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Volatility - return paradigm of foreign private portfolio investment in Nigeria

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ABSTRACT

The study aimed at capturing foreign private portfolio investment volatility as a determinant of its return. The study covered the periods between 1981 and 2013. An Exponential Generalized Autoregressive Conditional Heteroscedasticity (EGARCH) was specified and estimated using the maximum likelihood technique. The result reveals that foreign private portfolio investment volatility explains foreign private portfolio investment return. The result also revealed that good news has positive effect on foreign private portfolio returns while Momentum of risk in the system had profound effect on volatility. The EGARCH model significantly captures thick tailed returns and volatility clustering. News about volatility from previous period had no significant effect on current volatility. The persistence of volatility shocks were close to unity so that the shocks die out rather slowly. These outcomes suggest that investment selection should consider investment based on the dominance principle; negatively signed leverage term; lower momentum of risk; lesser shocks and innovation; less persistent volatility shock; and reasonable capacity to accommodate effects of "non – trading periods", and accumulate predictable information releases or forecastable events at a higher rate".

Keywords:

Volatility-return,
Foreign private portfolio
Investment,
E-Garch

Contribution/ Originality

We examine portfolios investment return through its implied risk from an inward approach better identified as a capital liability pricing model (CLPM) looking at it from the vista of the flow of capital to host economy unlike other models, say CAPM whose natural implication is that individual stock is clearly influenced by the volatility of the market as a whole.

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1. INTRODUCTION

Financial economists have demonstrated that asset allocation, risk exposure factor and the noise of the market as well as human emotions and research are among the most important determinants of an investment's return. On the other hand, Ihejirika and Anyawu (2013) wrote that among the factors that affect options pricing – stock price volatility, time to expiration, exercise price, current stock price, dividend rates and interest rate – stock price volatility is the most important. Earlier, Fama and French (2012) in their work: "Volatility and Premiums in the US Equity Returns" asserts that understanding volatility is crucial for informed investment decisions. The importance attached to stock market and equity price volatility and indeed, Foreign Private Portfolio Investment volatility as it affects returns on investment as seen by Black and Scholes (1973) emphasized that investors needed to estimate only one parameter, the volatility, and input it into a relative simple formula to find the price of an option. More recently, Harvey and Lange (2015) observe that there is evidence for a double relation between volatility and returns in equity markets. They state that longer-term fluctuations of volatility mostly reflect risk premiums and hence establish a positive relation to returns while short-term swings in volatility often indicate news effects and shocks to leverage, causing a negative volatility-return relation.

Volatility has been described simply as a measure of risk (uncertainty) or variability of price of a financial instrument over time. The term "volatility" may refer to historical volatility (how much the company stock actually fluctuated in the past) or implied volatility (how much the market expects the stock will fluctuate in the future). One basic tenet of financial economics is the positive relationship between risk and return giving rise to the dictum: the higher the risk, the higher the return. In other words, the return to risky assets tend to be higher than the return to less risky assets compensating an investor for taking on the risk of buying the more volatile asset. Accepted, Finometric constructs capturing time varying volatility in investments exist, but none of these Constructs explicate foreign private portfolio investment return through its volatility in Nigeria. This creates a research gap. Therefore, it is essential to have a good understanding of Volatility – Return Paradigm of Foreign Private Portfolio Investment in Nigeria as this is necessary for any prudent investor to make smart portfolio decisions.

In light of this gap, this study therefore seeks to establish a paradigm that explicates foreign private portfolio investment (FPPI) return through its implied risk. The research compass focuses on the Nigerian economic system foreign investment from an inward vista, more pointedly foreign portfolio investment from private wellspring.

Following the above introduction, the paper is organized as follows: Section two deals with review of related literature. Section three explores our methodology while section four deals with data analysis and results. Finally, the conclusion is presented in section five.

