European Journal of Business and Management
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol 4, No.15, 2012

SHARE PRICES AND MACROECONOMIC FACTORS: A TEST OF THE ARBITRAGE PRICING THEORY (APT) IN THE NIGERIAN STOCK MARKET.

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ABSTRACT
The broad objective of the study is to examine the suitability of the APT in explaining stock returns in Nigeria. Specifically, the study examines the significance of money supply, exchange rate, inflation and oil prices in explaining stock returns in the Nigerian stock market. The study adopts a time-series research design while Secondary data in quarterly estimates for All share index, oil prices, money supply, Gross Domestic Product, Exchange rate, inflation and interest rate for the period 2000Q1- 2010Q4 were used for the analysis. The method of data estimation is the co-integration and error correction methodology (ECM). The findings reveal that money supply (M2) appeared to be negative and also a significant determinant of stock returns both in the long run and the short run dynamic model for both one period and two period lags at 5% and 10% significance levels. Exchange rate was also observed to be negatively related to stock returns in both the long run and the short run dynamic model for both one period lag and two period lags. However, the result appeared to be insignificant at 5% and 10% significance levels. Interest rate was also observed to be negatively related to stock returns in both the long run and the short run dynamic model for both one period lag and two period lags. The slope coefficient appeared to be insignificant at 5% and 10% significance levels at both the long run and short run. Oil prices was also observed to be negatively related to stock returns in both the long run and the short run dynamic model for both one and two period lags respectively. The slope coefficient also appeared to be significant at 5% and 10% significance levels at both the long and short run while the error correction coefficient is rightly signed. The conclusion is that though the APT macroeconomic variables can explain stock returns, not all the variables are significant both in the long run and in the short run. The recommendation is that there is the need for sensible coordination of macroeconomic policies in Nigeria.
Key words: arbitrage pricing theory, macroeconomic variables, Nigerian stock market

1.1 INTRODUCTION

An important body of research in empirical finance has been the behaviour of stock returns and especially the forces that influence the stock returns. Stock returns and indeed asset prices in general are commonly believed to respond to information about economic fundamentals. There are reasons to suspect that individual stock prices are influenced by a wide variety of unanticipated events and that some events have a more pervasive effect on asset prices than do others (Chen et al., 1986). Thus there has been some level of curiosity about what could explain considerably the pattern of stock market returns. Consequently, various asset pricing models have been adopted in explaining and determining equity returns. Retrospectively, the one-factor capital asset pricing models (CAPM) is seen in certain quarters as the dominant asset pricing model. However, the CAPM model is based on the assumption that the expected return for any asset is a positive function of only one variable i.e. its *market beta* defined as the covariance of asset return and market return. This single factor assumption of the CAPM is often cited to be its underlying weakness, thus the need for a more robust and multi-factor model to account for stock returns led to the development of the Arbitrage pricing technique (APT). The APT model as formulated by Ross (1976) rests on the assumption that stock price is influenced by limited and non-correlated common factors and by a specific factor totally independent of the other factors. According to Morel (2001), by using the arbitrage reasoning, it can be shown that in an efficient market where stock prices respond appropriately to various variants and sources of information, the expected return is a linear combination of each factor's beta. The risk associated with holding a particular security comes from two sources. The first source of risk is the macroeconomic factors that affect all securities. The whole asset market is influenced by these factors and cannot be diversified away. The second source of risk is the idiosyncratic element. This element is unique to each security and according to the APT, in a broadly diversified portfolio, it can be diversified away.

The APT comes from an entirely different set of assumptions as it is not primarily concerned about the efficiency of portfolios. Instead, it starts by establishing a line of causality between each equity's return and the prevailing and pervasive macroeconomic influences or factors as well as partly on random disturbances (Brealey et al., 2006). Broadly speaking, the APT implies that the return of an asset can be broken down into an expected return and an unexpected or surprise component. Thus, the APT predicts that "general news" will affect the rate of return on all stocks but by different amounts. In this way the APT is more general than the CAPM, because it allows larger number of factors to affect the rate of return. (Cuthbertson, 2004). Azeez and Yonezawa (2003) are of the opinion that the primary advantages of using macroeconomic factors are that firstly, the factors and their APT prices in principle can be given economic interpretations, and secondly

rather than only using asset-prices to explain asset-prices, observed macroeconomic factors introduce additional information, linking asset-price behaviour to macroeconomic events. This has signaled the focus of the study on the impact of the APT in explaining stock returns in the Nigerian capital market. There are several reasons why the Nigerian stock market is a good ground to examine the impact of the APT. Firstly, the Nigerian stock market provides a great possibility to test existing asset pricing models and pricing anomalies in special conditions of evolving markets. Second, in the light of evolving synergies between equity markets due to enhanced capital movements, it is interesting to test the extent macroeconomic fundamentals can be used as a basis for portfolio investments in the market. A related question in this respect is whether investors in this market react to news or unexpected changes in the economy in a similar fashion as those in advanced market economies.

