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A Review Study of Risk-Return Relationship and Performance Measures Comparing Different Industry Sectors

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Abstract: The significance of risk-return relationship is advocated from both investors and organizations. Evaluating the relationship between expected rate of return and the risk of asset would help investors to make better and more accurate decision on investing in different industries. To this regards, the study reviewed the risk-return relationship and pricing methods, theories and empirical studies to develop a performance measures comparing different industry sectors. The empirical evidences were discussed within the scope of market risks and returns. Then, the theories and pioneer literature related to Capital Asset Pricing Model (CAPM) was explored to show the relationship between expected return and systematic risk. Treynor Index, Sharpe Index, and Jansen Index as performance measures were extracted from CAPM model and the correlation were discussed between them. As of outcome, the study proposed a risk-return construct regards to develop better performance measures for industry sectors.

Key words: Capital Asset Pricing Model, Performance measures, Return on investment, Risk-return relationship.

INTRODUCTION

Many studies argue the importance ofrisk-return relationshipin a stock market.The pricing of stocks and bonds within the stock market is one of the most important areas of finance and investment and affects the economic life of both industries and individuals.Since cash flows from assets are uncertainand differ from asset to asset, the expected rates of return from assets would be different among diverse assets classes based on investors' perspectives. The difference between required rates of return on different assets reflects varying risks levels for investors in subjected assets. The association between the expected rates of return of an asset on the risk makes the expected rate of return concept and its relationship with some measures of risk the most fundamental issue theoretically and practically.

Evaluating the relationship between expected rate of return and the risk of asset would help investors to make better and more accurate decision on investing in different industries.The capital asset pricing model (CAPM) is the most referenced theory that attempts to explain the relationship between risk and expected rate of return and thus provide a conceptual method to determine the most important component of the asset valuation problem.Although different risk-return models have proposed by literature, no models have substituted for the CAPM which is "built on impeccable logic." (Bodie, Kane, & Marcus, 2008)The CAPM has been the dominant asset pricing theory and is a primary tool in academic research and business application (Jagannathan & Wang, 1996). To this regards, this paper attempts to review the risk-return and pricing methods theories and empirical studies to develop a performance measures comparing different industry sectors.

Literature Review:

There are plenty of empirical and theoretical studies related to the asset pricing model, whichtry to determine the elements affecting the amount of expected return in this model.These studies have been undergone on the relationship between expected return and riskfor 60 years now.Portfolioinvestment theory was the first modern theory proposed by Markowitz (1952). Markowitz (1952) assumed that the rates of return of individual assets covary with one another, and there is a rather stable covariance, or correlation coefficient, between the rates of return of every two assets. Thus, he stated that it is theoretically possible to construct a variance-covariance matrix of all risky assets. By having the variance-covariance of returns for all risky assets, it would possible to mathematically compute the risk of any portfolio of each asset. Markowitz also indicated that for any level of risk that an investor can tolerate there is an optimal weight of assets that yields a maximum rate of return on the portfolio.

The portfolio theory of Markowitz in 1952 tried to show how investors can create a portfolio of individual securities to optimally adjust the risk and return. The earliest model was developed by Lintner (1965) and Sharpe (1964) which is extension of the model of Markowitz (1959) and Tobin (1958). The Sharpe-lintner model uses beta as the market risk and market return for calculating the expected return. This model was

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expanded and changed by different researchers during the years, and researcher tried to come up with a model that can explained the risk return relationship more accurately. The Markowitz model inspired other researchers to incorporate Makowitz's risk-return ideas into less complicated models. And, these efforts led to the development of the CAPM. Theoretical foundation of capital asset pricing model was originally developed by Sharpe in 1964 and subsequently elaborated into the equilibrium model of the capital market prices by Sharpe (1964), Lintner (1965), and Mossin (1966). Further, with present computational capacity of computers, the Markowitz model is now implemented to allocate investments between classes of securities, such as, between stocks and bonds, and the CAPM is used to allocate funds between different stocks within the equity part of the portfolio. Knowing the factors that determine investors' return expectations enables them to evaluate the stock or portfolio at any particular time as the stocks are undervalued, overvalued, or properly valued. This would help the investor to make right decision in the market.In the next section, the relationship between risk and return is presented.

Empirical Evidences for Risk and Return Association:

There are few hypothesis relations to the relationship between riskand expected return.One of the well knows risk-return relationship assumptions emphases on a positive relationship between the two; thereby by increasing the amount of systematic risk, the amount of expected return will increase as well. In 1985 Malone and Sareewiwathana conducted a study on the most active securities on the Securities Exchange of Thailand. The result of their study indicated a liner and positive relationship between systematic risk and return (Sareewiwathana & Malone, 1985).

