.28	11.3754	0.1004	31.2400	0.8313
Unity	2017	0.80	-34.5319	0.3270	521.2800	2.5475
Unity	2018	1.74	-14.7851	0.0592	267.7000	2.0327
Wema	2007	1.89	0.2558	0.0719	66.9615	0.8475
Wema	2008	1.65	-0.1331	-0.0161	225.7460	1.2530
Wema	2009	0.26	0.5793	0.0335	14.0125	1.4021
Wema	2010	0.29	1.8810	0.0629	122.5000	0.9473

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Wema	2011	0.90	0.4590	0.0453	136.5650	0.9717
Wema	2012	0.50	0.1899	0.0479	36.2300	0.9948
Wema	2013	2.37	1.3984	0.0379	103.7750	0.8749
Wema	2014	0.83	1.1729	0.0485	139.4750	0.8856
Wema	2015	0.95	1.2088	0.0447	176.6850	0.8839
Wema	2016	0.79	1.9958	0.0443	326.4950	0.8849
Wema	2017	0.69	2.4079	0.0514	14.5300	0.8709
Wema	2018	1.53	1.4216	0.0565	779.5200	0.8933
Zenith	2007	1.45	0.2796	0.0490	448.3200	0.8274
Zenith	2008	0.86	0.7504	0.0523	99.9135	0.7985
Zenith	2009	0.38	1.2068	0.0656	826.2155	0.7913
Zenith	2010	0.92	0.8189	0.0475	13,017.2000	0.8151
Zenith	2011	1.00	0.8624	0.0597	18,004.5000	0.8768
Zenith	2012	1.09	0.8736	0.0607	7,422.8300	0.8203
Zenith	2013	1.40	0.6285	0.0646	10,153.1550	0.8358
Zenith	2014	1.07	0.7785	0.0542	8,576.9000	0.8503
Zenith	2015	0.79	0.9569	0.0540	6,576.4300	0.8542
Zenith	2016	0.79	1.4596	0.0494	5,533.4900	0.8574
Zenith	2017	1.46	0.9556	0.0454	10,778.1250	0.8556
Zenith	2018	1.25	0.7811	0.0492	18,103.5350	0.8638
AIICO	2007	1.28	0.9201	0.3108	9.5760	0.5964
AIICO	2008	1.13	1.3911	0.1500	4.6345	0.4768
AIICO	2009	0.26	2.5969	0.1565	102.9870	0.4978
AIICO	2010	1.01	3.9790	0.2018	72.2900	0.5588
AIICO	2011	0.67	1.9447	0.6154	71.7350	0.6517
AIICO	2012	0.71	2.5166	0.2868	30.4300	0.6676
AIICO	2013	1.70	1.4145	0.1178	88.7950	0.7449
AIICO	2014	0.92	1.5586	0.0912	48.3450	0.7989
AIICO	2015	1.09	1.5025	0.0000	66.9650	0.8810
AIICO	2016	0.81	1.5430	0.2291	14.0550	0.8927
AIICO	2017	0.77	2.8990	0.0059	185.1000	0.8814
AIICO	2018	1.25	2.7580	0.1342	44.6900	0.8539
Cornerstone	2007	2.12	0.5344	0.2394	87.1650	0.2367
Cornerstone	2008	1.12	0.1716	0.3309	17.9235	0.3234
Cornerstone	2009	0.28	1.0094	0.2385	26.7980	0.3630
Cornerstone	2010	0.54	1.2914	0.2961	15.3100	0.3972
Cornerstone	2011	0.88	1.2666	0.2600	1.6750	0.4771
Cornerstone	2012	1.01	1.3650	-0.4430	6.7000	0.4902
Cornerstone	2013	1.00	1.4902	0.2343	17.2400	0.5011
Cornerstone	2014	0.99	1.3650	0.0000	9.8700	0.4524
Cornerstone	2015	1.00	2.2999	0.3151	158.7000	0.4340
Cornerstone	2016	1.00	1.1283	0.3376	110.7250	0.5476
Cornerstone	2017	1.00	0.8413	0.2190	36.3750	0.7022
Cornerstone	2018	0.61	1.8125	0.3701	11.4000	0.6890
Guinea Ins.	2007	2.69	2.3459	0.0530	6.2790	0.1334
Guinea Ins.	2008	1.87	1.7495	0.2184	2.4345	0.1840
Guinea Ins.	2009	0.24	8.7232	0.2597	0.8127	0.2189
Guinea Ins.	2010	0.83	8.7255	0.2275	65.2250	1.0000
Guinea Ins.	2011	1.00	1.7305	0.2674	23.2700	0.3403
Guinea Ins.	2012	1.00	0.9489	0.2166	10.7738	0.3527
Guinea Ins.	2013	1.00	1.0340	0.1813	0.8250	0.2921
Guinea Ins.	2014	1.00	0.9435	0.1862	89.3550	0.3655
Guinea Ins.	2015	1.00	0.7920	0.1460	42.0900	0.2955
Guinea Ins.	2016	1.00	0.9585	0.2158	78.4750	0.2710
Guinea Ins.	2017	1.00	1.1095	0.2173	99.0970	0.2264
Guinea Ins.	2018	0.71	1.1764	0.2366	62.4850	0.2548
Lasaco	2007	2.49	1.6244	0.1752	123.9325	0.2945

