Premium Factors and the Risk-Return Trade-off in Asset Pricing: Evidence from the Nigerian Capital Market

Arewa, Ajibola, PhD
Dept of Accounting and Finance
Faculty of Management Sciences
Lagos State University, Lagos
Nigeria

Ogbulu, Onyemachi Maxwell, Ph.D
Dept of Banking and Finance
Abia State University, Uturu
Nigeria

Abstract

The study presents an empirical investigation on the determination of priced risk factors and consideration of risk-return trade-off using monthly security data in the Nigerian stock market for the period of 2003 to 2011. The results show that the unconditional market factors are not priced but they maintain positive relationship with return except the systematic co-kurtosis while the effects of four latent size and value risk factors are evident in the market. However, one of the latent factors and value factor show negative relationship.

Keywords: Beta, Co-kurtosis, Co-skewness, Size, Value, Latent factor, Nigerian Episode

JEL Classification Number: C_2; C_8; G_3

1.1 Introduction

Over time, the determination of risk factors that are priced (or not) and the consideration of risk-return trade-off across capital markets have been a critical issue in finance. The first empirically acceptable model for determining priced and non-priced factors is the Capital Asset Pricing Model (CAPM). The CAPM considers systematic covariance risk as the only relevant risk that influences variations in average return (Sharpe, 1965). But the study of Kraus and Litzerbeger (1976) revealed that co-skewness factor produces significant role in determining security return and this led to the development of the skewness preference model. In addition, Lang and Lai (1997) introduced the systematic kurtosis risk into the Kraus and Litzerbeger's model and their pricing equation is fondly called the CAPM with higher order co-moment.

The covariance risk of Sharpe's model, the co-skewness risk of Kraus and Litzerbeger and the co-kurtosis risk of Lang and Lai are all market factors. Therefore, the need to determine non-market risk factors led to the introduction of the Three- Factor Model by (Fama and French, 1997). They simply imported size and value factors into the traditional CAPM pricing identification. Today their pricing specification is known as Fama and French Three-Factor Model denoted FF3FM. The peculiarity of these models is that they are rooted in the market proxy which according to (Ross, 1976) and (Ross and Roll, 1980), the true market portfolio is not identifiable. This poses a serious limitation to the operationalization of these models and consequently the Arbitrage Pricing Theory (APT) of Ross appears to be a supplementary or an alternative to these equations.

However, the contention that the APT is an asymptotic model makes it not to be too famous. The APT identifies latent or systematic macroeconomic factors to be more significant than the market and non-market factors in considering risk-return relations.

Thus, the objective of this study is to determine the priced and non-priced risk factors that influence security returns in the Nigerian capital market using the identifications of the CAPM, CAPM with higher order co-moment, FF3FM and APT. The rest of the paper is organized as: literature review, methodology and data, result, conclusion and recommendations

2.0 Literature Review

Kraus and Litzenberger (1976) carried out a study to extend the mean- variance capital asset pricing model by including the effect of skewness on assets' returns variation. Their specification asserts that average return is linear in systematic covariance and systematic skewness respectively. Furthermore, Kraus and Litzenberger (1976) argued that the slope of the unconditional CAPM is lower and the intercept is higher than predicted. If an investor prefers positive co-skewness, these authors discovered that the inclusion of systematic skewness to the unconditional model yield an intercept value equivalent to the risk-free rate. Therefore they suggested that only systematic skewness, not total skewness, should be used in an asset pricing model in analogous to the systematic risk of beta used in the CAPM.

Similarly, Friend and Westerfield (1980), found that the slope coefficient of systematic skewness is significantly different from zero, implying that systematic skewness can be priced. However, the intercept is significantly different from zero, indicating that the value is not equal to the risk-free rate. This inconsistency is said to have stemmed from a different period of observation and the composition of asset classes used to calculate market returns.

