Risk Adjusted Efficient Market Return for Stocks

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Abstract

Investment in stocks is considered to be the most risky among the other investment alternatives. The risk is due to the uncertainty in the return from stocks. There are various asset pricing theories in Finance through which investors can estimate the expected return from investment. One of the most discussed and accepted asset pricing models is the Capital Asset Pricing Model (CAPM) put forward by Sharpe (1964). Although the model is accepted worldwide, there are wide criticisms against the model at the same time. One of the significant concept on which the model is being criticised is the concept of risk free rate of return. It represents that portion of return to the investors which is availed to them without taking any risk. It is the minimum and assured return from investment irrespective of risk. It is the risk premium part of the model that deals with the return commensurate to the risk taken by the investors. Literature show evidence that the treasury bills, that are taken as proxy for risk free rate cannot be completely risk free. Moreover, the concept of risk free rate as the minimum return from investment, especially from stock investment do not hold logical. Thus, the authors find a need to treat equity pricing uniquely by substituting the risk free rate of return with a more appropriate concept. Maintaining the structural base of CAPM, the minimum return from equity investment should not be risk free return, but rather the minimum return from equity investment. Such a minimum return, which is availed to all in an efficient market, can be termed as 'Efficient Market Return'. In that case, the total return that an investor gets from stock will be the risk adjusted efficient market return, the return in commensurate with the risk he undertakes.

Keywords: Efficient Market Hypothesis, Efficient Market Return, Return, Risk, Risk Free Rate.

Introduction

Investment decision has always been a significant task for the investors worldwide. It is especially true for the case of investors in security market, as it is the most risky among other investment options. To decide upon stock market investment, investors do look at the stock prices curiously and inquisitively. Ultimately, their intention is to earn higher returns over and above their initial investment. However, it may not always be possible, as the actual return may be less than what is expected by the investors, the situation that can be precisely ascribed as risk. Risk is an inherent element in every investment. Under the

condition of uncertainty, investors are concerned about the expected return that they get from the investment and the means to predict it.

Economists like Neumann and Morgenstern (1944) came up with models for dealing with asset choices under the condition of risk. However, those models were normative models, which had more theoretical value, rather than prescriptive models which had more pragmatic value. It was then that, Markowitz (1952) formulated a portfolio selection model, stressing on diversification of investment. Markowitz explained that through proper diversification of securities, the unsystematic risk, that is exclusive to individual securities, can be minimised. Then what remains in the total risk is the systematic risk, which is not diversifiable. Thus, by reducing the unsystematic risk and thereby the total risk of portfolio through diversification, portfolio return can be enhanced. Even though Markowitz pointed out that there existed relation between risk and return, the nature and depth of the relation was not specified. Here, Sharpe and others raised question that if there exist relation between risk and return, then how exactly they were related. The Capital Asset Pricing Model (CAPM) was developed by Sharpe (1964) as an answer to this question. The CAPM put forward the concept that the expected return from an asset will be according to the risk involved in the asset. As per the CAPM, that expected return from an asset is constituted by the risk free rate (the risk free return) and a risk premium (return for the additional risk taken). From then, the model remained a foundation for assessing capital asset prices and for this vital contribution to the subject Sharpe was awarded with the Nobel Prize in Economic Sciences in 1990.

However, the model has been critically evaluated from the very beginning of its publication. A significant and most discussed part of the model is regarding its assumption of a risk-free rate of return. Many academicians have criticised the model on the basis of the risk-free rate of return and its validity. In this paper, an attempt is made to introduce a new concept of efficient market return as a valid alternative for the risk-free rate of return in the CAPM, in pricing equity shares theoretically. The rationale for the same lies in two facts. The foremost fact is that no investment can be said as risk free, especially investment in equity. Even the treasury bills rate, which is usually taken as proxy for risk-free rate cannot be considered as completely risk free. Another significant fact is that, the CAPM put forwards a general pricing model for all capital assets, including equity. As equity is the most risky and common investment, it is appropriate to consider equity pricing separately. In that case, the concept of risk-free rate of return does not arise at all, as risk is an inherent and vital element of equity. While investing in equity, one does not expect risk-free rate of return, but rather expects a minimum rate of return that is available to all investors in an efficient market. In this paper an attempt is made to term such minimum rate of return under the efficient market as the 'efficient market return' and introduce as an appropriate alternative for risk-free rate of return in the CAPM exclusively for pricing equity.