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Lasaco	2008	1.17	0.2470	0.2258	106.8905	0.3121
Lasaco	2009	0.28	1.0322	2138346.0000	18.4530	1.0000
Lasaco	2010	0.58	1.2634	0.1042	20.9350	0.3634
Lasaco	2011	1.00	1.4027	0.3053	7.7900	0.4093
Lasaco	2012	1.00	1.4821	0.2276	221.5700	0.4458
Lasaco	2013	1.00	1.5837	0.2110	38.3550	0.4819
Lasaco	2014	1.00	1.7528	0.0860	76.3350	0.5493
Lasaco	2015	1.00	1.7966	0.0391	68.7800	0.5922
Lasaco	2016	1.00	2.1443	0.2808	1.6850	0.5679
Lasaco	2017	1.00	2.2275	0.2537	1.4300	0.5608
Lasaco	2018	0.68	3.2178	0.3649	5.1700	0.5025
Law Union	2007	1.19	0.4756	0.4110	40.4535	0.2267
Law Union	2008	1.27	0.5959	0.5007	22.5880	0.3730
Law Union	2009	0.25	1.0155	0.4725	0.4012	0.3392
Law Union	2010	0.46	2.5207	0.4612	34.2800	0.3702
Law Union	2011	0.96	2.5963	0.4852	14.1650	0.3693
Law Union	2012	0.95	1.9520	0.3680	28.7950	0.4590
Law Union	2013	1.00	2.3800	0.3936	2.4950	0.3961
Law Union	2014	1.00	1.6224	0.3519	127.9050	0.4266
Law Union	2015	1.09	2.4245	0.1492	56.9300	0.4611
Law Union	2016	1.17	2.9324	-0.6692	1.4300	0.4127
Law Union	2017	1.29	1.9671	0.0087	1.8000	0.3555
Law Union	2018	0.92	1.9263	0.0573	4.2000	0.4317
Linkage	2007	2.71	0.4507	-508570.0000	3.6885	1.0000
Linkage	2008	0.91	0.2902	2013697.0000	24.8840	1.0000
Linkage	2009	0.21	1.5900	0.2490	1.9020	0.0000
Linkage	2010	0.94	3.8002	0.1711	182.9800	0.2282
Linkage	2011	1.00	3.5648	0.1141	110.3100	0.2214
Linkage	2012	1.00	5.7709	-0.2054	69.8550	0.1239
Linkage	2013	1.00	3.8420	-0.2440	208.6950	0.1336
Linkage	2014	1.00	3.8969	-0.1335	0.4403	0.1329
Linkage	2015	1.00	4.0774	0.1262	3.5455	0.1633
Linkage	2016	1.00	3.5632	-0.1068	35.3650	0.1869
Linkage	2017	1.40	4.3002	0.0773	9.0250	0.1440
Linkage	2018	1.09	2.6827	0.0331	9.6600	0.2257
Mutual Benefits	2007	3.89	0.4703	0.2098	19.9465	0.3815
Mutual Benefits	2008	1.06	0.2328	0.2303	24.4650	0.4827
Mutual Benefits	2009	0.27	1.0990	0.2074	0.2585	0.5094
Mutual Benefits	2010	0.61	1.5654	0.2433	23.1500	0.4844
Mutual Benefits	2011	0.95	2.0123	0.3217	20.6400	0.5213
Mutual Benefits	2012	1.00	0.7846	0.2599	171.4350	0.6413
Mutual Benefits	2013	1.00	0.8263	0.1104	211.0950	0.9261
Mutual Benefits	2014	1.01	1.3872	0.2290	231.2650	0.8527
Mutual Benefits	2015	0.99	1.5503	0.1975	115.2100	0.8349
Mutual Benefits	2016	1.00	1.2027	0.1099	24.4450	0.8637
Mutual Benefits	2017	1.40	1.3667	0.0930	134.5250	0.8563
Mutual Benefits	2018	0.47	1.9960	0.0994	1.2850	0.8541
NEM Insurance	2007	2.97	0.4232	0.4091	101.7343	0.2340
NEM Insurance	2008	1.01	0.2979	0.6575	32.5125	0.1921
NEM Insurance	2009	0.24	1.7628	5.0348	15.0740	6.4442
NEM Insurance	2010	0.72	2.1173	3.6582	22.7000	5.3679
NEM Insurance	2011	0.99	2.3515	0.7404	26.7000	0.1903
NEM Insurance	2012	0.95	1.5950	0.8650	73.6450	0.4306
NEM Insurance	2013	1.44	1.1778	0.5546	199.4450	0.5134
NEM Insurance	2014	1.04	3.4361	0.6209	169.5150	0.4625
NEM Insurance	2015	0.89	2.4869	0.5026	10.1700	0.4865
NEM Insurance	2016	1.20	2.0387	0.1627	51.3300	0.4886