Chen (1980) observed that if the asytomptic APT model presents two factors to be significantly priced, then the Kraus and Litzenberger (1976) pricing equation can be derived. Apart from systematic skewness test, Fang and Lai (1997) developed a four-moment CAPM that includes systematic variance, systematic skewness and systematic kurtosis to the risk premium of an asset.

Also, Christie-David and Chaudhry (2001) showed that the third and fourth moments explain the return-generating process in futures markets significantly well. Investors are generally rewarded for taking high risk as measured by high systematic variance and systematic kurtosis. Likewise, investors forego the expected returns for taking the gains of a positively skewed market. Arditti (1971) also documented that skewness and kurtosis cannot be diversified away by increasing the size of holdings. Connor and Sehgal (2001) empirically investigated the three Factor Model of Fama and French for Indian securities' returns. They found out that Cross-sectional average returns were explained by market, size and book to market factor, not only by the market factor, and there is no link between common risk factor in earnings and risk factor in stock returns.

Furthermore a growing number of studies have revealed that the cross-sectional variation in mean security returns cannot be explained by the market beta alone and showed that fundamental variables such as size (Banz, 1981), ratio of book-to-market value (Rosenberg, Reid and Lanstein, 1985; Chan, Hamao and Lakonishok, 1991), macroeconomic variables and the price to earnings ratio (Basu, 1983) account for changes in the cross-sectional variation in an asset`s expected returns.

Chung, Johnson and Schill (2001) discovered that as higher-order systematic co-moments are included in the cross-sectional regressions for portfolio returns, the SMB and HML generally become insignificant. Thus, they argued convincingly that SMB and HML are good proxies for higher-order co-moments. Ferson and Harvey (1999) loosely asserted that many multifactor specifications are rejected due to the fact that they ignore conditioning information.

Harvey and Siddique (2000) investigated an extended version of the CAPM by including systematic co-skewness. Their specification incorporates conditional skewness. The extended form of the CAPM is preferred as the conditional skewness captures asymmetry in risk, in particular downside risk which has recently become considerably important in measuring value at risk. They however reported that conditional skewness explains the cross-sectional variation of expected returns across assets and is significant even when factors based on size and book-to-market are included.

However, Kothari et al. (1995) and MacKinlay (1995) argued that a substantial part of the premium is due to survivor bias and data snooping. The data source for book equity contains a disproportionate number of high-BE/ME firms that survive distress, so the average return for high-BE/ME firms is overstated. The data snooping hypothesis posits that researcher's fixation to search for variables that are related to average return, will find variables, but only in the sample used to identify them. But a number of papers have weakened and even dismissed the survivorship-bias and the data snooping hypothesis. For instance, Lakonishok et al. (1994) find a strong positive relation between average returns and BE/ME for the largest 20 per cent of NYSE-Amex stocks, where survivor bias is not an issue.

Similarly, Fama and French (1993) find that the relation between BE/ME and average return is strong for value-weight portfolios. As value-weight portfolios give most weight to larger stocks, any survivor bias in these portfolios is trivial. There are also many studies using different sample periods on US data and samples in different countries confirming the existence of the size and book-to-market equity effects.

Recently, Chung, Johnson and Schill (2004) investigated the relationships of higher-order systematic co-moments with size and value factors. They proposed that non-market factors of size and value are proxies of higher-order systematic co-moments. By adding several sets of higher-order co-moments up to the tenth order, the significances of SMB and HML factors reduce and become insignificant, while adjusted R-square improves. Replacing systematic co-moments with standard moments, the SMB and HML factor loadings remain significant.

Buyuksavarci (2010) investigated the effect of macroeconomic variables on Turkish Stock Exchange (TSE) based on APT framework and found that some factors such as interest rate, industrial production index, oil prices and exchange rate have significant negative effect on TSE-100 index returns while money supply factor maintains positive effect and that both inflation rate and gold prices do not have any significant effect. Tursoy ,Gunsel and Rjoub (2008) show that the APT has more explanatory power than the CAPM. Even Fama and French (1993) developed the Three-Factor Model and revealed that size and value factors are more significant than beta in explaining variations in returns.