1.2 STATEMENT OF THE RESAERCH PROBLEM

The determinants of stock returns have evolved into a formidable area of research in empirical finance. The influx of research interest not withstanding there are indications that the issues involved in returns determination are yet to be settled. The research findings with regard to the suitability of the APT in explaining stock returns have indicated conflicting results across countries. Specifically, developing economies have not provided adequate research findings. Furthermore there are also divergences with regard to which of the macroeconomic variables exert significant influence on stock returns (Humpe and Macmillan 2007; Mukherjee and Tuftee 1998; Nishat and Shaheen 2004; Nishat and Shaheen 2004; Maghayereh 2002; Al-Sharkas 2004; Fama 1991). Thus this study addresses the need and thus fills the void of empirical evidence on the suitability of the APT in developing economies. Also the study provides more insight into the effects of various macroeconomic variables on stock returns in anticipation of increasing the conclave of empirical evidence in this regard.

2.1 LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

The Arbitrage Pricing Theory

The Arbitrage pricing theory relates the expected rate of return on a sequence of primitive securities to their factor sensitivities, suggesting that factor risk is of critical importance in asset pricing (Gilles & Leroy, 1990). The APT is a new and different approach to determining asset prices. It tries to capture some of the non-market influences that cause securities to move together. It is based on the law of one price: two items that are the same cannot sell at different prices. Unlike the CAPM, which requires strong restrictions on return distributions and preferences, the APT gives a characterization of expected returns on assets based only on the weak assumptions that there are no arbitrage opportunities, returns follow a factor structure and there are homogeneous expectations (Gilles & LeRoy, 1990). The APT formulated by Ross (1976) rests on the hypothesis that the equity price is influenced by limited and non-correlated common factors and by a specific factor totally independent of the other factors. By using this arbitrage reasoning it can be shown that in an efficient market, the expected return is linear combination of each factor's beta (Morel, 2001). The risk associated with holding a particular security comes from two sources. The first source of risk is the macroeconomic factors that affect all securities. Their influence pervades the whole asset market and cannot be diversified away. The second source of risk is the idiosyncratic element. This element is unique to each security and, according to the APT, in a broadly diversified portfolio it can be diversified away. Broadly speaking, the APT implies that the return of an asset can be broken down into an expected return and an unexpected or surprise component. Thus, the APT predicts that "general news" will affect the rate of return on all stocks but by different amounts. In this way the APT is more general than the CAPM, because it allows larger number of factors to affect the rate of return (Cuthbertson, 2004).

2.2 The Macroeconomic Variables of the APT and Stock Returns

Though the Arbitrage pricing theory does not provide a clear basis for identifying the macroeconomic factors that are related to stock returns with respect to causality, there are however, several variables that have been identified in the literature as important determinants of stock returns and we shall examine them as follows;

- **Inflation rate**

There is no theoretical consensus on the existence of a relationship between stock returns and inflation rate or on the direction of the relationship and the empirical findings in this regard have been at polarity. In supporting the existence of a negative relationship, Udegbunam and Eriki (2001) conducted a study on the Nigerian Stock Market by examining the relationship between stock prices and inflation and their results provided a strong support for the proposition that inflation exerts a significant negative influence on the behaviour of the stock prices. Li and Wearing (2002), in their study of the effect of inflation on the stock prices on Kuwait Stock Exchange discovered that inflation significantly impacts stock prices negatively. Similar to developed markets, Naka, Mukherjee and Tuftee (1998) for India and Nishat and Shaheen (2004) for Pakistan indicate that inflation is the largest negative determinant of stock prices. Maghayereh (2002) and Al-Sharkas (2004) also show reliable negative relationship between Jordan stock prices and inflation. Anari and Kolari (2001) report negative correlations between stock prices and inflation in the short run.

- **Interest rate**

The relationship between interest rate and stock returns indicates several issues that may serve as intermediaries or transmission mechanism through which the effect may be observed. The interest rate represents an opportunity cost for investing in stocks. It is also a component of the equity capitalization rate. Therefore, it is considered as one of the most important factors affecting the behavior of investors in the market. As interest rises, bonds become more attractive investment, given their risk-return characteristics; this motivates investors to adjust their investment portfolios by buying bonds and selling stocks, thus depressing stock prices. Furthermore, the rise in interest rates raises equity capitalization rates, which also leads to lowering stock prices. Accordingly, interest rate is expected to have an inverse effect on stock prices. According to Hume and Macmillan (2007), US and Japan stock prices are negatively correlated to a long term interest rate. Al-Sharkas (2007) for Jordan and Adam and Twenebboah (2008) for Ghana indicate that the relationship between stock prices and interest rates is negative and statistically significant.

- **Exchange rate**

Mishra (2004), and Apte (2001), found a significant positive relationship between stock prices and exchange rates. Dornbusch and Fisher (1980) developed a model of exchange rate determination that integrates the roles of relative prices, expectations, and the assets markets, and emphasize the relationship between the behaviour of the exchange rate and the current account. Slavarek (2004) finds that a rising stock market leads to the appreciation of domestic currency through direct and indirect channels. Adjasi and Biekpe (2005) showed that in the long-run exchange rate depreciation leads to increase in stock market prices in some of the countries, and in the short-run, exchange rate depreciations reduce stock market returns. On the other hand, some studies, such as Choi, Fang and Fu (2008) showed the possibility of a very weak or no relationship between stock prices volatility and exchange rates movement.