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NEM Insurance	2017	1.33	1.4992	0.6389	24.8500	0.4459
NEM Insurance	2018	2.52	1.0230	0.5257	2,214.7850	0.4460
Niger Insurance	2007	1.24	0.6718	0.0844	50.4435	0.5320
Niger Insurance	2008	1.36	0.4313	0.2662	3.5180	0.6971
Niger Insurance	2009	0.28	1.4311	0.3336	6.6020	0.7837
Niger Insurance	2010	0.40	1.4463	0.2389	9.0050	0.8877
Niger Insurance	2011	0.87	1.2694	0.3024	10.7450	0.7346
Niger Insurance	2012	0.85	2.1036	0.3456	27.6950	0.6739
Niger Insurance	2013	1.00	2.0367	-0.1279	32.7600	0.6741
Niger Insurance	2014	1.00	2.0533	0.2857	2.3150	0.6423
Niger Insurance	2015	1.00	2.1255	0.3006	23.5100	0.5965
Niger Insurance	2016	1.00	4.2271	0.1080	9.1450	0.6262
Niger Insurance	2017	1.00	1.9120	0.1701	115.4000	0.6671
Niger Insurance	2018	0.64	2.6512	0.1642	92.7700	0.6269
Prestige	2007	1.44	0.6858	0.2475	2.2220	0.2550
Prestige	2008	1.30	0.3917	0.3297	2.3025	0.2650
Prestige	2009	0.31	0.4617	0.4580	31.5750	0.3739
Prestige	2010	0.71	0.7511	0.3563	12.9050	0.3704
Prestige	2011	0.59	0.8179	0.2329	14.5950	0.3238
Prestige	2012	0.36	2.2178	0.3114	5.6200	0.5999
Prestige	2013	1.05	6.4133	0.3535	20.3850	0.5645
Prestige	2014	0.95	0.9440	0.1127	7.2500	0.6307
Prestige	2015	0.92	3.7576	0.1360	29.6100	0.4396
Prestige	2016	1.00	3.5118	0.2186	37,058.0000	0.3572
Prestige	2017	1.00	4.2678	0.3402	53.8450	0.3624
Prestige	2018	1.09	5.1700	0.1653	3.1500	0.3778
Standard Allian	2007	2.48	0.2762	0.2425	10.6870	0.1421
Standard Allian	2008	0.96	2.1514	0.1115	10.8175	0.0469
Standard Allian	2009	0.28	1.6057	0.1273	0.7400	0.1232
Standard Allian	2010	0.55	1.2464	0.3344	13.5750	0.3373
Standard Allian	2011	0.96	1.4221	0.4400	117.1450	0.3613
Standard Allian	2012	1.00	1.1475	0.5486	151.5300	0.4545
Standard Allian	2013	1.00	1.1251	0.2195	0.3250	0.4564
Standard Allian	2014	1.00	0.8048	0.3091	6.3010	0.5574
Standard Allian	2015	1.00	0.6965	0.1394	203.0550	0.6100
Standard Allian	2016	1.00	0.7666	0.0889	0.0004	0.6429
Standard Allian	2017	1.00	0.8390	0.2297	12.5523	0.6171
Standard Allian	2018	0.70	0.8977	0.1655	54.4450	0.6031
Sovereign Trust	2007	3.07	0.4439	0.3659	4.3670	0.1873
Sovereign Trust	2008	1.11	0.4606	0.4649	64.3460	0.3244
Sovereign Trust	2009	0.23	1.0575	0.4327	0.8050	0.3476
Sovereign Trust	2010	0.69	1.4407	0.3046	0.7008	0.6073
Sovereign Trust	2011	1.00	0.6554	0.7950	0.0195	0.6759
Sovereign Trust	2012	1.00	0.9940	0.8677	0.0183	0.5587
Sovereign Trust	2013	1.01	1.2110	0.6011	0.5664	0.5973
Sovereign Trust	2014	0.99	1.2110	0.6011	0.0005	0.5584
Sovereign Trust	2015	1.00	1.2050	0.5674	0.0014	0.4576
Sovereign Trust	2016	1.00	1.2554	0.5837	0.0005	0.4496
Sovereign Trust	2017	1.00	1.3121	0.5833	0.4158	0.4942
Sovereign Trust	2018	0.56	1.9938	0.5383	1.2875	0.4859
Unic Diversified	2007	1.48	0.5476	0.2814	38.2940	0.3247
Unic Diversified	2008	0.93	0.5443	0.3318	6.2275	0.4118
Unic Diversified	2009	0.26	1.7478	0.2257	2.1965	0.4999
Unic Diversified	2010	0.72	1.8935	0.0191	11.0300	0.5530
Unic Diversified	2011	0.81	2.2767	0.0204	3.6900	0.5203
Unic Diversified	2012	1.00	2.0920	0.0000	25.6650	0.5378
Unic Diversified	2013	1.00	3.5110	-0.0343	0.0019	0.6433