The paper is purely conceptual and is organised into five sections. Section I is the introduction to the paper. Section II covers the review of literature. Section III explains the methodology, Section IV discusses the concept of efficient market return and Section V ends with the conclusion of the study.

Review of Literature

From the development of CAPM by Sharpe (1964) as a model for pricing capital assets under equilibrium, it has been a topic of debate and discussion across academicians over nations. Lintner (1965) and Mossin (1966) have contributed towards the model in support of Sharpe. Sharpe's intention was to develop a theory of market equilibrium under the conditions of risk. The significant part was that there were no attempts from any authors to extend the model of investor behavior towards building a market equilibrium theory of asset prices under conditions of risk. For deriving at the conditions of market equilibrium, two essential assumptions were made by him. One is that, it was assumed to have a general rate of interest, namely risk-free rate in the market. It is the rate at which all investors are assumed to lend and borrow at equal terms. The second assumption was on homogeneity of investor expectations. The former one form basis for the model and as per the CAPM, the expected return from an asset equals risk-free rate of return plus risk premium.

Several attempts of modifications to the model were also made by various authors incorporating different aspects. Significant among them includes the work of Lintner (1969) where returns were calculated in real terms. Thereafter, Brennan (1970) incorporated the effects of taxation into the model to make it more realistic in terms. Another salient modification was put forward by Black (1972) by assuming equilibrium with no risk-free asset. Merton (1973) dealt with the concern of the investors regarding the future investment opportunities and proposed an inter-temporal model of capital market. However, Rubenstein (1974) was keen on a more general class of utility functions. While authors came up with varying modes of calculating returns, the third moment of return distributions were considered by Kraus and Litzenberger (1976) in their work. Ross (1976) introduced an alternative model of Arbitrage Pricing Theory (APT) in

between that. Despite the advent of APT, discussions on CAPM continued actively. The transaction costs were incorporated in the modification made to the CAPM by Levy (1978). Thereafter, an attempt to incorporate investors' preference for consumption was made by Breeden (1979). It was market segmentation that was given importance in the study of Merton (1987). In the version of Markowitz (1990), the restrictions on short sales were considered. Similarly several modifications were proposed by various authors.

The assumption of risk-free rate of return is the significant basis on which the CAPM has been criticised. One of the significant works based on that was made by Black (1972). He explored the nature of capital market equilibrium under two assumptions. First, it was assumed that there was no riskless asset and that no riskless lending or borrowing was allowed. Second assumption was that, there was a riskless asset and that only long positions were allowed in the asset. He found that, under both cases, the expected return on an asset was a linear function of its beta and that too in a similar manner when there were no restrictions on borrowing. If there was a riskless asset, then the slope of line relating expected return on risky asset to its beta must be smaller than it is when there are no restrictions on borrowing . He clearly depicted that the assumption of risk-free rate of return was not necessary. Moreover, he pointed out that the minimum-variance zero beta portfolio return would be more appropriate than the risk-free rate of return.

The test of Sharpe-Lintner (S-L) hypothesis is the most commonly used test for testing the risk-free rate assumption of the CAPM. Friend and Blume (1970), Black (1972), Black, Jensen and Scholes (1972), Fama and MacBeth (1973) were among the first few to test the S-L hypothesis. The S-L hypothesis is that the expected return from any zero-beta security is equal to the risk-free rate of return. If this hypothesis is rejected, then it means that, the minimum-variance zero beta portfolio return is the more appropriate measure. In the study of Black et al. (1972), the hypothesis was rejected as the intercept of Security Market Line (SML) exceeded the risk-free rate. In the study of Fama and Macbeth (1973) also, it was pointed out that their data do not support the S-L hypothesis. Another significant fact to be noted is that, the study was consistent with the efficient market simultaneously (Fama & MacBeth, 1973). Thus, under efficient market, the study does not hold the relevance of risk-free rate of return. Another notable work was by Morgan (1975), who supported Black et al. (1972). He tested the predictive power of CAPM with minimum-variance zero beta portfolio return instead of risk-free rate of return. There were no significant difference between the new model and traditional model and hence he concluded that the new one will be more appropriate.

Stambaugh (1982) investigated the sensitivity of the tests of CAPM to portfolios with various sets of assets returns including bonds, real estate and consumer durables in addition to stock. As per CAPM, the sensitivity should be identical. However, the inferences point out significant sensitivity between the set of assets (Stambaugh, 1982). An attempt for testing the CAPM with time-varying risks and returns was made by Bodurtha, Jr. and Mark (1991). They have drawn on Engle's autoregressive conditionally heteroscedastic modeling strategy to formulate a conditional CAPM with time-varying risk and expected returns (Bodurtha, Jr., & Mark, 1991). Ho, Strange & Piesse (2000) made another effort whereby they bought evidence from Hong Kong market for the CAPM anomalies.