- **Gross Domestic Product**

The Gross domestic product measures the total market value of all final goods and services produced in a country in a given year, equal to total consumption, investment and government spending, plus the value of exports, minus the value of imports. Its rate of growth is always associated with economic growth. Cochrane (1994) finds strong evidence that substantial amounts of variation in GDP growth and stock returns are attributed to transitory shocks. The growth rate of GDP is the most important indicator of the performance of the economy. The growth rate of GDP and the stock market returns have positive relationship. The higher the growth rate of GDP, other things being equal, the more favourable it is for the stock market (Chandra, 2004). This means that as long as GDP is growing, it is expected that industries and the firms should be faring well. Due to the expected positive impact of real economic activity on the firms' future profits and consequently on its future dividends, GDP is expected to exert a positive impact on stock return (Fama, 1981, 1990).

- **Oil price**

Studies have also shown interest in the effects of oil price changes on financial markets in developed and developing countries. Kaul and Seyhun (1990) found a negative significant relationship between real stock returns in the New York Stock Exchange and oil price volatility. Jones and Kaul (1996) study the responses of stock markets in the US, Canada, Japan, and the UK to shocks in oil prices. Their results indicate that in the US and Canada, changes in stock prices can be completely justified by the impact of oil price shocks on real cash flows. On the other hand, the reactions of stock prices in Japan and the UK to innovations in oil prices are too large to be completely accounted for by the real cash flows alone. Huang et al (1996) show that changes in daily oil future returns affect individual company stocks, but do not have significant impact on aggregate market indices in the US. Sadorsky (1999) argues that both oil price changes and the volatility of oil prices are important factors affecting US real stock returns. In a more recent study on Greece, Papapetrou (2001) shows that all prices have significant effects on real economic activity and employment.

- **Money supply**

The impact of money supply on stock prices can be explained in two hypotheses namely monetary Portfolio Hypothesis (MPH) and Efficient Market Hypothesis (EMH). While EMH assumes that the impact of the change of money supply on share price reaction is limited and the speed of adjustment does not leave a room for traders to obtain abnormal returns because stock prices incorporate all relevant information, the MPH expects that an increase in money supply will result in an increase in almost all-economic activities including the stock market (Friedman, 1988). Therefore, an increase in domestic liquidity is expected to increase demand for stocks and consequently an increase in stock prices. Humpe and Macmillan (2007) report that Japan stock prices are influenced negatively by the money supply, while there is an insignificant (although positive) relationship between US stock prices and the money supply.

2.3 HYPOTHESES STATEMENTS

From the review of literature, the following hypotheses have been specified;

H1. There is a significant long run relationship between money supply and stock returns.
H2. There is a significant long run relationship between exchange rate and stock returns.
H3: There is a significant long run relationship between interest rate and stock returns.
H4: There is a significant long run relationship between oil price and stock returns.

3.1 METHODOLOGY

The study adopts a time-series research design in examining the relationship between macroeconomic variables and stock returns as specified by the APT. Secondary data in quarterly estimates for All share index, oil prices, money supply, Gross Domestic Product, Exchange rate, inflation and interest rate for the period 2000Q1- 2010Q4 were used for the analysis. The method of data estimation utilizes regression analysis. However, the co-integration and error correction methodology (ECM) is employed. Four analytical procedures are involved in the co-integration and error correction model. First, the descriptive statistics for the data is presented. After that, the unit root test is carried out for each of the variables so as to ascertain the time series properties of the data set and obtain the stationary status. This is to ensure that the variables are stationary and that shocks are only temporary and will dissipate and revert to their long-run mean. Next, the test of Cointegration is performed in order to discover the long run rational properties of the data. The final step is to obtain the error correction representation for the model which helps to analyze the dynamic short run and long run behaviour of the model.

3.2 MODEL SPECIFICATION

This model will examine how the selected APT macroeconomic variables (inflation, interest and exchange rates, money supply and GDP) would impact on quoted company's stock returns using quarterly data at levels;

$$E(R_{it}) = \alpha_0 + \beta_1 INFL + \beta_2 EXRT + \beta_3 GDP + \beta_4 INTR + \beta_5 MS + \beta_6 OILP + \varepsilon_t$$

Where; $E(R_{it})$ = Expected stock returns, this value is computed by taking the log of the ratio between current all share index and previous all share index, INFL = Inflation rate, EXRT = Exchange rate, GDP = Gross Domestic Product, INTR = interest rate, MS = Money supply, OILP = Oil Prices, ε= Error term

3.3 PRESENTATION AND ANALYSIS OF RESULT

Table 1 Descriptive statistics

	ALLSP	CPI	EXRT	LINTR	NGDP	M2	POIL
Mean	26194.96	140.4797	127.7614	19.25833	3731688.	4114183.	53.27972
Median	23461.24	143.5000	128.1550	18.59000	3662063.	2732145.	50.32000
Maximum	62413.16	215.6000	150.9200	26.26000	6747612.	10730793	127.3500
Minimum	9044.830	76.31000	110.6200	14.88000	1164239.	1263161.	19.43000
Std. Dev.	14737.32	40.91394	10.35000	3.119514	1830815.	2960048.	27.47803
Jarque-Bera	6.027695	1.943683	1.163191	3.490973	2.823332	5.542643	5.095475
Probability	0.049102	0.378386	0.559006	0.174560	0.243737	0.042579	0.078259
Sum	943018.4	5057.270	4599.410	693.3000	1.34E+08	1.48E+08	1918.070
Observations	36	36	36	36	36	36	36