Firm	Year	STR "N"	Book-To-Mkt Ratio	Net Int. Margin Ratio	FSZ "N'M"	LVR Ratio
Unic Diversified	2014	1.00	3.3865	-0.4915	0.7500	0.7616
Unic Diversified	2015	1.00	3.3865	0.0000	3.3800	0.7616
Unic Diversified	2016	1.00	1.6801	0.0020	0.0000	0.5584
Unic Diversified	2017	1.00	2.1781	0.0098	197.9075	0.6062
Unic Diversified	2018	0.50	3.7554	0.0044	31.2250	0.6062
Wapic Insurance	2007	1.18	0.4026	0.1515	31.9935	0.2654
Wapic Insurance	2008	1.07	0.2712	0.4720	7.9875	0.2985
Wapic Insurance	2009	0.25	0.7356	0.3784	17.7660	0.2569
Wapic Insurance	2010	0.37	1.9549	0.2285	14.5700	0.2570
Wapic Insurance	2011	0.75	2.4062	0.2433	8.7500	0.2170
Wapic Insurance	2012	1.06	2.8279	0.1451	7.2550	0.2220
Wapic Insurance	2013	1.77	1.3087	0.3230	299.5950	0.2608
Wapic Insurance	2014	0.78	1.6293	1.2000	0.0630	0.2737
Wapic Insurance	2015	0.65	2.1780	0.2073	34.5700	0.2772
Wapic Insurance	2016	0.99	2.2467	0.1743	13.0400	0.2700
Wapic Insurance	2017	1.00	2.2956	0.2168	9.2550	0.2798
Wapic Insurance	2018	0.97	1.7754	0.3343	45.7450	0.3771
Royal Exchange	2007	1.38	0.5017	0.0949	3.8540	0.2353
Royal Exchange	2008	1.01	3.4219	-0.0045	1.0410	5.2394
Royal Exchange	2009	0.39	13.0046	8.2549	0.9105	0.2610
Royal Exchange	2010	0.36	52.9656	0.0742	25.5850	0.0976
Royal Exchange	2011	0.84	19.9694	0.2008	7.2450	0.0993
Royal Exchange	2012	1.00	16.0165	0.6981	68.7300	0.1069
Royal Exchange	2013	1.17	13.4907	0.8204	8.2850	0.1042
Royal Exchange	2014	0.93	15.4373	0.7777	73.0250	0.2336
Royal Exchange	2015	0.91	15.2033	0.7614	2.3350	0.2667
Royal Exchange	2016	0.99	14.3466	0.7712	204.5900	0.3729
Royal Exchange	2017	1.00	13.4147	0.7042	0.5300	0.4978
Royal Exchange	2018	0.56	16.2913	-0.3037	2.8750	0.6443
Union Homes	2007	1.22	0.3123	0.0232	0.0825	0.9233
Union Homes	2008	0.67	0.2754	0.0362	146.0855	0.8625
Union Homes	2009	0.23	0.5295	0.0415	21.8035	0.8734
Union Homes	2010	0.49	6.6354	0.0039	48.6050	0.9984
Union Homes	2011	0.74	-0.9560	0.0562	28.8400	1.1357
Union Homes	2012	0.82	-2.7286	0.0620	0.0060	1.2858
Union Homes	2013	1.00	48.0727	0.5821	1.8930	1.5651
Union Homes	2014	1.00	49.2946	0.6207	225.1950	1.7073
Union Homes	2015	7.64	46.8845	2.4842	272.8400	1.6746
Union Homes	2016	0.90	66.5042	4.8113	191.5100	-0.0443
Union Homes	2017	0.88	108.2045	4.6832	6.7632	-0.0450
Union Homes	2018	0.12	67.8441	4.6428	33.4429	-0.1075