Nguyen (2010) investigated the stock price behavior of the Stock Exchange of Thailand (SET), by applying APT. He employs the data for the period before the Asian financial crisis of 1997-98, i.e. between January 1987 and December 1996. The research analyzed the relationship between stock returns in Thailand and some economic fundamentals, namely returns on the SET Index, changes in exchange rates, industrial production growth rates, unexpected changes in inflation, changes in the current account balance, differences between domestic interest rates and international interest rates and changes in domestic interest rates. The test results show that the APT does hold in the stock market of Thailand, while the CAPM fails to do so.

Ifuero and Esther (2012) employed quarterly data for the period 2001 to 2005 in Nigerian Stock Exchange (NSE) market to test the nature of the relationship between security returns and beta using the CAPM framework. They provide evidence in support of the positive risk-return relationship and linearity hypotheses in Nigeria. Furthermore, Adeniyi and Solomon (2012) investigated the empirical validity of the CAPM using monthly stock prices of 16 companies from the most capitalized 20 companies in Nigerian Stock Exchange (NSE) between the period January 2000 and December 2009 and find that the higher the risk, the higher the return hypothesis does not hold and overall, they conclude that the CAPM appears to be inconsistent in Nigeria but they do not provide evidence in support of any alternative model(s).

3.1 Methodology

The study employs the traditional pricing equations of the CAPM, CAPM with higher co-moment, Fama and French Three-Factor Model and APT Identification models. The models are developed by Sharpe (1965), Lang and Lai (1997), Fama and French (1992) and Ross (1976) respectively. However, these models are presented below explicitly with the features of time series and cross-sectional regression models. This is because the time series regression models are estimated to derive proxies for the cross-sectional regression models; while the estimated results of the cross-sectional data provide the pricing implications of the models. Thus:

In the one-pass or time series regression equation for the CAPM

$R_{it}- R_{ft} = a_i+ b_i(R_{mt}– R_{ft}) + \mu_{it}$ …………………………………(1)

Where:

$R_{it}$is the return on security (i) at time (t)
R_{ft} is the risk free rate at time (t)
a_i is the constant return earned in each period from security (i)
R_{mt} is the return on market portfolio at time (t)
b_i is the estimate of beta for security (i) (β_i) representing the systematic risk
μ_t is the residual term.

The estimated beta i.e. β_i is then used as the independent variable in the following two-pass or cross-sectional regression equation:

$R_{it} = \lambda_0 \mp \lambda_1\beta^{\wedge}_{it} + \varepsilon_{it}$ ……………………………………….(2)

where: R_{it} is the average returns of i'th securities at time (t)

λ_0 is the intercept term
λ_1 is the regression parameter
$\beta^{\wedge}_{it}$ is the estimated beta for security (i) at time (t)
μ_{it} is the random variable.

On the a-priori ground: The estimate of the intercept term ($E\lambda_0$) is not expected to be significantly different from zero (i.e. $E(\lambda_0) = 0$). This means that the intercept term or Jensen alpha is expected to be the same with risk free rate.The estimate of the market price of risk i.e. the market risk premium ($E\lambda_1$) is expected to be significantly different zero (i.e. E $\lambda_1 > 0$) and it must display positive coefficient in order to support the empirical stance or validity of the CAPM. According to Radcliffe (1987), when testing for the CAPM using equation 1 and 2 above, we are actually testing for the following: that theb_is are true estimates of the historical β_is, and secondly that the market portfolio used in carrying out the empirical study is the appropriate proxy for the efficient market portfolio adopted in measuring historical risk premium and thirdly, that the CAPM specification is correct in linear form.
In the one-pass or time series regression equation for the CAPM with higher co-moment.