In contrast, other studies indicate that beta (systematic) risk is somehow weak to predict the risk, since there are other variables that can influence the return. Wong and Tan (1991) used empirical analysis for measuring the relationship between risk and return in Singapore stock market for the period 1980-1985 with using weekly data.Their findings indicated that there is a negative relationship between beta and risk for portfolios and single stocks.

Hawawini(1991) studied the relationship between risk and return by using CAPM of the Fama and MacBeth(1973) on Tokeyo Stock Exchange. As a result, he found no significant relationship between risk and return for the period of the sample used. However, the study of Lakonishok and Shapiro (1984) argued that there is a significant relationship between risk and return. Pettengill *et al* (1995) also conducted a study in USA with using monthly return and their results showed that cross sectional portfolio return and Beta had a consistent and highly significant relationship.

The study of the Fama and French (1992) showed that there is a flat relationship between market risk and average beta. Conversely,study of Davis (1994) for large US industrial firms rejected the relationship between beta and return.The studies byMiles and Timmermann, (1996) and He and Ng (1994) showed that there was weak empirical evidence on the risk-return relationship.The study of Jagannathan andWang (1996) on the stock market of Taiwan shows a positive relationship between systematic risk and return.Heston *et al.* (1999) performed a study for cross sectional relationship between size, beta and average return of twelve countries in European and he found that the average returns were related to both beta and size.

In addition, the study of Hodoshima *et al.* (2000) and Fletcher (1997, 2000) in UKinternational stock market and Jaoan shows that there is a support for a positive and significant relationship between systematic risk and return in up market months and a negative relationship in down market months respectively. Shum and Tang (2004) used the time-series model with a constant beta model and they found that in up (down) market,systematic risk and return relationship is significantly negative (positive).The study of Hung *et al*. (2004) also argued that the amount of systematic risk (Beta) was very significant in their conditional model. Theriou *et al* (2005) implemented a study in Athens Stock Exchange and their results indicated that there was no significant risk-return relationship for the period. Study of the Meric *et al* (2010) in thestock market of US showsa positive risk-return relationship between Industries listed in US stock market.There are many controversial results have been revealed in empirical literature; therefore, this studyreviews Capital Asset Pricing Model (CAPM) to explore the relationship between expected return and systematic risk.

CAPM Risk –Adjusted Return:

Since the foundation for CAPM introduced in the year 1960s, it let to the investors to predict the expected return of the investment in maker. Several researches have been analyzed the applicability of this model in variety of markets. The model was supported conditionally and unconditionally by several researchers like Jagannathan and Wang (1996), Fama and MacBeth (1973), Chen (2003), and Soydemir (2005). However, other empirical results claim that CAPM is not a qualified model, because there are other factors that can influence the expected return of the stock rather than just systematic risk. For instance, the study of Fama and French (1992), Banz (1981), Dhankar and Singh (2005) and Gonzalez (2001) refused to qualify CAPM.

Elsas *et al*. (2003) analyzed the relationship between risk (beta) and return in German stock market, and they used both standard CAPM and CCAPM for testing positive and negative market risk premium separately,

the results of their studies indicated that CCAPM is better than CAPM for estimating the stock return. The study of the Abu Hassan *et al* (2008) in Malaysia stock market, using different trying to predict the expected stock return, indicated that there are not any models that have the ability to absolutely predict the expected stock return.

In addition, the CAPM makes certain assumptions about the behaviors of the investors and about the working of the capital market and on the basis of those assumptions derives a specific linear relationship between expected rate of return and risk; a relationship that according to CAPM should hold for every individual asset or any combination of individual assets in order for the capital market to be in equilibrium. The basic principle in the CAPM is that the reason why rates of return of individual stocks covary with one another is because the rate of return of every stock or any portfolio of stocks varies with a common factor, and that common factor is the rate of return of the overall stock market. The overall market is the portfolio of all risky assets, in which every asset is weighted by the dollar market value of that asset relative to total market values of all assets.

