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The Case Against Stock Picking

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Abstract

This paper brings together various topics in finance—the Capital Asset Pricing Model, Portfolio Theory, the empirical evidence, and the Efficient Market Hypothesis—to address whether individual security selection—Stock Picking—is or is not a meritorious venture.

Introduction

The temptation to select specific securities is strong. The temptation flows from the belief that either one has superior insights/research and/or that one contemplates specific approaches to portfolio development with an eye toward a peculiarly beneficial return to risk. There are number of reasons why such temptations should be minimized. The reasons can be shown graphically using the Capital Asset Pricing Model, statistically using Portfolio Theory, empirically using historic evidence and tests, and functionally using the Efficient Market Hypothesis.

Graphical Demonstration

Superior portfolio construction is generally measured in terms of a generated or expected total return (income plus gains/losses) versus an experienced or contemplated risk. Securities of number n combine into portfolios with a return of:

$$R_p = \sum_{i=1}^{n} w_i R_i \qquad (1)$$

where R_p is the return to the portfolio, R_i is the return of security i, and the weight w_i represents the proportion to the whole portfolio, given that:

$$\sum_{i=1}^{n} w_i = 1. \qquad (2)$$

Note that some weights may be negative reflecting a borrowed short position. The risk of a portfolio is measured by its standard deviation, the square root of the portfolio's variance or:

$$\sigma_p^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} w_i w_j \sigma_{ij} \qquad (3)$$

where σ_p^2 is the variance of the portfolio and σ_{ij} is the covariance of the security i by j. Some fifty years ago, Markowitz [1959] examined a two-space of vertical returns and horizontal risk measured by the standard deviation of the returns with the preference toward higher/upward returns and toward lesser/leftward risk. In examining the risk of a portfolio comprised of two securities, the previous Equation 3 measuring portfolio risk becomes:

$$\sigma_p^2 = w_a^2\sigma_a^2 + w_b^2\sigma_b^2 + 2\, w_a w_b \sigma_{ab} \qquad (4)$$

where σ_{ab} also equals $\sigma_a\sigma_b\rho_{ab}$ where ρ_{ab} is the correlation coefficient. Markowitz noted that in the risk-return space that all theoretically feasible portfolios create either a straight line or a curved line to left, or:

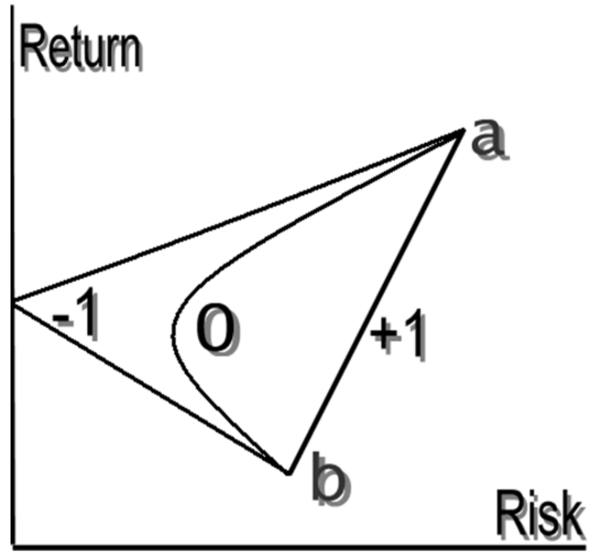

Figure 1: Feasible Portfolios with Correlations of +1, 0, and -1

A third security can be added to a given previously weighted portfolio, and so on, until a Feasible Set of portfolio choices exists, and Markowitz showed that the shape or envelope of the Feasible Set would be continuously smooth on its left side, or:

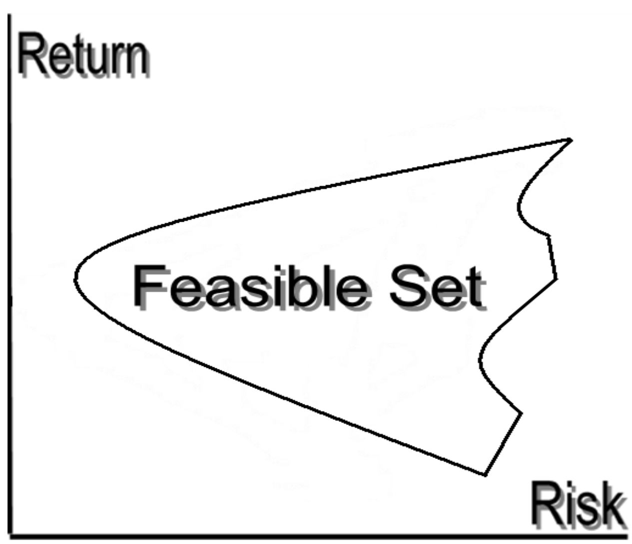

Figure 2: The Feasible set of Risky Securities

If a risk-free security is also introduced, the portfolio variance Equation 4 simplifies and becomes both linear and directly proportional, or $\sigma_p = w_a\sigma_a$ with *a* as the risky security. The addition of the risk-free security adds the possibility of a straight Capital Market Line (and hence the Capital Asset Pricing Model) from the risk-free security to the optimal tangency on the Feasible Set given a preference for a higher return for any given amount of risk, or:

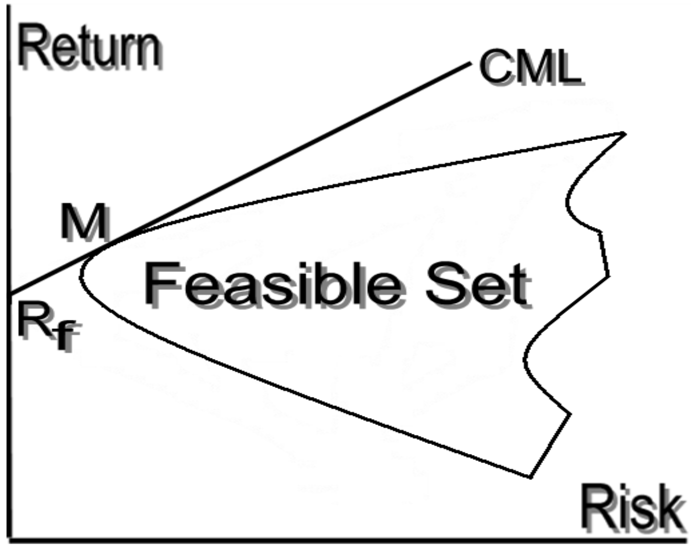

Figure 3: Risk-free Security Creates Portfolio Choices on the CML

It is argued that the tangency should be that portfolio which reflects the risky Market as a whole. However, Roll [1977] has demonstrated that one cannot prove nor disprove that the tangency is indeed the Market—it must taken on faith that the Market as a whole is reflective of the portfolio at the tangency. Note also note that the Capital Market Line to the right of the Market tangency is where the weight of the risk-free security is negative reflecting a borrowing of funds and thus is often described as the borrowing region of the Capital Market Line. It now follows that any portfolio choice optimizing return and minimizing risk lies on the Capital Market Line and uniquely is composed of only two choices for *all* investors—the risk-free security and the Market. In this Separation Theorem the investor's optimal choices are separated from the investor's preferences and that any rational risk averse investor must choose only among the risk-free and market index at the tangency point. Of course each investor chooses his/her appropriate mix of these two choices and that any other set of choices creates an inferior portfolio in terms of return and risk.

The case against stock picking now becomes clear. Any security, or any subset of securities, lies interior and inside the Feasible Set and is not an optimal portfolio choice. This is a graphical demonstration that stock picking is an inappropriate approach to portfolio selection.

Statistical Demonstration

A demonstration using statistics can also show that individual security selection ceases to affect any sufficiently diversified portfolio and thus makes irrelevant any analysis uniquely associated with any specific security. Writing again Equation 3 and separating into two terms where i equals j and where i does not equal j, or:

$$\sigma_p^2 = \sum_{\substack{i=1 \\ \text{for } i=j}}^{n} \sum_{j=1}^{n} w_i w_j \sigma_{ij} + \sum_{\substack{i=1 \\ \text{for } i \neq j}}^{n} \sum_{j=1}^{n} w_i w_j \sigma_{ij} \ . \qquad (5)$$

Here the covariance, in the special case of i equals j, is merely the variance wherein the variance is the weighted sum of the squared products of the *same* mean differences versus the covariance which is the weighted sum of the products of two *different* mean differences. Consider a covariance matrix:

$$\begin{matrix} \sigma_{11} & \sigma_{12} & \sigma_{13} & \cdots & \sigma_{1n} \\ \sigma_{21} & \sigma_{22} & \sigma_{23} & \cdots & \sigma_{2n} \\ \sigma_{31} & \sigma_{32} & \sigma_{33} & \cdots & \sigma_{3n} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ \sigma_{n1} & \sigma_{n2} & \sigma_{n3} & \cdots & \sigma_{nn} \end{matrix}$$

or when i equals j that the covariance becomes the variance, or:

$$\begin{matrix} \sigma_1^2 & \sigma_{12} & \sigma_{13} & \cdots & \sigma_{1n} \\ \sigma_{21} & \sigma_2^2 & \sigma_{23} & \cdots & \sigma_{2n} \\ \sigma_{31} & \sigma_{32} & \sigma_3^2 & \cdots & \sigma_{3n} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ \sigma_{n1} & \sigma_{n2} & \sigma_{n3} & \cdots & \sigma_n^2 \end{matrix}$$