2. LITERATURE REVIEW

2.1. Foreign private portfolio investment volatility

A conceptual definition of portfolio investment, foreign private portfolio investment and Returns on International Investments is not lacking in the literature and has been articulated in Ihejirika *et al*. (2017) same authors of the present study. However, it is important to add that in a staff paper prepared by the United Nations Conference on Trade and Development (UNCTAD) (1999). secretariat titled "Comprehensive Study of the Interrelationship between Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI)", Foreign Portfolio investment is said to include investments by a resident entity in one country in the equity and debt securities of an enterprise resident in another country which seek primarily capital gains and do not necessarily reflect a significant and lasting interest in the enterprise. The paper goes on to say that the category includes investments in bonds, notes, money market instruments and financial derivatives other than those included under direct investment, or in other words, investments which are both below the 10% rule and do not involve affiliated enterprises.

In addition to securities issued by enterprises, foreigners can also purchase sovereign bonds issued by governments. According to the IMF's 1996 *Coordinated Portfolio Investment Survey Guide* the essential characteristic of instruments classified as portfolio instruments is that they are traded or tradable. Thus, foreign private Portfolio Investment Volatility is simply a measure of risk (uncertainty) or variability of foreign private Portfolio Investments flows over time. The term "volatility" may refer to historical volatility (how much foreign private portfolio investments actually fluctuated in the past) or implied volatility (how much the market expects foreign private portfolio investments will fluctuate in the future).

2.2. Empirical literature

Much empirical material examine the effect and impact of interest rate, inflation rate, exchange rate volatility, political instability, threat of nationalization on foreign private investment on the Nigerian economy. We review the methodologies, and results a few of the related empirical studies below. However, the present study emphasizes on the risks (say, interest rate risk and inflation rate risk) as the affect foreign private portfolio investment returns.

Beginning with earlier studies, we start with Campbell and Hentschell (1992) who explain the drop in stock prices associated with an increase in volatility within the context of an economic model using a QARCH formulation. In their model, exogenous rises in stock volatility increase discount rates, lowering stock prices. In a different study, Engle and Victor (1993) in their paper defined the news impact curve which measures how new information is incorporated into volatility estimates. Various new and existing ARCH models including a partially nonparametric one were compared and estimated with daily Japanese stock return data. New diagnostic tests were presented which emphasized the asymmetry of the volatility response to news. Finally, the EGARCH were found to capture most of the asymmetry.

In their study, Barrell *et al*. (2004) investigated the relationship between exchange rate uncertainty and the location of US foreign direct investment in Europe by adopting the mean-variance approach to the standard q theory of investment in order to highlight the impact of exchange rate volatility and exchange rate correlation on investment. They estimated US foreign investment in the UK and in Continental Europe in a panel of seven manufacturing industries. There results show that US firms investing in Europe tend to be risk-averse and decrease their investments as exchange rate volatility rises. Secondly, they found that market power does not seem to reduce the effects of exchange rate volatility on FDI. And lastly an increase in the correlation between the sterling dollar exchange rate and the euro dollar exchange rate tends to relocate US investment from the Euro Zone to the UK.

In Nigeria, Udoh and Egwaikhide (2008) while examining the effect of exchange rate volatility and inflation uncertainty on foreign direct investment, estimated the variables using the GARCH model. Estimation results indicated that exchange rate volatility and inflation uncertainty exerted significant negative effect on foreign direct investment during the period.

Wang and Xu (2009), Taking a hint from the drastic 2008 – 2009 episode examined whether market volatility is linked to momentum. They found that market volatility indeed has significant and robust predictive power for momentum profits, especially in negative market states. In contrast to the cross sectional relation that momentum profitability is higher among firms with higher information uncertainty or higher default risk. Their tests show that volatile down markets forecast low momentum payoffs. The time series predictability of momentum was asymmetric, which arose from loser stocks. Jointly, their new findings raise a tough challenge to the existing theories on momentum.