Roll and Ross (1994) call the CAPM "probably the single greatest risk/return innovation." It is observed that the CAPM can be useful for a measure of expected stock returns (Richard & Ross, 1994). Primary empirical studies of the CAPM such as Lintner (1965) and Johnson and Shannon (1974) studies concentrated on the linearity of the relationship between rates of return and beta for cross section of securities. Then empirical assessments of the model initiated by Fama and French (1992) focused on the anomalies in the CAPM framework. These studies tried to investigate whether other variables like size, besides the beta, could explain the variation of average rates of return for cross-section of securities.The study by Stein (1996) claimed that CAPM beta can be useful even if it is no use in predicting stock returns (Stein, 1996). Under several criteria the CAPM can be useful namely;

1. The assumption that the cross-sectional variables for stock returns such as book-to-market reflect pricing errors, rather than compensation for fundamental sources of risk,
2. The firm must have long horizons and be relatively unconstrained by its capital structure, and
3. An estimated beta is a satisfactory proxy for the fundamental riskiness of the firm's cash flows.

The CAPM provides a useful conceptual framework for capital budgeting and the cost of capital includes the systematic risk or the beta which is a valid measure of risk; and the trade-off between return and risk. Stein also argue that CAPM may be a useful tool for managers and investors, because the model as a single market factor model conceptually may work under a wide variety of conditions, not just for a limited set of portfolios.However, the decades-long academic debates and controversies on the validity and usefulness of the CAPM model and its beta, the CAPM is introduced as the main instrument in corporate finance and investment texts. Horneand James (2001)argued that although beta may not be a good indicator of the realized returns, it remains a reasonable measure of risk (Horne & James, 2001).

The CAPM also dominates as a main tool among corporate managers in the valuation of a firm and an investment project or in the determination of the cost of equity capital. In the survey of 392 chief financial officers by Graham and Harvey (2001), 73.5% of managers claim that they use the CAPM to estimate the cost of equity capital (John & Harvey, 2001). In the interview survey by Bruner, *et al*. (1998), 80% of managers and advisors claim that they use the CAPM (Bruner, Eades, Harris, & Higgins, 1998). However, the surveys of Graham and Harvey (2001) and others are often conducted on managers of large firms, and may well contain serious selection bias and unknown non-response bias. The representativeness and universality of the surveys still remains in question.The COMPUSTATdatabase, a major corporate financial data base widely used in both academia and businesses, provides market beta estimates for individual firms. Investment services firms also provide beta estimates as "risk attributes" or "volatility measures" of their bond and stock funds. No other theoretically well-founded model alternative to the CAPM has been implemented for the estimation of the cost of equity capital (Kaplan & Peterson, 1998).

As discussed before, the expected return of each industry or each sector can be extracted by using Capital Asset Pricing Model (CAPM). The Model can be used for evaluating risk return relationship. This equation can calculate the required rate of return by using realized rate of return, risk free rate and Beta.

$$R_I = R_F + \beta \times (R_M - R_F)$$

Where:

R_I = Expected return on a industry I
R_F = Risk-free rate
B = Beta of the industry
R_M = Return of the Market
$R_M - R_F$ = Risk premium

Investors are willing to avoid risk, and they are looking for maximizing their wealth by the end of their investment's period. The assumptions related to this equation are as follow:

- The option of investment for investors is usually between their means (μ) the variance (σ_2) of their expected return
- Risk-free security is a kind of security which is dispensation by the government (Treasury Securities) which has no risk.

These assumptions are represented in a highly idealized and simplified world, yet they are required to keep CAPM on their basic forms that connect the market risk to the expected return of the stock. In the real world, fulfilling these assumptions is very hard and complicated as researchers planned to carry out an empirical study based on CAPM.The CAPM showed that expected return of each sectoral index is related to the systematic risk (Beta) of that index.The traditional CAPM indicated the assumption that Beta of a firm is always constant during the life of the firm.However, there are significant evidences that this supposal is unreliable. This is featured by the studies of Kok (1992, 1994), Bos and Newbold (1984), Cheng (1997) and Kim (1993).Further, the study of the Durack *et al*. (2004) and Jagannathan and Wang (1996) indicated that time-varying beta isa better measure to predict excess return compare to constant beta.

Performance Measures Comparing Different Sectors:

The issue of selecting the proper measure of investment performance and benchmark remains strongly debated among scholars. Majority of debates have surrounded the use of the appropriate benchmark against which to measure return on investment. Despite advances in technology and the application and the invention of advance modeling techniques, the debate has continued in investment circles for over three decades. In evaluating performance, caution should be exercised in using benchmarks that "fools" the alpha calculation by either overweighing or underweighting the returns of small firms. In this context, three different measures or techniques have been used for measuring theperformance of sectors. These measures are Treynor Index,Sharpe Index and Jansen Index model. These three indexes also known as "composite performance measures" In order to evaluate portfolio performance, each measure must at least addresses two important matters as follows.

- The kind of benchmark of the aggregate market that is used to do comparison
- The adjustment of the realized return which is associated the risk of portfolio.