Source: Eviews 7.0

Table I above presents the result for the descriptive statistics for the variables. As observed, the all share index has a mean value of 26194.96 for the time period examined i.e. from 2001Q1-2010Q4 and a standard deviation of 14737.32. The maximum and minimum values stood at 62413.16 and 9044.83 respectively. The Jarque-Bera statistic value of 6.03 and p-value of 0.049 confirm the normality of the data and suitability for generalization. It also indicates the absence of outliers in the data. The mean value for consumer price index (CPI) stood at 140.48 with a standard deviation of 40.91. The maximum and minimum values of CPI for the period under review were 215.60 and 76.31 respectively. The Jarque-Bera statistic value 1.94 and p-value of 0.37 suggest the non-normality of the series. Exchange rate has a mean value of 127.7614 for the period under examination. The maximum and minimum values were 150.92 and 110.62 respectively while the Jarque-Bera statistic value of 1.16 and p-value of 0.55 suggest the probable non-normality of the series. Interest rate (LINTR) was observed to have a mean value of 19.25 and a standard deviation 3.12. The maximum and minimum values were 26.26 and 14.88 respectively while the Jarque-Bera statistic value of 3.49 and p-value of 0.17 also suggest probable non-normality of the series.

Furthermore, a mean and standard deviation of 53.28 and 27.47 was observed for price of oil (POIL). The maximum and minimum values also stood at 127.35 and 19.43 respectively. The Jarque-Bera statistic value of 5.09 and p-value of 0.045 confirm the normality of the series. As observed, GDP has a mean value of 3731688 and standard deviation of 1830815 with maximum and minimum values of 6747612 and 1164239 respectively. The Jarque-Bera statistic value of 2.82 and p-value of 0.24 suggest the probable non-normality of the series. Finally, Money supply (M2) shows a mean value of 4114183

and standard deviation of 2960048 for the period under review. The maximum and minimum values were 10730793 and 1263161 respectively. The Jarque-Bera statistic value of 5.54 and p-value of 0.042 confirm the normality of the series.

- **Factor Analysis**

An important feature of the APT model is that the nature and number of the priced factors are unspecified by the APT. Two approaches have been used to empirically implement the theory. The most widely used approach, originally proposed by Gehr (1978) and subsequently extended by Roll and Ross (1980), relies on factor analysis techniques to simultaneously estimate the common factors and factor loadings of security returns. Most empirical work on the APT is based on the use of factor analysis or principal components analysis to identify the factors. The result of the factor analysis is presented in tables 2, 3 and 4 below.

Table 2 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.738
Bartlett's Test of Sphericity	Approx. Chi-Square	276.919
	Df	15
	Sig.	.000

Source: Spss 17.0

Table 3

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.397	73.289	73.289	4.397	73.289	73.289
2	.984	16.394	89.684			
3	.347	5.779	95.463			
4	.191	3.185	98.648			
5	.072	1.205	99.853			
6	.009	.147	100.000			
Extraction Method: Principal Component Analysis.						

Source: Spss 17.0

Table 4 Component Matrix

Component 1	CPI	EXRT	LINTR	NGDP	M2	POIL
Eigen –vectors	.975	.51	.886	.976	.858	.875

Extraction Method: Principal Component Analysis.

Source: Spss 17.0

Table 2 indicates that the Kaiser-Meyer-Olkin test (KMO) value for the sample is high (.738) and Barlett test of sphericity is significant at 99% level, indicating that the factor analysis is an appropriate technique for our data and shows evidence of diffusion in the patterns of correlation and thus indicates that factor analysis would yield distinct and reliable factors.

Table 3 shows the eigen values associated with each linear component before extraction, after extraction and after rotation. Before extraction six (6) components were identified. The eigen-values associated with each factor represent the variance explained by that particular linear component and the result also displayed the eigen values in terms of percentage of variance explained. Hence factor 1 for example explains about 73.289 % of the total variance. It should be clear that the first component explains a large amount of variance where as subsequent principal components explain only small amounts of variance. The criterion for selecting the principal components was based on specifying the extraction of factors with eigen values greater than 1 which leaves us with one (1) component. The eigen values associated with these factors are again displayed in the column labeled extraction *of sum of squared loadings*. The values in this part of the table are the same as the values before extraction except that the discarded factors are ignored. Hence only the first component is retained after extraction as the eigen value is 4.397which is actually greater than 1.

Table 4 shows the loading of the factors into the first and only principal component. As Anand (2004) notes only factors having significant loadings of the magnitude of 0.50 and above are suitable as significant and as such should be interpreted. From the analysis of the component matrix, all the factors are observed to have positive loadings above 0.50 in the component matrix. As shown, Exchange rate has a loading of .51, CPI has a loading of .975, Interest rate (LINTR) has a loading of .886 and Gross Domestic Product (GDP) has a loading of .976. Furthermore, Money supply (M2) has a loading of .858 and price of oil (POIL) has a loading of .875. Consequently, all the variables are retained as appropriate APT factors.