Several versions of the intertemporal Capital Asset Pricing Model predict that changes in aggregate volatility are priced into the cross – section of stock returns. Literature confirms this prediction and suggests that it is a risk factor. However, prior studies do not test whether asymmetric volatility affects if firm sensitivity to innovations in aggregate volatility is related to risk, or is just a characteristic uniformly affecting all firms. They found that sensitivity to innovations affect returns when volatility

is rising. But not when it is falling. When innovations rise this sensitivity is a priced risk factor, but when it falls there is a positive impact on all stocks irrespective of loadings.

Tamarauntari and Bernard (2012) examined the effect of information asymmetries on macroeconomic volatility and Foreign Portfolio Investment volatility in Nigeria using the AR(k) – EGARCH (p,q) model, and the nexus between macroeconomic uncertainty and FPI volatility in Nigeria using the LA-VAR Granger causality test. Quarterly time series data were drawn from the Central Bank of Nigeria Statistical Bulletin, 2011 spanning through 1986Q1 to 2011Q4. The study found that all the included variables were highly volatile and responded asymmetrically to information shocks. The results also predicted that a stable macroeconomic environment is necessary for steady Foreign Portfolio Investment inflow and steady Foreign Portfolio Investment inflow is also needed for some levels of macroeconomic stability.

Abdullahi *et al.* (2012) studied the contemporaneous long-run dynamics of the impact of foreign private investment, interest rate and inflation rate on economic growth in Nigeria for the period 1970-2009. The results indicate a uni-directional causality relationship between GDP and FDI at 5%, while the result of granger causality shows that some of the variables Granger cause one another.

Omorokunwa and Ikponmwosa (2014) investigated the dynamic relationship between exchange rate volatility and foreign private investment in Nigeria from 1980 – 2011. They employed error correction model (ECM) after a battery of preliminary investigations which include the ADF test for stationarity and the Engle and Granger two step cointegration procedure They found among other things that exchange rate volatility has a very weak effect on the inflow of Foreign Direct Investment to Nigeria, both in the long run and in the short run and that exchange rate volatility has a weak effect on foreign portfolio investment in the short run, but a strong positive effect in the long run.

More recently, Harvey and Lange (2015) in their study "Modeling the Interactions between Volatility and Returns" report that Volatility of a stock may incur a risk premium leading to a positive correlation between volatility and returns while on the other hand the leverage effect, whereby negative returns increase volatility, acts in the opposite direction. They proposed a reformulation and extension of the ARCH in Mean model and thus apply the EGARCH model in which the logarithm of scale is driven by the score of the conditional distribution. By employing a two component extension they were able to distinguish between the long and short run effects of returns on volatility. They opine that the EGARCH formulation allows more flexibility in the asymmetry of the response (leverage) and this enables them to find that the short-term response was, in some cases, close to being anti-asymmetric. The long and short run volatility components were shown to have very different effects on returns, with the long-run component yielding the risk premium.

Finally, Reza *et al.* (2018) analyzed stock returns and volatility of the global water industry. The study estimated ARMA (1, 1)-GARCH (1, 1) and EGARCH (1, 1) models on the World Water index (WOWAX), S-Network Global Water Index (S-Net), S&P Global Water Index (S&P), and MSCI ACWI Water Utilities Index (MSCI ACWI), the Asia, Europe, Latin America and US water markets, Pictet Global Water Fund (Pictet), and KBC Eco Water Fund (KBC Eco) for the period 2004–2014. Their EGARCH (1, 1) model results suggest the existence of persistence of volatility from four water indices, four water markets and two water funds in different periods and asymmetric volatility (leverage) for Asia and US, S-Net and Pictet in full, pre-GFC and GFC periods and for WOWAX in GFC and post-GFC periods. They found that the WOWAX was not highly correlated with water markets and water funds, which suggests that it may provide a possible opportunity for portfolio diversification in different periods.

3. RESEARCH METHODOLOGY

3.1. Research design

The research follows a non-experimental design. The research is an ex post facto research. This means that relationships are investigated after the fact has been known. The variables needed were specified viz. foreign private portfolio investment return and risks.