Keys:
STR = Stock return
BMR = Book-To-Martket Ratio
NIM = Net Interest Margin Ratio
FSZ= Firm Size
LVR = Leverage

APPENDIX B

```
. xtsum str bmr nim fsz lvr mpr
```

Variable		Mean	Std. Dev.	Min	Max	Observations
str	overall	1.040144	.6827	.12	7.64	N = 348
	between		.1184877	.8783333	1.3275	n = 29
	within		.67267	-.149023	7.370977	T = 12
bmr	overall	2.16968	2.755737	-2.7286	19.9694	N = 348
	between		2.05263	.539525	12.19955	n = 29
	within		1.874663	-9.528169	13.20721	T = 12
nim	overall	.2742552	.7196694	-.6692	8.2549	N = 348
	between		.3638539	.0307333	1.503942	n = 29
	within		.6242845	-1.225786	7.458355	T = 12
fsz	overall	24.32152	8.841858	8.04	39.12	N = 348
	between		2.345757	20.795	28.54667	n = 29
	within		8.53524	7.774856	40.68319	T = 12
lvr	overall	.5192638	.1603639	.2194	.682	N = 348
	between		.032467	.465	.5904583	n = 29
	within		.1571493	.1803305	.7362638	T = 12
mpr	overall	.109225	.0247918	.0608	.14	N = 348
	between		0	.109225	.109225	n = 29
	within		.0247918	.0608	.14	T = 12

```
.
. swilk str bmr nim fsz lvr mpr
```

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
str	348	0.63768	88.077	10.587	0.00000
bmr	348	0.60317	96.468	10.802	0.00000
nim	348	0.33092	162.649	12.037	0.00000
fsz	348	0.97662	5.684	4.108	0.00002
lvr	348	0.81833	44.162	8.955	0.00000
mpr	348	0.94803	12.633	5.996	0.00000


```
. pwcorr str bmr nim fsz lvr mpr, star (0.05) sig
```

	str	bmr	nim	fsz	lvr	mpr
str	1.0000					
bmr	-0.0838 0.1189	1.0000				
nim	0.0582 0.2787	0.2918* 0.0000	1.0000			
fsz	0.3735* 0.0000	-0.0937 0.0808	-0.0245 0.6483	1.0000		
lvr	0.2150* 0.0001	0.0079 0.8827	0.0156 0.7712	-0.3285* 0.0000	1.0000	
mpr	-0.0038 0.9442	0.1460* 0.0064	-0.0302 0.5740	-0.1779* 0.0009	0.1645* 0.0021	1.0000

```
. reg str bmr nim fsz lvr mpr
```

Source	SS	df	MS
Model	148.701265	5	29.7402529
Residual	389.126483	342	1.13779673
Total	537.827748	347	1.54993587

```
Number of obs =     348
F(  5,   342) =   26.14
Prob > F      =  0.0000
R-squared     =  0.2765
Adj R-squared =  0.2659
Root MSE      =  1.0667
```

str	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
bmr	-.0318927	.0220826	-1.44	0.150	-.0753275	.0115422
nim	.149345	.0834651	1.79	0.074	-.0148246	.3135147
fsz	.0700526	.0069396	10.09	0.000	.056403	.0837022
lvr	2.884653	.3809599	7.57	0.000	2.135334	3.633973
mpr	1.83659	2.392338	0.77	0.443	-2.868959	6.542138
_cons	-1.54801	.3990496	-3.88	0.000	-2.332911	-.7631099