R_{it}-R_{ft}= b_0+ sk $(R_{mt}– R_{ft})^{2\ +}$ μ_t………………………….………..(3)
R_{it}-R_{ft}= a_0+ kt $(R_{mt}– R_{ft})^{3\ +}$ e_t ……………………………..……..(4)

where: sk and kt are the estimated risk proxies for $sk^{\wedge}$ and kt^respectively in equation 5; other variables have been defined in equation 1.

$R_{it} = \mu_0 + \lambda_1\beta_{it} + \lambda_2\, sk^{\wedge}_{it} + \lambda_3 kt^{\wedge}_t + v_t$……………………….(5)

Where: $sk^{\wedge}_{it}$and$kt^{\wedge}_t$ are defined as systematic co-skewness and co-kurtosis risk premia.

In the one-pass or time series regression equation for the FF3FM.

$R_{it} – R_{ft} = b_0 + s(SMB)_t + \mu_t$…………………………….(6)

Where: the estimated value of s is the factor loading for size factor

$R_{it} – R_f = a_0 + h(HML)_t + e_t$…………………………….(7)

Where: the estimated value of h is the factor loading for value factor.

Therefore, the sensitivity with excess return with the return of SMB gives loadings for size factor while that of HML portfolio gives loadings for value factor.

The cross-sectional regression model for FF3FM

$\bar{R}_{it} = \lambda_0 + \lambda_1\beta^{\wedge}_{it} + \lambda_2 s_{it}^{\wedge} + \lambda_3 h^{\wedge}_{it} + \mu_t$………………………(8)

Where: $\beta^{\wedge}_{it}$ is covariance risk factor for security i at time (t)

$s_{it}^{\wedge}$ is risk factor for security i at time (t)
$h^{\wedge}_{it}$ is the value risk factor for security i at time (t)

In the one-pass equation for the APT

$x^{\sim}_i = b_{i1}F^{\sim}_1 + b_{i2}\, F^{\sim}_2 +$ ………. $+ b_{im}F^{\sim}_m + e_i\mu^{\sim}_i$ ……….(8)
i = 1, 2, 3 ……p

Where: X_j= is the observed variables (i. e. security returns)

b_{ji}'s are the systematic risk estimates associated with the representative common factors and they are (P x M) matrices

F's are the (M x 1) random vector of M common factors.
μ_j is a (P x P) diagonal matrix, called the unique factor pattern.
Y is an (M x 1) random vector of P unique factors, while M and
P is the number of factor extracted and number of security respectively.

The cross-sectional regression model for FF3FM

$R_{it} = y_0 + y_1 b^{\wedge}_{i1} + y_2 b^{\wedge}_{i2} + \ldots\ldots\ldots\ldots + y_k b^{\wedge}_{ik} + e^{\sim}_{i} \ldots\ldots\ldots\ldots\ldots\ldots(9)$

Where: R_{it} is the average return of i`th securities

$b_{i1}, b_{i2} \ldots\ldots b_{ik}$ are the estimated factor loadings

$y_1, y_2 \ldots\ldots\ldots\ldots y_k$ are the estimated risk premia associated with the i`th factors.

y_0 and $e_i$are the constants and error terms respectively.

3.1.1 Data Source

The data employed in this study are purely secondary data of raw stock prices and they are sourced from NSE web-site: www.cscsnigerialtd.com and those on capitalization from the various volumes of NSE Fact Books.

4.1 Empirical Results

4.1.2 Determining the CAPM Risk Factor

The study utilizes the estimated coefficients of equation (2) to verify if the risk factor in the CAPM framework is significantly priced. The results from the equation are reported in table 4.1

Table 4.1: The Result of the CAPM Pricing Factor

Variable	coefficient	std error	t-value	p-value
Constant	0.002	*0.013*	(0.148)	0.883
Beta	0.003	*0.028*	(0.123)	0.903

Note: the figures in italics and parenthesis are the standard errors and t-values respectively. The critical value for t-test with 51Degrees of freedom @ 95% level is 1.684 using one-tailtest and AR^2 is -0.019.
Source: Author's Computation.