3.2. Sources of data

The data typology is time series data. The sample size for the analysis was determined judgmentally. Desk data spanning from 1981 to 2013 serves as time frame within which our analysis remains valid. The researchers adopt the output of their previous work "principal components of Nigerians foreign private portfolio investment volatility" and "empirical regularities of Nigerians foreign private portfolio investment return and volatility" Ndugbu *et al.* (2017) and Ihejirika *et al.* (2017).

3.3. Tools of analysis

Toward achieving the research aforementioned objective an Exponential generalized autoregressive conditional heteroskedasticity (EGARCH) – in mean between return and risk was modeled. The EGARCH model was proposed by Nelson. EGARCH compounds four concepts: exponential autoregressive, heteroskedasticity and conditional. Conditional describes a situation when an investor has information up to a certain point in time. Conditioning improves precision. The ARCH /GARCH process is often seen as a way of modeling time varying risk. Thus, instead of identifying the factors that explains time varying risk, the consequences of time varying risk can be picked-up and modeled with an ARCH/GARCH process. GARCH is useful for situations when it is important to understand risk as measured by the implied volatility of the variable. GARCH model is intuitively appealing as it explains volatility as a function of shocks or news by financial analysts. EGARCH represent the unexpected. According to the GARCH model, the larger the shock the greater the volatility.

ARCH/GARCH is not the only way of approaching observed volatility. An alternative, but less common approach is to view the time varying variance as a sign of a missing variable in the model (so-called stochastic volatility)(SV). The model approaches the problem with so-called latent variable models techniques.

The maximum likelihood (ML) method is used to estimate the parameters of the structural equations. The log likelihood function is given as:

$$Log\ (L) = \Sigma^{T}_{i=1}\ (-log\{var_t\} - e^2_t) / var_t$$

The ML estimator is one that maximizes the density function of our model.

The construct captures essence of conceptual and theoretical framework in its specification. The study aims at determining foreign private portfolio investment return on its implied risk. Thus, spontaneously foreign private portfolio investment return is the endogenous variable.

The Finometric model in question is the Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) – in mean sector I given by equation (1) and (2):

$$FPI_R = b_0 + Klog(h_t) + b_1AA + e_t \quad \ldots\ldots\ldots\ldots\ldots\ldots 1$$

$$Log(h_t) = w + a_1|e^2_{t-1}/\delta_{t-1}| + b_2log(h_{t-1}) + re^2_{t-1}/\delta_{t-1} + a_2CR_t + a_3PR_t + a_4MR_t + a_5LR_t + a_6RR_t + a_7IR_t + a_8HR_t + a_9LR_t + a_{10}FIR_t + a_{11}KR_t + a_{12}TR_t + v_t \quad \ldots\ldots\ldots\ldots\ldots\ldots 2$$

The second equation is fine tuned to encompass the Principal Components as follows:

$$Log(h_t) = w + a_1|e^2_{t-1}/\delta_{t-1}| + b_2 log(h_{t-1}) + re^2_{t-1}/\delta_{t-1} + a_2TR_t + a_3LR_t + a_4ER_t + a_5PR_t + a_6CR_t + a_7MR_t + v_t \quad \ldots\ldots\ldots\ldots\ldots\ldots 3$$

Where

r – Asymmetric or Leverage effect.
h_t- Implied volatility.
AA – Asset Allocation.
TR - Taxability Risk.
PR - Political Risk.
MR - Market Risk.
v – Risk shock.
$FPPI_R$ – Foreign Private Portfolio Investment Returns.
K – Risk - return tradeoff.
e_t– Returns shock.
LR – Liquidity Risk.
ER - Economic Risk.
CR – Commodity Risk.

GARCH-in-mean (GARCH-M) model provide three distinct specifications – one for the conditional mean equation, one for conditional variance, and one for conditional error distribution. The conditional variance is a function of three terms:

- a conditional term
- News about volatility from the previous period, measured by e^2_{t-1} (the ARCH term)
- Amplitude of return (the GARCH term)

4. DATA PRESENTATION AND ANALYSIS

4.1. Preview

Toward achieving the research aforementioned objectives, an EGARCH – in - Mean model was estimated. The construct examines foreign private portfolio investment (FPPI) volatility as a determinant of its return.