- **Unit Root Test**

To examine the existence of stochastic non-stationary in the series the study establishes the order of integration of individual time series through the unit root tests. Two unit root tests are carried out. These are: The augmented Dickey-Fuller (ADF) and the Phillip-Peron (PP). The series are: real gross domestic product (RGDP), exchange rate (EXRT), consumer price index (CPI), all share index (AS index), Money supply (M2), interest rate (INTR) and crude oil prices (Poil). The test was carried out both with intercept and then with intercept and trend. The result for unit root at first difference with intercept shows that all the variables achieved stationarity using both the ADF and PP test statistics at 5% level. The result is presented below in tables 5, 6, 7 and 8 respectively.

Table 5 The ADF and PP unit root test for the APT variables at Levels with intercept and trend

Variable	ADF value	Critical value	PP test value	Critical value
AS Index	-2.061	-2.939	-1.662	-2.938
EXRT	-1.504	-2.949	-1.309	-2.947
CPI	0.669	-3.635	0.638	-2.947
LINTR	-1.484	-2.949	-1.142	-2.947
NGDP	-4.769**	-3.547	-4.200**	-3.543
M2	0.643	-3.547	-0.636	-3.543
POIL	-3.947**	-3.547	-2.800	-3.543

Source: Eviews 7.0
*Note: *** Stationary at 1%. ** Stationary at 5% and * Stationary at 10%*

Table 6 The ADF and PP unit root test for the APT variables at Levels with intercept

Variable	ADF value	Critical value	PP test value	Critical value
AS Index	-2.061	-2.939	-1.662	-2.938
EXRT	-1.504	-2.949	-1.309	-2.947
CPI	0.669	-3.635	0.638	-2.947
LINTR	-1.484	-2.949	-1.341	3.543
NGDP	-0.234	-2.949	-0.181	-2.997
M2	2.358	-2.949	2.468	-2.947
POIL	-1.915	-2.949	-1.644	-2.947

Source: Eviews 7.0
*Note: *** Stationary at 1%. ** Stationary at 5% and * Stationary at 10%*

Table 7. The ADF and PP unit root test for the APT variables at first difference with intercept and trend

Variable	ADF value	Critical value	PP test value	Critical value
AS Index	-3.330	-3.535	-3.452	-3.531
EXRT	-3.322	-3.551	-4.876**	-3.547
CPI	5.681**	-3.551	6.879**	-3.547
LINTR	-3.575**	-3.551	-4.652**	-3.547
NGDP	-9.096**	-3.551	-6.138**	-3.547
M2	3.756**	-3.551	-7.105**	-3.547
POIL	-5.401**	-3.551	-4.402**	-3.547

Source: Eviews 7.0
*Note: *** Stationary at 1%. ** Stationary at 5% and * Stationary at 10%*

Table 8. The ADF and PP unit root test for the APT variables at first difference with intercept

Variable	ADF value	Critical value	PP test value	Critical value

AS Index	-3.267**	-2.942	-3.423**	-2.939
EXRT	-3.378**	-2.953	-4.876**	-2.949
CPI	5.465**	-2.953	6.736**	-2.949
LINTR	-3.338**	-2.953	-4.605**	-2.949
NGDP	-9.244**	-2.953	-6.224**	-2.949
M2	-3.743**	-2.953	-5.807**	-2.949
POIL	-5.478**	-2.953	-4.469**	-2.949

Source: Eviews 7.0
*Note: *** Stationary at 1%. ** Stationary at 5% and * Stationary at 10%*

Tables 5 and 6 show the result of the unit root test at levels and with intercept and with intercept and trend. As shown in the tables, of the variables, only GDP and POIL were observed to be stationary at levels with both intercept and trend. The ADF and PP values for GDP of 4.769 and -4.200 exceeds the critical values at 5% significance levels respectively. For POIL, only the ADF value of -3.947 exceeded its critical value at 5% level.

Table 7 shows the result for unit root at first difference with intercept and trend. As shown in the table, the ADF and PP test statistics for CPI w ith value of 5.681and 6.879 exceeds the critical values at 5% significance levels respectively and thus we conclude that CPI is stationary at 1st difference i.e. I(1). The ADF and PP test statistics for LINTR with values of -3.575 and -4.652 exceeds the critical values at 1%, and 5% respectively. Thus we conclude that LINTR is also stationary at 1st difference i.e. I(1). The ADF and PP test statistics for GDP with values of -9.096 exceed the critical values at 5% significance level and thus we conclude that GDP is also stationary at 1st difference i.e. I(1). However, AS Index did not achieve stationarity at 1st difference with intercept and trend as the ADF and PP test statistics values of -3.330 and -3.452 was found to be less than the critical values at 5% significance level. The ADF test statistics for M2 with values 3.756 and -7.105 exceeds the critical values at 5% significance levels respectively and thus we conclude that M2 is also stationary at 1st difference i.e. I(1). The ADF and PP test statistics for POIL with values of -5.401 and -4.402 exceeds the critical values at 5% significance levels respectively and thus we conclude that POIL is also stationary at 1st difference i.e. I(1). EXRT was found to be stationary at 1st difference only for the PP test statistics with a value of -4.876 exceeding the critical value at 5%.

Table 8 shows the result for unit root at first difference with intercept alone. As observed all the variables achieved stationarity using both the ADF and PP test statistic at 5% level.

