AN OVERVIEW OF THE EMPIRICAL ASSET PRICING APPROACH

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INTRODUCTION

This paper takes a critical examination of what Asset Pricing is all about. It critically takes an overview of its historical background, the model and Theory-Capital Asset Pricing Model and Arbitrary Pricing Theory as well as those who introduced/propounded them.

This paper critically examines how securities are priced, how their returns are calculated and the various approaches in calculating their returns.

In this Paper, two approaches of asset Pricing namely Capital Asset Pricing Model (CAPM) as well as the Arbitrage Pricing Theory (APT) are examined looking at their assumptions, advantages, hitches as well as their practical computation using their formulae in their examination as well as their computation. This paper goes a step further to look at the importance Asset Pricing to Accountants, Financial Managers and other (the individual investor).

The paper finally recommends by stating that due to the hitches found the Capital Asset Pricing Model as well as the Arbitrage Pricing Theory, a better and more effective model should be designed that would accommodate for hitches found in the aforementioned approaches to Asset Pricing.

DESCRIPTION

HISTORICAL BACKGROUND OF ASSET PRICING THEORY

Asset pricing is one of the majorly-discussed issues in modern day Finance, a branch of Economics which focuses on Capital Markets. Its theory can be traced to Daniel Bernoulli's renowned Paper (1738) presented to the Imperial Academy of Sciences in St. Petersburg which was originally in Latin, translated into the German Language in 1896 and finally translated into the English Language in the 1950s. Since this period, a lot of research and contributions have been made to the Theory of Asset Pricing.

Bernoulli argues that in *order to determine the value of an item, it must not be based on the price, rather, on the utility the item yields* as against the proposition that *in computing the expected value, this is achieved by multiplying the possible gain of each by number of ways of its occurrence and dividing the sum of the products by the total number of the possible cases*. There was little impact on his approach in relation to decision making under risk until the expected utility theory was developed by Von Neumann and Morgenstern (1944,1947) and Savage (1954).

In 1921, the concept of Risk and Uncertainty was developed by Knight. He distinguished between Risk and Uncertainty stating that the earlier can be expressed in numerical probabilities while the later, assigning probabilities to the alternative outcomes is impossible.

Markowitz (1952) made a publication on the selection of Portfolio. In his publication, he sees the need not to invest in securities having high covariance among themselves. He asserts that with adequate data and ability to compute, a set of portfolios that can produce the highest returns expected for any given level of risk and at the same time giving the lowest risk level for any level of expected return can be identified.

Tobin (1958) helps the individual investor to identify which of the efficient portfolio should be held at a point in time. He sees the need for investor to split their funds between safe liquid asset, say cash and bond or equity. He suggests: *"breaking down the portfolio selection problem into stages at different levels of aggregation-allocation first among".*

Sharpe (1963) developed a model-Simplified Model for Portfolio Analysis which assumes that returns on security are related (linearly) to fluctuations in a whole market index, with a recognized level of sensitivity. In addition, returns which are security specific are made with an identified mean and variance.

King (1966) made a key empirical study on the risk attributed to Security. He studies the returns of 63 companies from retail stores, tobacco, petroleum, metals, utilities and railroads in the NYSE between 1927 and 1960. He analyzed the co-movements of their stocks' returns and he is able to reveal that the prices of shares tend to vary alongside the market and he measures the degree of their variability that is due to their membership in the industry.

MODELS OF ASSET PRICING

The aim of Asset Pricing Theory is to explicate expected returns. There are two principal models associated with Capital Asset Pricing. These models are:

1. Capital Asset Pricing Model (CAPM);
2. The Arbitrage Pricing Theory (APT).

CAPITAL ASSET PRICING MODEL (CAPM)

This theory was independently introduced by William F. Sharpe (1964), Jack Treynor (1961,1962), Jan Mossin (1966) and John Lintner (1965 a, b), which was built on the previous work, diversification and modern portfolio theory pioneered by Harry Markowitz. The Capital Asset Pricing Model is used to refer to a model that is used to determine an appropriate rate of return of an asset in order to enable an investor take a decision about adding assets to their diversified portfolio. It is used for pricing an individual security or portfolio. It designates the connection that exists between risk (systematic) and expected returns for assets (stocks). It is used for pricing securities that are risky.