Thedifference between these composite measures primarily depends onmethod of risk-adjustment and the construction of evaluation measures. These performance measures are very important because the lower return of the stock or portfolio is not necessarily shows the inferior performance. This is also obvious that during the period of rising security prices, return of the mutual fund should be lower than return of the growth fund. Ranking the assets would be difficult when some of the assets have both high expected return andsystematic risk as some of them has low expected return and risk at some points. To overcome such problems, it is advised to use one of the performance measurement's techniques at the time than combining return and risk; thereby, the results can be shown with one single number (index) (Haslem, 2003).In this case, each index must use a market return's measure as a standard to adjust for both risk and comparison.

All the measures are an outgrowth of CAPM model which was developed by Sharpe (1964) and Lintner (1965),yet they were also dominated by the studies of Markowitz (1959), Tobin (1958), and Mossin (1966).These performance measures were introduced by Treynor (1965), Sharpe (1966) and Jenson (1968).In the next section, three performance measures suitable for the study are discussed.

Jensen Performance Index:

This ratio compares the performance andriskof expected return with the realized return. This can allowcomparing the portfolio performance relative to the market or to each other.The Alpha (of the index)is the difference between required rate of return and realized rate of return that can exceed for a given amount of risk. The positive alpha indicates the superior performance while the negative alpha indicates inferior performance.Despite the fact that the Jensen's model has been used to measure investment performance, in recent year, the model has been subjected to various criticism. It is argued that the model uses only the market portfolio or one benchmark index (Block & French, 2002). Other researchers such as (Fama and French, 1992) noted that a two or three factor model would yield a more accurate measure of investment performance.

Nevertheless, despite the criticisms of the Jensen Index, it has been has extensively used in prior studies to measure the performance of industry sectors (Goebel and Kim, 1989; Cannon and Vogt, 1995; Han and Liang, 1995; Howe and Shilling, 1990 ; Sagalyn, 1990; Kim *et al*., 2003; Block and French, 2002). The popularity of the Jensen Index compared to the other indexes lies in the fact that the Jensen Index permits researchers to ascertain whether or not abnormal portfolio returns are statistically significant when compared to the overall market. Theα_I can be calculated by using following formula.

$\alpha_I = R_I - [R_F + (R_M - R_F) \times \beta_I$

Where:

α is alpha;
R_I indicates the realized return of each industry I;
R_M is Market's return;
R_F is Risk free rate; and
β_I is Systematic risk (Beta).

When the required return of the sector is higher than its realized return, the amount of Alpha is positive which can show a superior performance of the portfolio and reverse is true (Meric, Ratner, & Meric, 2010).

Treynor Performance Index:

This ratio is a risk-adjusted measure that can measure the performance of the portfolio by standardizing the excess return of the portfolio by its systematic risk.The TR_I can be calculated by using following formula:

$$TR_I = \frac{(R_I - R_F)}{\beta_I}$$

Where:
$R_I$indicates the realizedreturn of each industry I;
R_F is Risk free rate;and
$\beta_i$is Systematic risk (Beta).

SharpePerformance Index:

This ratio is a measure of performance that can standardizes the amount of return in excess of risk- free rate by the amount of standard deviation of the portfolio's return.SR_Ican be calculated by using following formula:

$$SR_I = \frac{(R_I - R_F)}{\sigma_i}$$

Where
σ_i = is the standard deviation of the sector i's returns.

Given the formulasabove, many of the researchers and investors have been used this performance measures for calculating the performance of the portfolio. For Instance, the studies of Kim (1978), Friend and Blume (1970), Fama and MacBeth (1973) and Klemkosky (1973) showed the empirical evidence of the same methods.Sharpe (1966) conducted a study to test the rank correlation between the Treynor and Sharpe indices and his results showed 0.94correlations between them. Reilly (1985) conducted a study of same indices and his findings showed that the rank correlation between these two ratios is 1, yet the correlation between the Treynor index and Jensen alpha is 0.975, while the correlation between Sharpe index and Jenson alpha is 0.975. The Figure 1 shows the relationship between three indices.

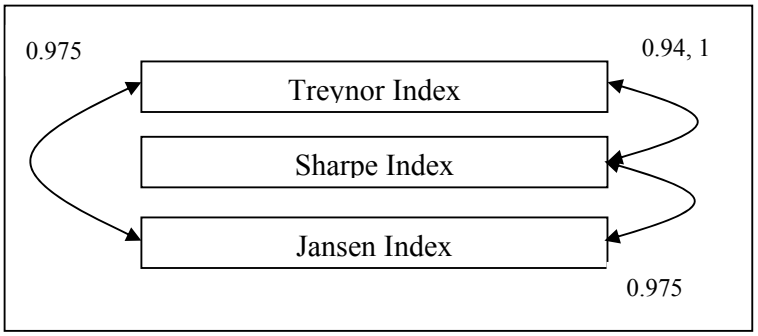

Fig. 1: Treynor, Sharpe, and Jensen Indices Correlation.