4.2. Data presentation

The table array of variables needed for this analysis is presented below.

Table 1: Cell array of the principal component risks

	Taxability risks	Liquidity risk	Economic Risk	Political risk	Commodity risk	Market risk
1981	NA	NA	NA	NA	NA	NA
1982	-1.2874	-0.5404	-1.7263	-3.0995	-1.5984	-0.3691
1983	-0.2347	0.0593	-1.5648	-2.0171	-0.5842	-0.4403
1984	0.1609	0.0588	-1.0788	-0.9625	-0.5764	-0.0456
1985	-0.7089	-0.5568	-0.3829	-0.4402	-0.3884	0.0793
1986	-1.1000	-0.1800	-0.0141	-0.3665	0.1322	0.0260
1987	0.3413	0.3980	-0.6117	-0.2405	0.2815	-0.9780
1988	1.4058	-0.7495	-0.6047	-1.1706	0.7293	-0.3616
1989	0.1001	-0.1320	-0.7389	-0.2399	-0.0647	-0.2183
1990	1.0040	-1.3196	0.2370	-0.5001	0.6020	-0.4055
1991	0.3778	-2.3538	0.5834	0.8065	-0.3917	0.2009
1992	0.7647	0.0915	-0.7114	-0.7542	0.5637	-0.6393
1993	-0.1895	0.7325	-1.3845	1.2666	0.6554	0.8609
1994	-0.1744	0.8954	-2.8154	1.3809	0.9660	1.1793
1995	2.7936	4.1089	-0.8937	0.5835	0.3458	2.5910
1996	6.4336	-2.6008	1.8181	-0.8102	0.7872	0.8978
1997	0.2215	-1.6366	0.0526	1.0755	0.0541	-0.0960
1998	-1.0494	-1.9437	-0.6973	2.8758	0.0129	-0.1131

1999	-0.9375	-1.4186	-0.6989	2.4696	0.0406	-0.3753
2000	0.2136	-0.2904	-0.5417	0.0624	-0.0042	-0.1603
2001	1.1820	1.5831	2.5547	1.3825	-3.4824	-0.5399
2002	0.3156	1.3361	0.6312	0.3764	-1.8128	-1.3666
2003	-0.7169	-0.2915	-0.2003	0.0715	-0.1548	-0.0403
2004	-0.5282	-0.7836	-0.0158	0.1961	-0.2197	0.1973
2005	1.2389	1.5270	0.1464	0.0058	-0.4088	0.1600
2006	-0.0799	-0.1287	-0.7333	-0.1092	0.0598	-0.1139
2007	-0.9776	0.0003	0.2069	-0.0768	-0.3309	0.5385
2008	-1.4995	0.1357	0.9606	-0.2368	0.7235	0.2163
2009	-2.3996	0.6141	2.7593	-0.7339	2.5701	0.5247
2010	1.1116	2.2554	0.3775	0.2616	1.5479	-3.0052
2011	-1.0610	1.1510	1.5788	0.2110	1.6954	-1.7930
2012	-0.9014	-0.1292	-0.0812	-0.0096	-0.7274	0.1063
2013	-2.3196	-0.0173	1.8338	-1.0723	0.1725	2.5102

Source: An extract from the authors previous work "principal components of Nigerians foreign private portfolio investment volatility" and "empirical regularities of Nigerians foreign private portfolio investment return and volatility" Ndugbu *et al.* (2017) and Ihejirika *et al.* (2017).

4.3. Model adequacy

Measures such as coefficient of determination may not be meaningful if there are no regressors in the mean equation. The correlogram of the Q – statistics is used to check the specification of the mean equation. The correlogram in the appendix shows that the mean equation is correctly specified as all the Q statistics are not significant. The correlogram of squared residuals is used to check the specification of the variance equation. The correlogram in the appendix shows that the variance equation is correctly specified as all the Q statistics are not significant.