Capital Asset Pricing Model Formula:

The Beta (ß) of an asset or portfolio, theoretically measures the relationship between its volatility and the overall market.
The formula for calculating the expected return of an asset is given thus:

Er = Rf +ßs (Em-Rf)

Where:

Er = Expected Return;

Rf = Risk-free Rate;

ßs = Beta of the security;

Em = Market Return (Expected).

Example of Capital Asset Pricing Model Application:

Assuming a stock has a risk-free rate of 3 percent, beta (a risk measure) of 3 percent. If the expected market return within the period is 10 percent, compute the expected return using the CAPM model.

Rf = 3% (0.03); ßs = 3%; Em = 10% - 3% =7% (0.07)

Er = 0.03 + 3 (0.10 – 0.03)

Er = 0.03 + 3 (0.07)

Er = 24%

It therefore means that the expected return (**Er**) is **24%.**

CAPITAL ASSET PRICING MODEL ASSUMPTIONS

Blitz et al (2014) explain five assumptions associated with Capital Asset Pricing Model and if violated may lead to failure of the CAPM. These assumptions are:

1. Constraints do not exist; i.e. investors are able to sell any portion(s) of their shares or any security/portfolio they hold;
2. Only one period of time exists for holding investments (by investors);
3. Complete and rationally processing of information;
4. Existence of a perfect market where all assets are perfectly divisible and perfectly liquid, no cost on transaction, no taxes (either on purchasing or selling any portion of assets) and all the investors are price takers (they accept prices and cannot influence same);
5. Investors oppose risk; they maximize the absolute wealth utility (all their investments maximize utility) and are concern only with variance (related risk) and mean (return).

Other assumptions include:

1. All investors have homogeneous expectations;
2. All investors have access to lending and borrowing any amount of funds of their choice under the risk-free rate of interest;
3. All investors are diversified over a range of investments.

ADVANTAGES ASSOCIATED WITH THE USE OF THE CAPITAL ASSET PRICING METHOD (CAPM)

Using the capital asset pricing model (CAPM) has a series of advantages discussed here:

- The CAPM only takes into cognizance systematic risk.
- The CAPM has an assumption that investors have diversified portfolios which removes *unsystematic risks*.
- The CAPM is easy to use as it uses a simple calculation.

HITCHES OF THE CAPITAL ASSET PRICING MODEL (CAPM)

The Capital Asset Pricing Model (CAPM) is fraught with a huge number of hitches and as such has been criticized by various Scholars.
The drawbacks associated with the use of the CAMP are discussed below:

1. In order to effectively and efficiently use the CAPM method, there is the need to assign values to the CAPM variables such as the risk-free rate of return (rf), market return (Em) and the equity beta (βs).

   Often times, the substitute used for the risk-free rate of return is the yield on short-term government debt which is often not fixed but changes with a given economic circumstance.

   On the other hand, finding the expected market return is often difficult. For instance, in the short run, there is the possibility that a stock market may provide a negative return instead of a positive one if the effect of falling share prices overshadows the yielded dividend.

   The value of beta often changes over a given period of time and therefore is not constant.

2. Another drawback in applying the CAPM is that it is based on a huge number of assumptions making it unrealistic and unable to provide accurate result.
3. One of the assumptions of the CAPM model is the ability of an investor to lend and borrow at a risk-free rate. In reality, the investor is unable to lend and borrow.
4. Determining the proxy beta of a project is another disadvantage of using the CAPM.

THE ARBITRAGE PRICING THEORY (APT)

The Arbitrage Pricing Theory like the *Capital Asset Pricing Model (CAPM),* is one of the asset pricing theory used in estimating the price of an asset. The theory was advanced by *Stephen Ross (an Economist) in 1976* as a substitute to the *Capital Asset Pricing Model (CAPM).* It assumption is that the return of an asset is dependent on a number of factors ranging from macroeconomic, security-particular and market factors.

The Arbitrage Asset Pricing Theory (APT) believes that two factors can elucidate the expected return of a financial asset being the macroeconomic/security-particular influence and the sensitivity of the assets influence. The security-particular influence for a given security include *market indices, change in the rate of interest, exchange rates, investor confidence, production measures* or *inflation.*

Once the Financial Analyst of a given Asset is able to derive the expected rate of return of such asset from the *Arbitrage Pricing Theory (APT)* model, they can determine the actual price of the asset by plugging the expected rate of return into a discounted cash flow model.