4.1 Multicollinearity test for APT factors

Table 9 Variance Inflation Factors

Variable	Coefficient Variance	Centered VIF
C	8.89E+08	NA
CPI	70124.89	84.93591
EXRT	62582.18	4.850742
LINTR	708021.0	4.985361
NGDP	2.07E-05	50.12566
M2	2.01E-06	12.71342
POIL	12155.48	6.640794

Source: Eviews 7.0

Table 9 shows the variance inflation factor (VIF) for the variables which measures the level of collinearity between the regressors in the APT model The VIFs show how much of the variance of a coefficient estimate of a regressor has been inflated due to collinearity with the other regressors. They can be calculated by simply dividing the variance of a coefficient estimate by the variance of that coefficient had other regressors not been included in the equation. The VIFs are inversely related to the tolerances with larger values indicating involvement in more severe relationships. Basically, VIFs above 10 are seen as a cause of concern (Landau and Everitt, 2003). The VIF's for CPI and GDP are beyond manageable proportion as the values give serious indication of severe multicollinearity. As Ross (1976) notes, the APT model rests on the

assumption that stock price is influenced by non-correlated common factors. Consequently, both variables are dropped from the APT factors. The co-integration and subsequent analysis is carried out using Allsp, Exrt, Lintr, Poil and M2.

4.2 Cointegration Test

The cointegration tests are carried out based on the Johansen (1988) and Johansen and Juselius (1992) maximum likelihood framework. The aim is to establish whether long-run relationship exists among the variables of interest. The results of the tests for the APT model is presented and they indicate that the trace test statistics reject the null hypothesis of $r \leq 0$ against the alternative $r \geq 1$ at 5% level of significance. The results suggest evidence for the presence of one cointegrating vector in APT model. The result is presented in table 10 below.

Table 10 Unrestricted Cointegration Rank Test (Trace)

Series: ALLSP EXRT LINTR POIL M2

Lags interval (in first differences): 1 to 1

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.620650	80.13462	69.81889	0.0060
At most 1	0.575549	47.17859	47.85613	0.0578
At most 2	0.304924	18.04197	29.79707	0.5629
At most 3	0.153033	5.675020	15.49471	0.7335
At most 4	0.000818	0.027824	3.841466	0.8675

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The most general method of selecting an optimal lagged length *k* is the Akaike information criteria (AIC) and the Schwartz Bayesian criterion (SBC). Both methods involve running the variance autoregressive (VAR) model with a different lagged length and selecting the lagged length with a higher explanatory power. However, Enders (2004) notes that if the lag length is too long, it may suggest skepticism about the validity of the co-integrating equations. In line with Enders (2004), the study selects a lag length of between 1 and 4. The test result indicates the presence of 1 cointegrating equations at 5 percent level of significance thereby confirming the existence of a long-run equilibrium relationship between the variables and denotes rejection of the hypothesis of no co-integrating relationship at the 0.05 level. With this result, one proceeds to specify the long run and short run dynamic equation. According to Engle and Granger (1987), when a set of variables are I (1) and are cointegrated then short-run analysis of the system should incorporate error correction term (ECT) in order to model the adjustment for the deviation from its long-run equilibrium. The vector error correction model (VECM) is therefore characterized by both differenced and long-run equilibrium models, thereby allowing for the estimates of short-run dynamics as well as long-run equilibrium adjustments process. The VECM is presented below.

Table 11 Long Run VECM Model Normalized On AllSP

ALLSP(-1)	Constant	EXTR(-1)	LINTR(-1)	POIL(-1)	M2(-1)
1.0000	138424.1	1362.05	-8166.53	-1942.65	-0.0195
		(0.94)	(-1.24)	(-1.93)	(0.00)

Parsimonious VECM Model

Error Correction:	D(ALLSP)
ECM $_{t-1}$	-0.017226
	(0.02000)
	[-0.86128]
D(ALLSP(-1))	0.678960
	(0.25643)
	[2.64774]

D(ALLSP(-2))	0.112766 (0.26071) [0.43254]
D(EXRT(-1))	-138.1637 (222.248) [-0.62166]
D(EXRT(-2))	-326.0514 (215.655) [-1.51191]
D(LINTR(-1))	-728.3281 (872.913) [-0.83437]
D(LINTR(-2))	-572.4918 (761.376) [-0.75192]
D(POIL(-1))	0.644754 (62.7302) [0.01028]
D(POIL(-2))	-262.8009 (89.4610) [-2.93760]
D(M2(-1))	-0.005569 (0.00291) [-1.91218]
D(M2(-2))	-0.004713 (0.00243) [-1.93956]
C	3155.612 (1441.87) [2.18856]
R-squared	0.704015
Adj. R-squared	0.548975
F-statistic	4.540865
Log likelihood	-308.2588
Akaike AIC	19.40962

Source : eviews 7.0

Table 11 presents the long-run and short-run coefficients of the cointegrating vector normalizing on allshare index and the Parsimonious VECM Model. The R^2 of 0.704 indicates that the VECM explains about 71% of the systematic variations in the dependent variable. The adjusted R^2 of 0.549 accounting for adjustment for degrees of freedom also performs fairly well. The f-statistic of 4.54 is statistically significant at 5% level and this indicates that the null hypothesis of no relationship between the dependent and independent variables is rejected. An evaluation of the slope coefficients indicates that only money supply (M2) appeared to be negative and also a significant determinant of stock returns both in the long run (-0.0195) and the short run dynamic model for both one period lag (-1.939) and two period lags(-0.005) at 5% and 10% significance levels. Therefore hypothesis one (H1) indicating the existence of a significant long run relationship between money supply and stock returns is accepted. Exchange rate was also observed to be negatively related to stock returns in both the long run (-1362.05) and the short run dynamic model for both one period lag (-138.16) and two period lags (-