It is revealed in table 4.1 that the intercept term has a coefficient of 0.002 an observed t-value of 0.148, while the critical t-value is 1.684 at 95% level of confidence. Since the critical t-value is larger than the observed t-value, we do not reject the null hypothesis that the intercept term is not significantly different from zero, hence the intercept Hypothesis holds and is statistically consistent with the CAPM.

Also, we discover that the slope coefficient (i.e. the coefficient of beta) is positive at 0.003 and the corresponding observed t-value is 0.123. This means that beta is not significantly different from zero which negates the a-priori stance of the CAPM. Therefore, the Slope Hypothesis is rejected since the coefficient of beta is not significant. However, the positive sign is in consonance with theory hence, the positive risk-return trade-off hypothesis is not rejected as the CAPM claims.

4.1.3 Determining the CAPM with Higher Order Co-moment Risk Factors

The results of the factors that are priced in the CAPM with higher order co-moment are presented in table 4.2

Table 4.2: The Results of the Unconditional Test of the Four Moments CAPM Fundamental Relation

Factor Risk Premium	coefficient	std error	t-value	p-value
Constant	-0.005	*0.008*	(-0.654)	0.516
Covariance	-0.027	*0.035*	(-0.784)	0.437
Co skewness	-0.024	*0.013*	(-1.851)	0.070
Co kurtosis	0.021	0.029	(0.737)	0.465

Note: The standard errors and t-values are in italics and parenthesis respectively. The critical t-value with 50 Degree of freedom @ 95% confidence level using one-tail test is 1.684 and AR^2 is -0.041.
Source: Author's Computation

The results of the test of the four moments CAPM pricing implication in table 4.2 reveal the observed t-values, the covariance co skewness and co kurtosis risks as -0.784, -1.851 and 0.737 respectively. Given a critical t-value of 1.684, it means that the only risk that is significantly priced using the unconditional four moments CAPM is the systematic co skewness risk.

Hence, the Nigerian capital market pays premium to investors for assuming such risk. The odd risk premium (0.021) for co kurtosis suggests that investors in the market prefer co kurtosis risk but they are not rewarded. However, the four moments pricing equation does not improve the explanatory power of the two moment CAPM since its Adjusted R-squared -0.041 still remains negative. Therefore, the unconditional test results are unsatisfactory according to a-priori.

4.1.4 Determining the Risk Factors in theFama and French Three-Factor Model

The tests on the determination of risk premia the FF3FM are based on the estimated values of equations (6), (7) and (8). Equations (6&7) are estimated to derive proxies for the risk factors in equation (8). Its results are reported in the appendix. The Adjusted R-squared is substantially high for most of the stocks meaning that the FF3FM has improved the descriptive power of the CAPM based on time series analysis.

However, on portfolio or cross-sectional basis, we found that the model does not improve on the CAPM explanatory power; though, all the risk factors including beta are significantly priced. These results are summarized in table 4.3

Table 4.3: The Results of the Unconditional Test of the French and Fama Three Factor Model

Risk Factor	Coefficient	Std Error	T-Stat	P.V
Constant	0.006	*0.007*	(0.968)	0.338
Covariance	-0.053	*0.098*	(-2.685)*	0.010
Size	-5.10E-06	*1.19E-06*	(-4.290)*	0.000
Value	0.001	*0.0002*	(4.623)*	0.000

Note: The values in italics and parenthesis are the standard errors and t-statistics respectively. The critical value for t-test with 50 Degrees of freedom @ 95 percent confidence level is 1.684. Adjusted R-squared is found to be -0.013; * means significant at 95%
Source: Author's Computation

The unconditional test of the FF3FM for the specified period January 2003 to December 2011 reveals that covariance risk, size risk and value risk factors are significantly priced since their respective observed t-values 2.685, 4.290 and 4.623 are larger than the critical t-values of 1.684. This suggests that investors in the Nigerian capital market are rewarded for taking these risks. However, the value of the Adjusted R-squared is very weak meaning that the FF3FM has not improved upon the descriptive power of the CAPM based on the unconditional test.

