# Utilizing the Capital Asset Pricing Model in Economic Settings

*David M. Gordon*

*(University of Saint Francis, USA)*

**Abstract:** The purpose of this paper is to explain to individuals teaching economics some of the basics of the much utilized capital asset pricing model (CAPM). Many times academics or professionals trained in economics do not have any type of background in finance and therefore lack any knowledge of the CAPM and its uses. This disconnect prevents utilizing many financial applications in their own classes, in their own businesses or with their own research. This work serves as an introduction to the CAPM that individuals can use as a starting point to additional research, study or use in teaching.

**Key words:** CAPM; pricing; economics; pedagogy

**JEL code:** G10

## 1. Introduction

Many times academics or professionals trained specifically in the area of economics do not have any substantial background in the areas concerning financial theory. This detachment prevents utilizing various financial applications, including pricing models such as the capital asset pricing model, in their own classes, in their own businesses or with their own research. This brief work serves as a cursory introduction to one of major financial models in finance that individuals can use as a starting point to additional research, study or use in teaching.

## 2. The Capital Asset Pricing Model Basics

The capital asset pricing model (CAPM) provides a method to indirectly price shares of common stock (Black F., 1972). There are two types of risk that exist within a security: systematic and unsystematic risk. Unsystematic risk is the portion of the variation in investment returns that can be all but eliminated through investor diversification. This type of risk comes about, because of risk factors unique to a particular firm or industry. It can be diversified away by holding an ample combination of various securities. Systematic risk is the portion of variation in investment returns that cannot be eliminated through diversification. It results from risk factors that affect all stocks. The CAPM assumes the following:

(1) Investors are fully diversified, thus they are subject to zero unsystematic risk.

(2) Systematic risk is the only relevant risk.

(3) The stock market is highly efficient, thus prices reflect true values.

(4) A perfect market exists.

David M. Gordon, Associate Professor, University of Saint Francis; research areas/interests: forensic economics, financial economics, monetary theory. E-mail: dgordon@stfrancis.edu.

(5) All investors are price takers.

(6) An investor can borrow or lend any amount at the risk free rate of return.

Assumptions 4 and 5 imply that information is available to investors at a nominal cost and that any actions taken by one investor cannot impact the price of the security.

In equation form the CAPM is as follows:

$$k_j = k_{rf} + \beta_j(k_m - k_{rf})$$

Where $k_j$ = the expected return on asset j;

$k_{rf}$ = the risk free rate of return;

$k_m$ = the expected return on the market portfolio;

$\beta$ = beta = a measure of the investment's systematic risk.

Beta measurements are calculated by regressing the returns on a market basket of stocks, such as the S&P 500 index, on the returns for a specific stock over a particular time horizon. The slope parameter estimate becomes a stocks' beta. A stock with a beta equal to one has the same risk as the market. Less than one implies a stock that is less risky relative to the market, while a stock with a beta greater than one implies larger risk relative to the market. The CAPM model states that stocks that have a greater risk should have a higher expected return and vice-versa. Although the CAPM does not yield a direct price for a stock it does grant us enough information that can be used to calculate a stocks' value. If we assume that the price of a stock is equal to the present value of all future cash flows, then the expected return given to us by the CAPM will serve as the appropriate discount rate to use when discounting back the necessary cash flows.

Fischer Black developed a CAPM that works with restricted borrowing (Brown S. J. & Warner J. B., 1985). A common assumption is that an investor can take a long or short position in the riskless asset of any size. This assumption has been attacked as being unrealistic. Black shows that the CAPM can still be utilized even when this assumption is relaxed.