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of str

         chi2(1)      =    91.28
         Prob > chi2  =   0.0000
```



```
. vif
```

Variable	VIF	1/VIF
fsz	1.15	0.870928
lvr	1.14	0.878544
bmr	1.13	0.885440
nim	1.10	0.908780
mpr	1.07	0.932125
Mean VIF	1.12	

```
. xtreg str bmr nim fsz lvr mpr, fe

Fixed-effects (within) regression               Number of obs      =       348
Group variable: id                              Number of groups   =        29

R-sq:  within  = 0.2604                         Obs per group: min =        12
       between = 0.5445                                        avg =      12.0
       overall = 0.2757                                        max =        12

                                                F(5,314)           =     22.12
corr(u_i, Xb)  = 0.0780                         Prob > F           =    0.0000
```

str	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
bmr	-.0433813	.0328767	-1.32	0.188	-.1080678	.0213051
nim	.1645933	.096028	1.71	0.088	-.0243464	.3535331
fsz	.0666895	.00733	9.10	0.000	.0522674	.0811116
lvr	2.81916	.3969918	7.10	0.000	2.038059	3.60026
mpr	1.892678	2.482136	0.76	0.446	-2.991044	6.776399
_cons	-1.417587	.4151574	-3.41	0.001	-2.234429	-.6007455
sigma_u	.22520162					
sigma_e	1.089357					
rho	.04098527	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(28, 314) =     0.50                 Prob > F = 0.9860

. est store fixed
```



```
. xtreg str bmr nim fsz lvr mpr, re

Random-effects GLS regression                   Number of obs      =       348
Group variable: id                              Number of groups   =        29

R-sq:  within  = 0.2600                         Obs per group: min =        12
       between = 0.5912                                        avg =      12.0
       overall = 0.2765                                        max =        12

                                                Wald chi2(5)       =    130.69
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

str	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
bmr	-.0318927	.0220826	-1.44	0.149	-.0751738	.0113884
nim	.149345	.0834651	1.79	0.074	-.0142437	.3129337
fsz	.0700526	.0069396	10.09	0.000	.0564513	.0836539
lvr	2.884653	.3809599	7.57	0.000	2.137986	3.631321
mpr	1.83659	2.392338	0.77	0.443	-2.852306	6.525486
_cons	-1.54801	.3990496	-3.88	0.000	-2.330133	-.7658875
sigma_u	0					
sigma_e	1.089357					
rho	0	(fraction of variance due to u_i)				

```
. est store random
. hausman fixed random
```

	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
bmr	-.0433813	-.0318927	-.0114887	.0243564
nim	.1645933	.149345	.0152483	.0474864
fsz	.0666895	.0700526	-.0033631	.0023603
lvr	2.81916	2.884653	-.0654937	.1116784
mpr	1.892678	1.83659	.0560878	.6616046

```
                b = consistent under Ho and Ha; obtained from xtreg
    B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test:  Ho:  difference in coefficients not systematic

          chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                  =        2.55
        Prob>chi2 =      0.7693
```



```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        str[id,t] = Xb + u[id] + e[id,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                 --------+------------------------------
                     str |    1.549936       1.244964
                       e |    1.186699       1.089357
                       u |           0              0

        Test:   Var(u) = 0
                                 chibar2(01) =     0.00
                              Prob > chibar2 =   1.0000

. reg str bmr nim fsz lvr mpr, robust

Linear regression                               Number of obs =     348
                                                F(  5,   342) =   27.67
                                                Prob > F      =  0.0000
                                                R-squared     =  0.2765
                                                Root MSE      =  1.0667

------------------------------------------------------------------------------
             |               Robust
         str |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         bmr |  -.0318927   .0210842    -1.51   0.131    -.0733637    .0095784
         nim |    .149345   .0713368     2.09   0.037     .0090308    .2896592
         fsz |   .0700526    .007661     9.14   0.000     .0549841    .0851211
         lvr |   2.884653   .2802383    10.29   0.000     2.333446    3.435861
         mpr |    1.83659   2.526457     0.73   0.468    -3.132762    6.805941
       _cons |   -1.54801   .3688436    -4.20   0.000    -2.273498   -.8225229
------------------------------------------------------------------------------
```