4.4. M – EGARCH Output

Table 2: MEGARCH result output

Mean equation = lnreturn on investment		
Variables	**Coefficient**	**Observed level**
C	-4.2834	0.0002
@SQRT(GARCH)	1.2809	0.0480
Returnoninvestment(-5)	0.0215	0.7614

Variance Equation = lngarch				
W	0.4350	0.3398	1.2802	0.2005
C(5)*Abs (Resid (-1)/@ Sqrt (Garch(-1)	0.5412	0.4849	1.1161	0.2644
Resid (-1)/@Sqrt(Garch (-1)	0.3571	0.3712	0.9620	0.3361
Log(Garch(-1))	0.7596	0.0907	8.3717	0.0000
Marketabilityrisk	-0.1164	0.0760	-1.5320	0.1255
Marketrisk	-0.0698	0.0908	-0.7691	0.4418
Politicalhorizonrisk	-0.1829	0.1046	-1.7492	0.0803
Economiclongevityrisk	-0.0438	0.0645	-0.6796	0.4968
Otherrisks	-0.1313	0.0932	-1.4089	0.1589
Liquidityexchangerateris	0.1462	0.1092	1.3389	0.1806
T-Dist. Dof	2.0120	0.0131	153.7406	0.0000

Source: E-views 9.1 output

The risk return tradeoff of 1.2809 is in line with financial principle, which postulates a positive relationship between risk and return. This is commendable, because introduction of exogenous or predetermined regressors in the variance equation, guarantees not that the forecasted variance will be positive. The statistical insignificance of the autoregressive term in the mean equation stands against implication of efficient markets theory. The weighted average of a long term average came out with the expected sign - greater than zero. The ARCH and GARCH term has the expected sign (0.5412) and (0.7596) - between zero and one. The coefficient of the ARCH term being less than one is essential, or the conditional variance will continue to increase overtime, eventually exploding.

The coefficient of the expected risk in the mean equation of 1.2809 is the risk return tradeoff. A one percent increase in risk will increase return by 1.2809. The constant term of the variance equation indicates that the weighted average of a long term average of volatility is 43%. This long term average captures effects of non-trading periods or forecastable events. The autoregressive (AR) term that governs persistence of volatility shocks is the sum of $\alpha + \beta$ {1.3008 = 0.5412+0.7596} is close to one, so that the shocks die out rather slowly (volatility shocks are quite persistent).

Given that the observed level (0.0480) is less than the 10% level, we conclude that foreign private portfolio investment volatility explains foreign private portfolio investment return. Given that the observed level (0.3361) is greater than the 10% level, we conclude that good or bad news has no asymmetric effects on volatility. This is not in tandem with an efficient or near efficient market. This is peculiar to the Nigerian case where asset prices and news tends to be independent. Given that the observed level (0.0000) is less than the 10% level, we conclude that momentum of risk in the system has significant effects on volatility. Given that the observed level (0.2644) is greater than the 10% level, we conclude that back shifted innovations in the system have significant effect on volatility.

4.5. Discussion of findings

The study revealed that foreign private portfolio investment volatility explains foreign private portfolio investment return. This aligns with basic tenets of financial economics. When risk increases, so do mean return. This result agrees with Campbell and Hentschell (1992) who found that exogenous rises in stock volatility increase discount rates, lowering stock prices. Barrell *et al*. (2004) is also supported by the findings of this study as they found that US firms investing in Europe tend to be risk-averse and decrease their investments as exchange rate volatility rises. More in agreement by the findings of this study relate to Harvey and Lange (2015) who report that modeling the interactions between volatility and returns may incur a risk premium leading to a positive correlation between volatility and returns. Intuitively return to risky assets tends to be higher than return to safe assets (low variation in returns) to compensate an investor for taking on the risk of buying the volatile asset.