326.05). However, the result appeared to be insignificant at 5% and 10% significance levels. Thus hypothesis two (H2) indicating the presence of a significant long run relationship between exchange rate and stock returns is rejected. Interest rate was also observed to be negatively related to stock returns in both the long run (8166.53) and the short run dynamic model for both one period lag (-728.32) and two period lags (-527.49). However, the slope coefficient appeared to be insignificant at 5% and 10% significance levels at both the long and short run. Consequently, hypothesis three (H3) indicating the existence of a significant long run relationship between interest rate and stock returns is rejected.

Oil prices was also observed to be negatively related to stock returns in both the long run (-1942.6) and the short run dynamic model for both one and two period lags (0.645,-262.80) respectively. The slope coefficient also appeared to be significant at 5% and 10% significance levels at both the long and short run. Thus Hypothesis four (H4) indicating the existence of a significant relationship between oil prices and stock returns is accepted. Finally, the specified error correction term (ECT_{t-1}) is to examine the short-run correction mechanism behaviour of the relationship between the APT factors and stock returns from its long-run equilibrium as a result of the error term (white noise) shock. The error correction coefficient term coefficient of

-0.017226 is rightly signed (negative) as stated by Wickens (1996). It measures the speed of adjustment towards long-run equilibrium although it is not significant at 5% level. The LM test for the presence of autocorrelation reveals that the p-value of 0.75 is greater than the critical value of 0.05 at 5% significance level and this shows the non existence of autocorrelation. In addition, the test for Heteroskedasticity reveals that the p-value of 0.60 is greater than the critical value of 0.05. This shows that there is no evidence of the presence of heteroskedasticity since the p-value is considerably in excess of 0.05.

5.1 DISCUSSION OF THE RESULT

An evaluation of the slope coefficients indicates that only money supply (M2) appeared to be negative and also a significant determinant of stock returns in the long run (-0.0195) and the short run dynamic model for both one period lag (-1.939) and two period lags(-0.005) at 5% and 10% significance levels. The findings in the literature in this regard have been at polarity. Studies with findings similar to that observed in this study include Fama (1981), Geske and Roll (1983) which point out that stock returns are negatively related to money supply. In addition, Humpe and Macmillan (2007) report that stock prices are influenced negatively by the money supply in the Japanese market. In similar vein, Abugri (2008), reports that the responses of returns to money supply are negative and significant in Brazil and Argentina, while the responses of returns in Mexico and Chile to money supply appear to be significant in explaining the movement of returns. However, at variance with the findings of this study is that of muradoglu and Metin (1996) which found that money supply is positively related to stock returns in short run dynamic model. Studies on emerging markets also found money supply to have positive impact on stock prices, for example (Hondroyiannis and papapetrou, 2001; Magha and Yereh, 2003; Oaikhenan, 2003). Exchange rate was also observed to be negatively related to stock returns in both the long run (-1362.05) and the short run dynamic model for both one period lag (-138.16) and two period lags (-326.05). Studies in tandem with the findings of this study with regard to the direction of the relationship include Abugri (2008) which examined emerging markets, Adam and Tweneboah (2008) which provides evidence for Ghana stock market, Soenen and Henngan (1988), for the US equity prices, Adjasi and Biekpe (2005). On the other hand, some studies, such as Choi, Fang and Fu (2008) showed the possibility of a very weak or no relationship between stock prices volatility and exchange rates movement. Interest rate was also observed to be negatively related to stock returns in both the long run (8166.53) and the short run dynamic model for both one period lag (-728.32) and two period lags (-527.49). However, the slope coefficient appeared to be insignificant at 5% and 10% significance levels at both the long and short run. Shiller and Beltratti (1992) in tandem with the findings in this study identified the existence of an inverse relationship between stock returns and interest rates. Such a relationship is supported by Campbell and Ammer (1993) and Nissim and Penman (2003).

Oil prices was also observed to be negatively related to stock returns in both the long run

(-1942.6) and the short run dynamic model for both one and two period lags (0.645, -262.80) respectively. The slope coefficient also appeared to be significant at 5% and 10% significance levels at both the long and short run. A particular concern in this regard especially for stock markets in economies highly dependent on oil is that the volatility often experienced in oil prices will be transmitted to the stock markets and this vulnerability could signal extreme instability in the market as well as hamper forecast and genuine policy simulation to improve the stock market. Sadorsky (1999), shares this view as he argued from findings that an oil price shock has a negative and statistically significant initial impact on stock returns. However, in contrast to our findings, Gogineni (2008) in his study finds that stock market returns are positively correlated with oil price changes likely caused by changes in aggregate demand. Gjerde and Saettem (1999) and Achsani and Strohe (2002) support the findings of Gogineni (2008) with evidence from Norway and Indonesia stock markets.