4.1.5 Determining the APT Risk Factors Premia

The test in respect of the APT Risk Factor Premia is conducted by estimating equation (9). The test results are reported in table 4.4.

Table 4.4 Results of the test of the APT Pricing Factors

Variable	coefficient	std error	t-value	p-value
C	0.011	*0.005*	(2.189)**	0.035
F1	-0.058	*0.343*	(-1.676)	0.103
F2	0.033	*0.013*	(2.591)**	0.014
F3	-0.002	*0.012*	(-0.150)	0.882
F4	-0.059	*0.013*	(-4.613)**	0.000
F5	0.038	*0.013*	(3.023)**	0.005
F6	-0.021	*0.012*	(-1.701)*	0.098
F7	0.005	*0.012*	(0.042)	0.967
F8	0.006	*0.012*	(0.492)	0.626
F9	-0.006	*0.012*	(-0.472)	0.640
F10	-0.005	*0.012*	(-0.398)	0.693
F11	-0.012	*0.012*	(-0.986)	0.331
F12	0.008	*0.012*	(-0.623)	0.537
F13	0.007	*0.013*	(0.567)	0.574
F14	-0.007	*0.012*	(-0.557)	0.581
F15	0.007	*0.012*	(0.552)	0.585
F16	0.018	*0.012*	(1.478)	0.148
F17	0.007	*0.012*	(0.714)	0.480

Note: The figures in italics and parenthesis are the standard errors and t-values respectively. The critical value for the t-test with 35 Degrees of freedom @ 95% confidence level is 1.697 using one-tail test. * and ** mean significant at 5% and both 1% & 5% levels respectively, $AR^2 = 0.41$.
Source: Author's Computation

The results in table 4.4 show that the component factors such as F2, F4, F5, and F6 display observed t-values of 2.591, 4.613, 3.023 and 1.701 respectively. These values are found to be larger than the critical t-value 1.697 at 95 percent level of confidence. At this level of confidence, the null hypothesis that none of the specified APT explanatory variables is significant is rejected. Four latent factors are discovered as priced factors influencing asset's return variability. Therefore, results are consistent with the a-priori and the applicability of the APT in Nigerian capital market is considered valid in determining/predicting the behavior of assets returns.

5.1 Conclusion

The study examined the factors that command risk premium in Nigerian stock market using the traditional or unconditional pricing errors of the CAPM, CAPM with higher order co-moment, FF3FM, and APT respectively. The results reveal that the CAPM risk factor (i.e. beta) is not significantly priced, though it has positive relation with return which is in consonance with the convention "the higher the risk, the higher the return". The factors in the pricing identification of the CAPM with higher order co-moment are not significant but while the covariance risk and co-skewness risk premia maintain inverse relationship with return, co-kurtosis risk does not. The FF3FM results show that both value and size are priced and maintain inverse and direct unconditional relationship with average return. The APT identifies seventeen latent factors, of which only four are significantly priced and all of these four except one have inverse relationship with average return. Thus, we conclude that the APT outperforms the CAPM and its subsequent versions in Nigerian stock market. This is overwhelmingly supported by the work of (Tursoy, Guisel and Rjoub, 2008).

6.1 Recommendations

In view of the observed results in the study, it is recommended that investors should pay less attention to unconditional market risk factors but give consideration to non-market and latent factors.
It is also recommended that investors should employ APT discounting model in determining the relative costs of their investments and finally, they should hedge their investments against unobservable risk factors.