News has no significant asymmetric or leverage effect on volatility. Leverage effect is a measure of business risk. The result revealed that market is experiencing good news (0.5412> 0), The good news has impact of 0.5412 on volatility, while when market experience bad news the effect on volatility is 0.8982 {0.5412 + 0.3570 = a_1 +r}. When negative news hit the financial market, asset returns tend to enter a turbulent phase and volatility increases. With positive news volatility tends to be small and the market enters a period of tranquility. But given that it is symmetric (r = 0) bad and good news have the same effect. The positive sign of the leverage term (0.3570) indicates that negative shocks have a larger effect on expected volatility than positive shocks. This does not align with the work of Tamarauntari and Bernard (2012) who found that all the included variables are highly volatile and responded asymmetrically to information shocks. News about volatility from previous period has no significant effect on volatility. This implies the larger the shock or innovations the greater the volatility.

Momentum of risk in the system had profound effect on volatility. This implies that the EGARCH model significantly capture thick tailed returns and volatility clustering. Momentum of risk of 76% indicates that volatility accumulate at a high rate. This aligns with the work of Wang and Xu (2009),

who found that market volatility indeed has significant and robust predictive power for momentum profits.

The persistence of volatility shocks is close to unity so that the shocks die out rather slowly. This implies that volatility shocks are quite persistent (see Reza *et al.*, 2018). The Variance Equation (lngarch) w (0.2005) value implies that the EGARCH model accommodates the effect of any non – trading periods and predictable information releases or forecastable events accumulate at a rate of 43%.

5. CONCLUSION

Foreign private portfolio investment volatility explains foreign private investment return. This aligns with basic tenets of financial economics. News had no significant asymmetric or leverage effect on volatility. Given that it is symmetric (r = 0) bad and good news have the same effect. Momentum of risk in the system had profound effect on volatility. This implies that the EGARCH model significantly capture thick tailed returns and volatility clustering. Momentum of risk of 76% indicates that volatility accumulate at a high rate. The larger the shocks, the greater the volatility. The w accommodates the effect of any non – trading periods and accumulates predictable information releases or forecastable events at a lower rate.

Based on the above conclusion the researcher proffers the following recommendation as a contribution to finance body of knowledge, as a blueprint of practical relevance to potential private and institutional investors intending to invest in Nigeria, as a portmanteau selection criteria to advanced analyst, as a springboard for further research in terms of methodology. It is therefore recommended that Investment decision should be based on risk – return tradeoff in other words, Investors should accept investment based on the dominance principle. Secondly, investments whose leverage term has a negative sign should be selected and Investments with lower momentum of risk as well should be selected. Further suggestions include that Investments with lesser shocks and innovation, Investments whose volatility shocks have lesser persistence and Investments that accommodate the effect of any non – trading periods and accumulate predictable information releases or forecastable events at a lower rate should be accepted.

The results of this study will serve as a blueprint of practical relevance to potential private and institutional investors intending to invest in Nigeria but who lack depth of analytical skill to ascertain the expected returns on investment through its risk. For advanced analyst, it serves as portmanteau selection criteria in investing in developing countries. With little modification on the country's main stay. For example in Nigeria, investment sector risk – return can be examined through oil and non-oil category. While studying Ghana, modification is simply made by examining sector risk – return through agriculture (cocoa) and non-agriculture category. The research contributes to literature as springboard for further research in terms of methodology and data. The research engages consultants who need to understand the fundamental ideas behind each type of risk, as they will be able to make investment recommendations to their clients with great confidence.