The Arbitrage Pricing Theory may be applied to individual securities as well as portfolios.

The Arbitrage Pricing Theory (APT) Formula

Below is the formula for computing the Arbitrage Pricing Theory:

E (ri) = RM + St1RP1 + St2RP2 + St3RP3 + St4RP4 + St5RP5 ... StnRPn

Where:

E (ri) = the expected rate of return on the asset

RM = the risk-free rate of return

St = the sensitivity of the price of the asset to macroeconomic factor *m*

RP = the risk premium that is associated with factor *u*

Mathematical Application of the Arbitrage Pricing Theory (APT):

A particular stock's return shows the following calculated factors (four), sensitivity to each factor and its associated risk premium:

- ✓ Prices of gold: β= -0.8, RP= 6%
- ✓ Gross Domestic Product (GDP) growth: β= 0.7; RP= 5%
- ✓ Inflation rate: β= 0.9, RP= 2%
- ✓ Standard and Poor's 500 index return: β= 1.5, RP= 9.5%
- ✓ Risk-free rate: 4%

Applying the *Arbitrary Pricing Theory (APT)* in calculating the expected return:

Expected Return=4%+(-0.8×6%) + (0.7×5%) + (0.9×2%) + (1.5×9.5) =18.75%

ASSUMPTIONS OF THE ARBITRAGE PRICING THEORY

There are three underlying assumptions associated with the Arbitrage Pricing Theory (APT). These assumptions are:

- Systematic factors explain asset returns.
- Investors can design a portfolio of assets where they may eliminate *specific risk* by diversification.
- Arbitrage opportunity do not exist in the midst of well-diversified portfolios. If any do exist, they will be exploited by investors.

ADVANTAGES ASSOCIATED WITH THE USE OF THE ARBITRAGE PRICING THEORY(APT)

There are a lot of advantages associated with the use of the Arbitrage Pricing Theory (APT) as opposed to the use of the Capital Asset Pricing Model (CAPM). These advantages are:

- The Asset Pricing Theory unlike the Capital Asset Pricing Model (CAMP), allows the use of multiple risk factors making the individual investors to have more information.
- The APT helps investors to look for arbitrage opportunities in order to make profit from mispriced securities.
- The use of APT allows the use of a number of sources of risk from the examined data.

HITCHES ASSOCIATED WITH THE USE OF ARBITRAGE PRICING THEORY (APT)

Like the use of the Capital Asset Pricing Model (CAPM), the Arbitrage Pricing Theory is limited by a number of limitations. These limitations are:

- The use of the APT it is practically impossible to examine a portfolio that has varied investments. It requires the examination of a single item in a varied portfolio.
- The use of the APT requires the accuracy of risk sources. Investors are required to have a clear insight of risk as well as their sources.
- The use of the APT requires the generation of a huge amount of data.

ACTUALIZATION

This paper examines the various common asset pricing methods namely the *Capital Asset Pricing Model (CAPM)* as well as the *Asset Pricing Theory (APT).*

A knowledge of these asset pricing approaches has a lot of benefits in the Finance as well as the Accounting profession. With the knowledge acquired in this paper, an individual investor (Accountant, Finance Manager, etc.) is able to manage their portfolio by deciding on the return of securities to be invested in to ascertain how profitable/otherwise such Security may be so as to decide if to invest in them/otherwise.

CONCLUSIONS

This paper has critically and successfully examined how Assets are priced and how an investor analyze how assets are priced before taking decision to add them to their portfolio or otherwise.

In this paper, two formulae are examined for computing the return of an Asset for both approach (CAPM and APT) as well as their assumptions, advantages and hitches. It is concluded that due to the flaws associated (not limited to the unrealistic assumptions) with the CAMP approach of Asset Pricing, the APT was introduced by Stephen Ross in 1976.However, the APT being a better approach is asset pricing also reveals it flaws one of which is its complexity in the area of generating a huge number of data. Hence, both.

A better and more accurate approach should be propounded to address the flaws associated with the CAMP as well as the APT approach of computing returns in securities (asset pricing). This would create confidence in investors as well as accuracy in their computation of returns in their to-be investment.

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