References

Adeniyi, J.A., & Solomon, A.O. (2012), Test of Capital Asset Pricing Model: Evidence from Nigerian Stock Exchange, Journal of Economic Theory, 6(46), 121-127

Arditti, F. (1967), Risk and the required return on equity, Journal of Finance, 22, 19-36.

Banz, R.W. (1981), The relationship between return and market value of common stocks, Journal of Financial Economics, 9, 3-18.

Basu, S. (1983), The relationship between earnings yield, market value and the return for NYSE common stocks, Journal of Financial Economics, 12, 126-156.

Buyuksalvarci, A. (2010),The effects of macroeconomic variables on stock returns: Evidence from Turkey, European Journal of Social Sciences, 14(3), 404-416.

Chen, N.F. (1980), Arbitrage Pricing Theory: Estimation and applications, Working Paper, Graduate School of Management, University of California, Los Angles.

Christie-David, R. & Chaudhry, M. (2001), Co-skewness and co-kurtosis in futures markets, Journal of Empirical Finance, 8, 55-81.

Chung, Y.P. Johnson, H. &Schill, M.J. (2001), Asset pricing when returns are non-normal: Fama-French factors vs higher-order systematic co-moments, Working Paper, A Gary Anderson Graduate School of Management, University of California.

Fama, E.F., & French, K.R. (1992), The cross-section of expected stock returns, Journal of Finance, 47(2), 427-465.

Fama, E. F., & French K.R. (1993), Common risk factors in the returns on stocks and bonds, Journal of Financial Economics 33, 3-56.

Fama, E. F., & French, K. R. (1998), Value versus growth: The international evidence, Journal of Finance, 53, 1975-1979.

Fang, H., & Lai T.Y. (1997), Co-kurtosis and capital asset pricing, The Financial Review, 32, 293-307.

Ferson, W.E., & Harvey, C.R. (1991), The variation of economic risk premiums, Journal of Political Economy, 99, 385-415.

Friend, I., &Westerfield, R. (1980), Co-skewness and capital asset pricing, Journal of Finance, 35, 897-914.

Harvey, C., &Siddique, A. (2000), Conditional skewness in asset pricing tests, Journal of Finance, 55, 1263-1295.

Ifuero, O. O., & Esther, I. A. (2012), Market risk and returns: Evidence from Nigerian capital market, Asian Journal of Business Management 4(4); 367-372.

Kotheari, S.P., Shanken, J.,& Sloan, R.G. (1995), Another look at the cross-section of expected stock returns, Journal of Finance, 50(1), 185-224.

Kraus, A., &Litenberger, (1976), Skewness, preference and valuation of risk assets, Journal of Finance, 31, 1085-1100.

Lakonishok, J., Shleifer, A., &Vishny, R. W. (1994), Contrarian investment, extrapolation and risk, Journal of Finance, 49, 1541-1578.

MacKinlay, A. C. (1995), Multifactor models do not explain deviations from the CAPM, Journal of Financial Economics, 38, 3-28.

Nguyen, T. D. (2010), Arbitrage Pricing Theory: Evidence from an emerging stock market, DEPOCEN Working Paper Series, No. 2010/03

Radcliffe, R.C. (1987), Investment, (2nd Ed), London, Scott, Foresman and Company.

Ross, S.A. (1976),The arbitrage theory of capital asset pricing, Journal of Economic Theory, 13(6) 341-360.

Roll, R. (1977),A critique of the asset pricing theory's tests; part I: On past and potential testability of the theory,Journal of Financial Economics, 4(2) 129-176.

Rosenberg, B., Reid, K. &Lanstein, R. (1985), Persuasive evidence of market inefficiency, Journal of Portfolio Management, 11, 9-17.

Sharpe, W.F. (1964), Capital asset prices: A theory of market equilibrium under conditions of risk, Journal of Finance, 19, 425-442.

Tursoy, T., Gunsel, N., & Rjoub, H. (2008), Macroeconomic factors, the APT and the Istanbul stock market, International Research Journal of Finance and Economics,22, 49-57