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Appendix

Ljung – Box Q statistic

Date: 10/19/16 Time: 03:46
Sample: 1981 2014
Included observations: 28
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. | . |	. | . |	1	-0.029	-0.029	0.0266	0.870
. | . |	. | . |	2	0.007	0.007	0.0284	0.986
. | . |	. | . |	3	0.002	0.002	0.0285	0.999
. |* . |	. |* . |	4	0.127	0.127	0.5929	0.964
.**| . |	.**| . |	5	-0.247	-0.244	2.8167	0.728
. | . |	. | . |	6	0.004	-0.005	2.8172	0.831
. | . |	. | . |	7	-0.020	-0.019	2.8331	0.900
. | . |	. | . |	8	0.027	0.015	2.8628	0.943
. | . |	. |* . |	9	0.025	0.093	2.8903	0.968
.**| . |	.**| . |	10	-0.243	-0.330	5.6348	0.845
. | . |	. | . |	11	-0.022	-0.012	5.6590	0.895
. | . |	. | . |	12	0.015	0.005	5.6706	0.932

*Probabilities may not be valid for this equation specification.

Correlogram squared residuals

Date: 10/19/16 Time: 15:20
Sample: 1981 2014
Included observations: 28

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. | . |	. | . |	1	-0.060	-0.060	0.1135	0.736
. | . |	. *| . |	2	-0.062	-0.066	0.2393	0.887
. | . |	. *| . |	3	-0.065	-0.074	0.3823	0.944
. | . |	. *| . |	4	-0.054	-0.068	0.4844	0.975
. |* . |	. |* . |	5	0.127	0.111	1.0766	0.956
. | . |	. | . |	6	-0.025	-0.023	1.1006	0.982
. | . |	. | . |	7	-0.026	-0.022	1.1277	0.992
. | . |	. | . |	8	-0.028	-0.022	1.1609	0.997
. | . |	. | . |	9	-0.025	-0.021	1.1882	0.999
. | . |	. | . |	10	0.048	0.022	1.2947	0.999
. | . |	. | . |	11	-0.027	-0.026	1.3296	1.000
. | . |	. | . |	12	-0.029	-0.029	1.3725	1.000

*Probabilities may not be valid for this equation specification

M – EGARCH model output

Dependent Variable: RETURNONINVESTMENT
Method: ML - ARCH (Marquardt) - Student's t distribution
Date: 10/18/16 Time: 06:48
Sample (adjusted): 1986 2013
Included observations: 28 after adjustments
Convergence achieved after 101 iterations

Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(4) + C(5)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(6)
*RESID(-1)/@SQRT(GARCH(-1)) + C(7)*LOG(GARCH(-1)) + C(8)
*MARKETABILITYRISK + C(9)*MARKETRISK + C(10)*POLITICALHORIZ
ONRISK + C(11)*ECONOMICLONGEVITYRISK + C(12)*OTHERRISKS
+ C(13)*LIQUIDITYEXCHANGERATERIS

Variable	Coefficient	Std. Error	z-Statistic	Prob.
@SQRT(GARCH)	1.2809	0.6479	1.9770	0.0480
C	-4.2834	1.1668	-3.6712	0.0002
RETURNONINVESTMENT(-5)	0.0215	0.0708	0.3036	0.7614
	Variance Equation			
C(4)	0.4350	0.3398	1.2802	0.2005
C(5)	0.5412	0.4849	1.1161	0.2644
C(6)	0.3571	0.3712	0.9620	0.3361
C(7)	0.7596	0.0907	8.3717	0.0000
C(8)	-0.1164	0.0760	-1.5320	0.1255
C(9)	-0.0698	0.0908	-0.7691	0.4418
C(10)	-0.1829	0.1046	-1.7492	0.0803
C(11)	-0.0438	0.0645	-0.6796	0.4968
C(12)	-0.1313	0.0932	-1.4089	0.1589
C(13)	0.1462	0.1092	1.3389	0.1806
T-DIST. DOF	2.0120	0.0131	153.7406	0.0000
R-squared	0.5953	Mean dependent var		0.2609
Adjusted R-squared	0.5629	S.D. dependent var		2.8429
S.E. of regression	1.8796	Akaike info criterion		3.0002
Sum squared resid	88.3181	Schwarz criterion		3.6663
Log likelihood	-28.0026	Hannan-Quinn criter.		3.2038
Durbin-Watson stat	1.8375			