5.2 CONCLUSION AND RECOMMENDATION

The study examines the suitability of the arbitrage pricing theory in explaining stock returns in the Nigerian stock market. The APT is not primarily concerned about the efficiency of portfolios. Instead, it starts by establishing a line of

causality between each equity's return and the prevailing and pervasive macroeconomic influences. Thus, the APT predicts that "general news" will affect the rate of return on all stocks but by different amounts. The findings of the study suggest that the APT macroeconomic variables can explain stock returns, not all the variables are significant both in the long run and in the short run. Notwithstanding, the recommendation is that there is the need for sensible coordination of macroeconomic policies in Nigeria.

REFERENCES

Abdullahi, I.B. and Lawal, W.A. (2011). Empirical Analysis of the Risk-Return "Characteristics of the Quoted Firms in the Nigerian Stock Market," *International Journal of Business and Social Sciences.*Vol. 11, No 8, pp.9-19

Abugri, B.A. (2008) "Empirical Relationship between Macroeconomic Volatility and Stock Returns: Evidence from Latin American Markets", *International Review of financial Analysis, Vol 17, No 8, pp. 9-19*

Adam, A.M. and Tweneboah, G. (2008). "Do Macroeconomic Variables Play any Role in the Stock Market Movement: Evidence from Ghana".

Adjasi, C.K.D. and Biekpe, B.N. (2005). "Stock Market Returns and Exchange Rate Dynamics in selected Africa countries: A bivariate analysis", *The Africa Financial Journal,* July, Cape Town, South Africa

Amadi, S.N. and Odobo, T.D (2002). "Macroeconomic Variables and Stock Prices: Causality Analysis, *the Nigerian Journal of Economic and Management Studies, Vol. 4 Nos 1 & 2, pp. 29-41.*

Apte, P.G (2001). "Currency Exposure and Stock Prices" *Journal of Foreign Exchange and International Finance,* Vol. 12, No. 92, pp. 135-143.

Azeez, A.A and Yonezawa, Y. (2003). "Microeconomic Factors and the Empirical Content of the Arbitrage Pricing Theory in the Japanese Stock Market" *Japan and the World Economy, Vol. 5, pp.22-24*

Chandra, P. (2004), Investment Analysis and Portfolio Management: New Delhi: McGraw Hill.

Chen, N. (1983). "Some Empirical Tests of the Theory of Arbitrage Pricing", Journal of Finance *Vol. 38, No 5, pp. 1383-1414*

Chen, N. Roll and Ross, S.A (1986). "Economic Forces and the Stock Market", Journal of Business, Vol. 59, No. 3 Pp 383-403.

Choi, D. Fang, F. and Fu, S. (2008). "Volatility Spillover between Stock Market Returns and Exchange Rate Changes: the New Case" Vol. 1, pp4, No. 2

Cochrane, J. (1994). "Production-Based Asset Pricing and the Link between Returns and Economic Fluctuations", *Journal of Finance, Vol.46, No. 1 pp. 209-237.*

Cuthbertson, K. (2004). Quantity Financial Economics: Stocks, bonds and Foreign Exchange. Chichester: Wiley, Corporation.

Dornbusch, R. and Fisher, S. (1980). "Exchange rate and current account" *American Economic Review* Vol., 70, pp. 960-971.

Fama, E.F. (1981). "Stock Returns, Real Activity, Inflation and Money", *American Economic Review*

Fama, E.F. (1990). "Stock Returns, expected Returns and Real Activity", *the Journal of Finance,* Vol. 45, Macroeconomic Variables in a Small Open Economy" *Journal of International Finance "*Markets Institutions and Money" Vol. 9, pp61-74

Handroyiannis, G. and Paptetrou, E. (2001). "Macroeconomic Influences on the Stock Market", *Journal of Economics and Finance*, spring. Vol. 25, pp.33-50

Huang, R.D. Masulis, R.W. and Stoll H.R. (1996). "Energy Shocks and Financial Markets" *Journal of Future Markets*, Vol. 16. Pp. 1-27

Humpe, A. and Macmillan, P. (2007). "Can Macroeconomic Variables explain long term Stock Movements? A Comparison of the US and Japan", centre for Dynamic Microeconomic Analysis Working Paper Series.

Jones, C.M. and Kaul, G. (1996), Energy Stocks and Financial Markets" Journal of future Markets, Vol. 16, pp. 1-27.

Kaul, G. and Seyhum, H.N (1990). Relative Price Volatility, Real Shocks, and the Stock Markets" Journal of Finance, Vol. 45, pp. 479-496.

Li, A.R and Wearing, C.B. (2002). "The Information Content of Earnings on Stock Prices The Kuwait Stock Exchange", Multinational Finance Journal, Vol. 6 No. 2 pp. 27-34

Mishra, K.A. (2004). "Stock Market and Foreign Exchange Market in India. Are they Related? "*South Asia Economic Journal*. Vol. 5, No. 2, Sage Publications, New Delhi

Motel, C. (2001). "Stock Selection using a Multifactor Model-Empirical Evidence from the French Stock Market", The European Journal of Finance, Vol. 7, No. 4, pp. 312-320

Muradoglu, G. and Metin, K. (1996). "Efficiency of Turkish Stock Exchange with respect to Monetary Variables: A Cointegration analysis", *European Journal of Operational Research,* Vol. 90, No. 3, pp.566-576.

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