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**Beta and Return**

Black, Jensen, and Scholes (BJS, 1972) studies the relation of beta and return through varying portfolio methods of analysis which allows to incorporate any cross-sectional effects into the method. They pointed out that most of these studies focused on the portfolio method used to construct the beta factor. With flat relation between average return and beta, low-beta stocks had better performance than high-beta stocks which contradict with CAPM predict. The beta becomes more valuable with a flat slope and investors can hold a new portfolio that has higher expected return with the same risk. Indeed, a firm's size can capture cross-sectional variation in average stock return; Banz study.

The original BJS study suggested the relatively flat slope of average return to beta which includes issues from data mining that is sort of big information that is related to problems. Selecting the simple portfolio method can avoid data mining bias by diversifying out the factors that are not related to beta. Simple portfolio methods help to eliminate bias, understand, and interpret the results which are easier than using formal statistical tests through strict portfolio methods; it can eliminate effects of market moves due to not zero beta through regressing the portfolio excess return on the market excess return to find residual. However, this method may lead to beta factor which might be highly correlated with total risk and residual. With the support from Fama and MacBeth (1973), and Stambaugh (1982) is getting similar results as the BJS time series of returns on the beta factor. In contrast, Gibbons, Ross, and Shanken (GRS, 1989) tested explicitly uses all covariance, not implicitly as BJS. So, the BJS portfolio has less bias in data mining. Referring to the Haugen and Baker (1991) studied that CAMP cannot capture return and beta due to inefficient market portfolio; low beta stocks have high expected return. To avoid bias error in beta, he applied the Black-Scholes method of estimating portfolio beta, alpha, and residual risk with monthly data during 1926-1991 from the Center for Research in Security Prices at the University of Chicago. The portfolio method resulted in being useful in predicted long periods due to constant change in stocks; and simply use an average residual volatility. The sample is ten portfolios with equally weighted market portfolios and uses five years historical betas to weight the tens portfolio. From the analysis, it shows positive intercept for low-beta portfolio, and the monthly pattern of 1926 to 1991 seems stronger than that from 1926 to 1965 in which low beta stocks perform better than CAPM predicts. The low-beta portfolios were similar to high-beta portfolios. Furthermore, the beta factor is a long portfolio in low-beta stocks; in contrast to high-beta stocks that are short positions. Due to an imperfect diversified portfolio, beta factor may lead to high-beta stocks may be worse if low-beta stocks are well performed. As a result in the first decade, the beta factor had a negative excess return which implied that low-beta did great. From the above analysis with a steep slope, it forecasts that low-beta stocks will do better than CAPM predicts.

As it is free to borrow with few restrictions, the beta of a corporation's stock depends on asset beta and leverage; therefore, low-beta assets tend to be attractive due to positive alpha, and use lots of leverage to increase stock price. Indeed, investors tend to use CAPM and beta to value investment to conduct portfolio strategy. On the other hand, low-beta stocks are underpriced while high-beta stocks may be overpriced because of many borrowing restrictions on corporate finance that may downgrade from the rating agencies with a flatter slope of relating expected return to beta than CAPM predicted.

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**The Equity Premium A Puzzle**

Rajnish MEHRA (1985) studies the equity premium that the return earned by a risky security is greater than that of return earned by a relatively risk free US T-bill in the historical US equity premium. Since the average equity premium is a large differential between average return on equity and average return on short-term debt, the models under Arrow-Debreu model. The studies found that the average real annual yield on equity is a maximum of forty percent higher than that on short-term debt which is inconsistent with the six percent premium observed for the U.S. economy in the 1889-1978 period. In economic upturn, with marginal utility that future consumption will be higher than present consumption and higher real interest rates on average, high risk averse investors discount the future to a greater extent than lower risk aversion.

During 1889-1978 in the United States, using four series from Grossman and Shiller (1981), it identified Risk Premium (R.P) as the difference between the Real Return on Standard and Poor's 500 and the Real Return on a Riskless security. Then, it applied the variation from Lucas' pure exchange model (1978) and growth rate of Markov process, so it can control the growth rates in aggregate per capita consumption, stationary asset prices, and the single representative 'stand-in' household. With concave and constant utility function, it results in a stationary equilibrium return process; and sets one productive unit which the return on this share of equity is also the return on the market along with competitive equilibrium with a price system of Debreu (1954). The study also controls the first-order serial correlation of the growth rate. It shows that the parameter of averaged risk-free rate and equity risk premium that the model predicted match the sample observed from the U.S. economy between 1889-1978. Indeed, parameters of the model can explain the willingness of individuals to substitute consumption. Supported by Arrow and Kehoe which $\alpha$ is one with constant relative risk aversion, Friend and Blume which $\alpha$ estimates range of two, and Tobin and Dolde that use $\alpha$ as 1.5 by life cycle saving behavior. The study also controls the value of $\alpha$ not larger than ten and assumes $\beta$ between zero and one, so the results will be the same for every consumption process; average real risk-free rates is between zero and four percent. However, the prediction does not match the observed real return of 0.80 percent and equity premium of 6 percent.

Without impact on the risk premium, error in inflation rate that equally bias the risk-free and equity return. On the other hand, the model may be hard to use due to biased estimates of the growth rate consumption and real risk-free rate; and the after-tax returns of each income class that is low at the beginning,and low tax rate and sizable equity risk premium for after-tax return in the latter period. The models are not sensitive to change in average growth rate of consumption which does not increase the equity premium, but sensitive with the standard deviation of consumption growth. However, in the real world, there are many capital types with different risks, and the disproportionate part of uncertainty in output may affect equity of owners which may increase equity risk premium by less than predicted. The risky stock of a firm in the model is also not the same as the Standard and Poor's 500 Composite stock price index. Indeed, the model is unable to generate average returns similar to the observed. Lastly, the equity premium puzzle explains the average risk-free rate is so low; from Friend and Blume, $\alpha$ estimates larger than one; low $\alpha$ results in high average equity return. But, some inapplicable types of contract may arise to share risk,so for further studies, it needs consumption data by income or age group to test the theories in non-Arrow-Debreu competitive equilibrium models.