Anomalies regarding risk-free rate of return were investigated across nations. Faff (2001) tested CAPM based on the evidence from Australia. Brennan and Xia (2001) observed anomalous returns, from portfolios, relative to the CAPM. Chou and Lin (2002) tested S-L hypothesis using data from 16 OECD (Organization for Economic Cooperation and Development) countries and Hong Kong. Sun and Yang (2003) derived a zero beta pricing formula for CAPM with heterogeneous beliefs and was a generalised model of Black (1972). Avramov and Chordia (2006) tested whether the CAPM is able to capture the anomalies related to size, value and momentum. They found that the model failed to capture the anomalies (Avramov & Chordia, 2006).

Strydom and Charteris (2013) studied the African risk-free rate anomaly by testing the S-L hypothesis. It was found that the risk-free proxy yields differed from the minimum return required by investors in a significant manner. However, the minimum-variance zero-beta portfolio returns were not different from the minimum required return significantly.

Over and above the criticisms on the concept of risk-free rate of return, there were also criticisms on the proxy selected as risk-free rate. Brennan (1971) pointed out the difficulty in estimating the risk-free rate as the borrowing and lending rates differ widely in many nations. He advised to use the zero beta portfolio return as the minimum required return instead.

Various academicians and practitioners have accepted the fact that there exist risk free rate puzzles and asset pricing anomalies. DeJong and Collins (1985) found that the unexpected changes in the risk free rate influenced the instability of the equity beta. When there were large unexpected changes in the risk free rate, the greater were

the instability in the beta (DeJong & Collins, 1985). Weil (1989) raised a logical question regarding the risk free rate for being a much lower rate. In his words, "why the risk free rate is so low, if agents are so averse to intertemporal substitution?" (Weil, 1989). He attributes market imperfections and heterogeneity as likely reason for that puzzle. The risk free rate puzzles are largely observed in shorter periods (Daniel & Marshall, 1997). Another study noted that the risk free rate puzzles continued to remain irrespective of sample taken or the nation to which it belonged (Canova & Nicolo, 2003).

Thus, there have been wide criticisms against the concept of risk-free rate in the CAPM and its calculations. It continues to be a relevant problem for further research and a valid solution for the risk free rate puzzle is always called for. In this study, an attempt is made to address this issue of risk free rate puzzle in detail, considering the depth of the problem and the need for a more appropriate solution. As a solution to the problem, a theoretically derived novel concept of 'efficient market return' is proposed in place of risk free rate of return in equity pricing.

Methodology

The paper is conceptual and thus is descriptive in nature. The concept of the efficient market return and its rationale are explained.

Concept of Efficient Market Return

As Fama (2014) had rightly attributed, the two pillars of asset pricing are efficient capital markets and asset pricing models. He interpreted it as the Siamese twins of asset pricing (Fama, 2014). Therefore, an asset pricing model cannot be developed without considering the market efficiency. This paper attempts to introduce a new concept of 'Efficient Market Return' by integrating the two pillars of asset pricing in a more appropriate way.

The Capital Asset Pricing Model (CAPM)

The CAPM developed by Sharpe (1964) put forward a model to estimate the expected return from any capital asset. Markowitz's (1952) Portfolio theory stated that through proper diversification, the risk can be reduced and return from portfolio can be enhanced. The more the diversification, the lesser will be the unsystematic risk or diversifiable risk. According to Markowitz theory, it is possible to eliminate the unsystematic risk to a great extent making the systematic risk the only risk remaining. All assets are prone to systematic risk, as it cannot be eliminated through diversification. Thus the Portfolio theory shows that there is a direct relationship between risk and return. It was Sharpe (1964) who explained the exact relation between risk and return more accurately. The CAPM states that the return expected from a security is linearly related with the risk involved in it. The model can be represented as below:

$$E(R_i) = R_f + [E(R_M) - R_f]\beta_{iM} \qquad (1)$$

The CAPM is shown in the equation (1) in which, $E(R_i)$ represents the expected return on an asset, β_{iM} is the beta representing the systematic risk involved in the asset, R_f represents the risk-free rate of return, and ($E(R_M)$ - R_f) is the market premium.