## 3. The Capital Asset Pricing Model and Market Efficiency

The efficiency of capital markets is looked at by Fama (1970). Fama posits that market efficiency itself is not directly testable, so it must be tested jointly with a model of equilibrium such as the CAPM. He divides his study into three parts: one part emphasizing the presence of a weak form of efficiency, another part looks at the semi-strong form of efficiency and the last part analyzes the strong form of efficiency. In the weak form of market efficiency stock prices reflect all past information. This renders techniques like technical analysis a useless tool, since all historical information is already embodied within the asset price. The semi-strong form suggests that not only all past information, but also all present publicly known information is incorporated into the stock price. The strong form goes one step further and states that all private information is also reflected in the current stock price. He finds evidence supporting the weak and semi-strong form hypotheses, but his evidence suggests that the strong form does not hold. This means that insiders could profit from their information by trading stocks accordingly.

Fama takes another look at the various forms of efficiency in a later paper (Fama E. F., 1991). He renames the categories: tests for return predictability (previously the weak form), event studies (semi-strong form), and tests for private information (strong form). Most of the evidence he surveys tends to support the presumption that past information does not serve as a good indicator of future price movements. He states that the cleanest evidence for market efficiency comes from event studies that tend to back up the semi-strong form of efficiency. He once

again finds that individuals with private information are able to earn abnormal returns, this points to the strong form of market efficiency not holding in the marketplace.

Brown and Warner examine cases of event studies (Fama E. F. & French K. R., 1997). They find that using daily data can generate certain problems. These problems include non-normality, non-synchronous trading and market model parameter estimation, and variance estimation. Daily stock returns might not be normally distributed as in the case with monthly or quarterly data. Small sample techniques might be required. Ordinary least squares estimates of market model parameters might be biased and inconsistent when security returns and returns on the market are measured over different trading intervals. Serial correlation could be present and if so would skew variance estimates. The authors test to see if these problems actually arise and find that only minimal difficulties occur. They find that using daily stock returns are as reliable as using monthly returns.

The CAPM can be used to estimate the cost of equity for a firm or for industries (Francis J. C., 1986). The authors find that the estimates for the cost of equity tend to be imprecise when the CAPM is used. Standard errors of more than 3% are common. The authors pose that the large errors are due to uncertainty concerning the true factor risk premiums. Errors would be larger for firms than for industries and even bigger for individual investment projects.

The CAPM is not the only model used for pricing assets. The arbitrage pricing model and the three factor pricing model are two alternatives that exist among many. Pastor and Stambaugh investigate the differences among these models (Pastor L. & Stambaugh R. F., 2000). They break the models into either risk based models or characteristic based pricing models. They assume those investors are concerned with optimizing their return while minimizing risk, in other words they assume that mean-variance optimizing investors exist. The various models suggest different optimum portfolios. When the ratio of position size to capital is condensed these differences in portfolio structures tend to wither away to almost zero.

## 4. Conclusion and Summary

The lack of basic knowledge in financial theory can restrain the teaching and research abilities of an academic economist. The lack of this knowledge can also hinder the abilities of an economist working in the private sector especially in areas concerning banking. The information contained within this paper serves as an introduction to one financial model that has wide applicability in many economic areas.

**References:**
Black F. (1972). "Capital market equilibrium with restricted borrowing", *Journal of Business*, Vol. 45 (July), pp. 444-455.
Brown S. J. and Warner J. B. (1985). "Using daily stock returns", *Journal of Financial Economics*, Vol. 14 (May), pp. 3-31.
Fama E. F. (1970). "Efficient capital markets: A review of the theory and empirical work", *Journal of Finance*, Vol. 25 (May), pp. 383-417.
Fama E. F. (1991). "Efficient Capital Markets: II", *Journal of Finance*, Vol. 46 (Dec.), pp. 1575-1617.
Fama E. F. and French K. R. (1997). "Industry costs of equity", *Journal of Financial Economics*, Vol. 43 (Feb.), pp. 153-193.
Francis J. C. (1986). *Investments* (4th ed.), New York: McGraw-Hill.
Pastor L. and Stambaugh R. F. (2000). "Comparing asset pricing models: An investment perspective", *Journal of Financial Economics*, Vol. 56 (June), pp. 335-381.