There are numbers of statistical features and sampling of theindices which has been studies by researchers like Johnson andBurgess (1975), Johnson andBurgess (1976), Lee(1976)Levy and Levhari (1977), and Lee and Chen (1981, 1984, 1986).For instance the result ofLee and Chen (1981, 1986) showed that the size of sample, investment horizon, and conditions of the mark*et al*ong with the sample's durationcan generally affect the statistical relationship between performance measures technique and their risk.

The size of the portfolio can also influence the portfolio's rank which was measured by using this three measure. For example the size of portfolio of 15 and above -when further decrease in risk is not generally possible- can make different rankings (Evans & Archer, 1968; Wagner & Lau., 1971; Johnson & Shannon, 1974). A mixed risk-adjustment performance measureswas discussed by Jones (1998) and with details by Sharpe (1999) in International Investments. The relationship between this performance measures was discussed by Sharpe (1999).

Their studies results showed that in the well diversified portfolios, the Adjusted Sharpe, Treynor, and Jensen's Alpha indicates identical ranking; however, in the less diversified portfolios the results of Sharpe Index can be different from two other indices.For instant, when the adjusted Treynor and Jensen's Alpha indicates anunderperforming portfolio then Sharpe index might indicated as an outperforming portfolio. Given the discussion above, the following framework introduce by the study to show how performance measures can help performance of the Sectoral Indices.

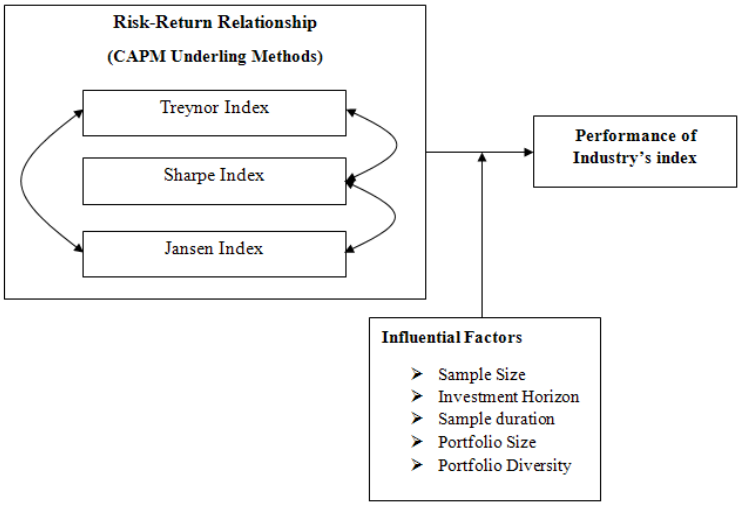

Fig. 2: The Research Proposed Construct.

Limitation and Future Work:

As review article was chosen as nature of this study, no empirical evidences would available in this context, therefore, the results ofthis study can be validate by pursuing into next stage as an empirical study.It cannot be guarantee that the performance of the sectors can be properly evaluated by the framework introduced by this study. However, the literature and documents on performance of the sectors in the past may give supportto the framework and insights to investors about their performance in future (Meric, Ratner, & Meric, 2010). The CAPM, beta, market risk, and required rate of return is adjusted based on pioneer literature, and they are not considering other element like effect of Macro or Microeconomic which can influence the stock price.

Conclusion:

The importance of risk-return relationship is advocated in many studies. The difference between required rates of return on different assets reflects varying risks levels for investors in subjected assets. Evaluating the relationship between expected rate of return and the risk of asset would help investors to make better and more accurate decision on investing in different industries. To this regards, the study attempts to review the risk-return and pricing methods theories and empirical studies to develop a performance measures comparing different industry sectors. To fulfill the research objectives, the empirical evidences were discussed within the scope of market risks and returns. Then, the theories and pioneer literature related to Capital Asset Pricing Model (CAPM) as the main model for the study was explored the relationship between expected return and systematic risk. Within this context, the performance measures were extracted from CAPM model namely; Treynor Index, Sharpe Index, and Jansen Index and the relationship were discussed between them. Further, the study proposed a conceptual framework regards to risk-return relationship towards developing better performance measures for industry sectors. At the latest part, the study presented the research limitation and future work that can be a path for future research in this field.

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