From the equation (1), it is clear that, when an investor invests in any asset, he gets two portions of returns. Risk-free rate of return, which is the return from a risk-free asset that ensures the minimum return for the amount of investment, constitutes the foremost portion. Usually, the rate of Treasury bills issued by the government is taken as proxy for the risk-free rate as no risk is expected from such bills. The second portion of return is the risk premium. As the name suggests, it is the premium for investors for the additional risk they had to bear. Therefore, the risk premium will be in proportion to the risk involved in the asset in which the investment is made. The risk premium is beta times the market premium. Market premium is the excess of market return over the risk free rate of return.

Like any theory, CAPM is based on certain assumptions. Of the assumptions, two significant assumptions are widely discussed and highlighted. First that the market is efficient and second that there exist a borrowing and lending at a risk-free rate (Rf), which is the same for all investors and does not depend on the amount borrowed or lent. These assumptions are both the strength and weakness of the model.

Efficient Market Hypothesis

The random nature of price movements of securities was first denoted by Bachelier (1900) in his study on theory of speculation. After a few years, Kendall (1953) proposed the theory that stock prices move randomly, through his paper. The term random walk was more popularised by Fama (1965) through his paper on the behavior of stock market prices. Then Fama (1970) came up with his most discussed work on efficient market model. An efficient market is a market where there is free flow of information and information is available to all participants. A market is said to be efficient when one cannot make any gain with his technical savvy over the naive investors who simply buy and hold. In efficient market when new information reaches, it will be assimilated, then and there, and reflected in the market price before anyone can take advantage to make personal gain. The competition between the active participants of the market lead to such a situation that at any point of time, the market reflects effects of all past information and also expected future events. In such a market, the price of securities will be an unbiased estimate of its intrinsic value. It may sometimes vary leading to situation of undervaluation and overvaluation, but those anomalies will not last due to the process of arbitrage.

Fama (1970) postulates three forms of market efficiency namely weak-form market efficiency, semi-strong form market efficiency and strong-form market efficiency. Weak form efficient market is a market where the security prices reflect all past prices and semi-strong form efficient market is the market where all public information is reflected in the prices. Under strong-form efficient market, the prices reflect all public as well as private information.

Thus, it is to be noted that, under efficient market, investors will be availed with a return common to all. No one can gain over another with any new information or technical expertise, as the information is available to all alike. But, that is not the case with all investors who invest in stocks. Some investor do gain more returns than the others. There are two possible reasons for that. The first reason can be the availability of new information to those particular investors alone. The second reason can be their decision to invest in more risky securities than others. The first case is not possible in an efficient market. It means that the additional return that the investors gain over the others is because of the additional risk that they bear.

No Investment is Risk-free

An important assumption of the CAPM is that there exists a risk-free rate at which borrowing and lending is done. The risk-free rate of return forms the basis for estimation of return from investment in any capital asset. It is the minimum return that one gets when investing in capital assets, as it is the return from risk-free asset. The risk-free asset is the last potential or viable investment opportunity when the assets are listed based on the risk involved. Van Horne (1970) stated that short term treasury bills rates could be approximated to short term risk free rate. He also pointed out that this short term risk free rate can be used as a basis for structuring long term risk free rate (Van Horne, 1970). So, the logic behind the model for establishing risk-free return as the basic return is that, an investor will be assured of at least the risk-free return, as all other assets have risk higher than the risk-free asset.

Here, a question arises: Is investment risk-free? It is an accepted fact that risk is inherent in every investment, only the intensity varies. The treasury bills issued by governments, which are taken as risk-free rate proxy, are definitely least risky, but not cent percent risk-free. It is true that the government securities are more or less free from credit risk, but they are prone to interest rate risk and inflation risk sometimes. It is a fact that, when a rupee is invested today and return is expected tomorrow, there is implied risk. Thus, when government comes under threat, it is possible that the government securities can also come under threat. As far as government securities continue as investment options, risk cannot be said to be completely eliminated. DeJong and Collins (1985) showed that the risk free rate is prone to unexpected changes, which in turn lead to beta instability. For the same reason, such securities cannot be called as "risk-free" in true sense. They may be suitably termed as least risky or risk-less, rather than risk-free.

Another vital point to be considered here is regarding the lack of clarity in the usage of the risk free rate for varying time horizons. Mukherji (2011) had pointed out the usual flaw among the academicians, where they use either short term or long term treasury bills rate as risk free rate, without having a proper reason. He stressed the fact that there lacked an empirical justification for selecting the risk free rates. Moreover, the treasury securities are prone to inflation risk through the time horizon (Mukherji, 2011).

Bruner et al. (1998) showed that there was wide choice for the risk free rate. He states that 70% of corporations and financial advisors used treasury bonds of ten years or more maturity, while only less than 10% used treasury bills (Bruner, Eades, Harris, & Higgins, 1998). Thus, there exists apprehension in the concept of risk free rate, its calculation and relevance.

Another point that is to be highlighted is that, equity investment is considered as the most risky investment among other alternatives. In equity investment, there is no

relevance for the concept of risk-free rate of return. It is true that risk-free rate of return gives the minimum return from any investment as is envisaged in the CAPM. As CAPM is a pricing model for all capital assets, the model may calculate the expected return from equity as a whole in a generic manner. However, conceptually, when equity investment is specifically treated, risk-free rate of return estimation is irrelevant and inappropriate. Under an efficient market concept, when one invests in equity, what is expected is a minimum return common to all investors of equity in an efficient market. One will not expect the 'risk-free rate of return' as return from equity investment. Therefore, in calculating the expected rate of equity return, it is not conceptually and logically sound to estimate the risk-free rate of return, which is neither related nor relevant to equity. That means, a more appropriate method for pricing equity exclusively, is called for. A unique model for equity pricing is quite relevant in the realm of finance.

Efficient Market Return as an Alternative for Risk-Free Rate of Return

Even though CAPM is criticised on various grounds, it is a fact that the framework that the model provide is inevitable for asset pricing. Authors like Black (1972) are of opinion that a rational market essentially needs CAPM. As Fama and French states, "The CAPM is wanted, dead or alive" (Fama & French, 1996). Hansen and Richard (1987) found that the static version of CAPM was a failure. He recommended a dynamic version of CAPM as a valid one (Hansen & Richard, 1987).

At the same, substituting risk free rate with more appropriate concepts, have been also tried by various academicians. Black (1972) recommended substituting the risk free rate return in the CAPM with the rate of return on portfolio of stocks with zero-beta. The model was called two factor model (Black, 1972).

The fundamental concept of CAPM is that, when one invests in an asset, he can expect a minimum rate of return for his invested amount and an additional rate of return for the quantum of additional risk taken by the investor. The rationale of using treasury bills rate as risk-free rate representing minimum rate of return in the CAPM is that, it is the least risky among the other investment alternatives. That is the case of CAPM, the generic model for capital asset pricing.

Being realised the relevance of pricing equity exclusively, an equity pricing model which gives the expected return from equity as a sum of minimum return from equity and a risk premium, would be appropriate. In case of such a unique model for equity pricing, instead of risk-free return, the minimum expected return should be the return that is available to all investors in the market, which is assumed to be efficient. This minimum return from efficient market can be termed as "efficient market return".

Efficient market return is the return available to the investors in the efficient market regardless of risk. It is the minimum return that an investor gets when invest in stock under efficient market. Whether the investor is naive or one with technical expertise or one having insider knowledge, there is only one and single return for identical amount of investment under state environment, that will be available to all, which can be rightly referred to as efficient market return. Any return that is excess over this return can be attributed to the additional risk that the investor take alone. Thus, the minimum return from equity investment, irrespective of the risk, is the efficient market return and it will be more appropriate than risk-free rate of return while pricing equity.

Risk Adjusted Efficient Market Return

Given the efficient market return as minimum return, the total return that an investor will get from investment in stock will be the efficient market return after adjusting the corresponding risk taken by the investors. The return will be thus commensurate with the risk undertaken by the investor. Thus, what an investor gets from investing in stocks will be the 'Risk Adjusted Efficient Market Return'.

Conclusion

The CAPM developed by Sharpe (1964) is the fundamental model for pricing capital assets. However, the concept of risk-free rate of return along with its estimation and implications in the model were criticised by academicians since then. It is assumed that risk-free rate of return is the minimum return one can expect from any investment. It is also assumed that the market is efficient. So, when equity investment is exclusively taken, the concept of risk-free rate as minimum rate of return does not hold, as the equity is the most risky investment. Through this paper, the authors put forward a more appropriate concept of efficient market return as an alternative for risk-free rate of return in pricing equity. Efficient market return is the return available to all investors under an efficient market environment irrespective of the risk undertaken. It will be the minimum rate of return that an investor gets from an equity investment, rather than risk-free rate of return. Thus, the efficient market return will be a more appropriate concept while pricing equity than risk-free rate of return.

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