One can recognize that the number of variance terms lying on the diagonal equals the number of securities *n* and that the number of remaining covariance terms equals $n^2 - n$ or n(n—1). Now let the weight *w* equal, say, 1/n. This weighting creates what is called a naïve portfolio. If one has *n* securities in a portfolio of randomly selected securities, then Equation 5 becomes:

$$\sigma_p^2 = n\,(1/n)(1/n)\,\overline{\sigma_i^2} + n(n—1)\,(1/n)(1/n)\,\overline{\sigma_{i\,j}} \qquad (6)$$

and where we now report merely the average mean variance and the average mean covariance respectively. Equation 6 simplifies to:

$$\sigma_p^2 = (1/n)\,\overline{\sigma_i^2} + (n—1)/n\,\overline{\sigma_{i\,j}} \ . \qquad (7)$$

Consider now an increase to the number of securities in the portfolio to a very large number of randomly chosen securities. The first variance term now approaches zero, and the second covariance term rises to the average mean covariance of the remaining covariances. Such a large number of randomly chosen securities eliminate any unique idiosyncratic variance component. The variance component, which now ceases to exist in a diversified portfolio, is associated with the unique characteristics of any particular security and likewise is associated with the process of stock picking. A randomly fully diversified portfolio thus does not reflect the process of stock picking.

A note of interest exists for those who are otherwise familiar with statistics. In other usages of statistics, the covariance term usually disappears by assuring that it is expected to equal zero in the design of the sampling procedure—double blind studies, random respondent selection and so on. In those procedures often one examines the means and variances after assurances that the covariance term(s) can be considered to approach zero. The opposite case is true in portfolio theory. The variance term disappears through random portfolio diversification and the covariance term remains. Thus the remaining covariance term becomes the basis for the beta coefficient (which equals the covariance to market divided by the variance of the market) in the Capital Asset Pricing Model and which is:

$$E(R_i) = R_f + \beta_i\,[E(R_m) - R_f]\,, \qquad (8)$$

where $E(R_i)$ is the expected return to security i, R_f is the risk-free return and $E(R_m)$ is the expected return to market as a whole.

Empirical Demonstration

A third and separate set of reasons exists for the case against stock picking—the empirical evidence. Repeated studies regularly show that the diversified passively managed market weighted mutual funds outperform discretionary actively managed mutual funds—the latter associated with stock picking. See Elton and Gruber [1995] for a more thorough analysis of passive index fund performance. The main reason that the passively managed funds perform better than actively managed funds is because the market index funds do not have the costs associated with the research necessary for actively managed mutual funds. Again, stock picking is an inappropriate approach to portfolio selection—in this case among mutual funds.

Functional Demonstration

A fourth reason argues against stock picking by examining a functional view of how information is reflected in security pricing. The literature associated with the following approach is consistent with the Efficient Market Hypothesis which argues that a security is priced and reflects information of varying types—historic (Weak form type), public (Semi-Strong form type or historic information with the addition of news), and all (Strong form type or public information with the addition of private information). Consider that a security is priced at time t as a function of information (rational or not) at the same time t. And the price tomorrow will reflect information available tomorrow, or:

$$P_t = f(INFO_t) \quad \text{and} \quad P_{t+1} = f(INFO_{t+1}) \qquad (9)$$

The difference between tomorrow's price and today's price is a function of tomorrow's news, or:

$$\Delta = P_{t+1} - P_t = f(NEWS_{t+1}) \quad (10)$$

Except for insider information (which is generally unavailable and/or generally illegal as a basis for investment decisions), the expected value of tomorrow's news should be expected to approximately equal a net change near zero, or:

$$E(\Delta) \cong 0 \quad (11)$$

It would not be zero *per se*, but slightly positive given the generally upward trend of the market. And this slightly positive return expected is that of a diversified market weighted portfolio! Again, stocking picking provides little excess returns, especially if one increases his/her costs toward gathering further information.

Conclusion

Why do people seek excess returns given the above? Some evidence exists that it is hard wired into the nature of higher forms of life. The costs and benefits of the analysis associated with searching for food, avoiding predator animals, and so on, seem to develop so that one will over utilize information. The consequences of over utilized information are that the life form merely wastes some minor calories and/or is merely embarrassed. Now consider the under utilization of information—the life form may lose its life due to insufficient food gathering or the failure to avoid predators. However, when such a basic approach to life is applied to a financial framework the reverse is true. That is, for higher order life the cost of information/analysis is marginally zero (in that being alive usually requires the same energy/cost as one who is unduly or hyper vigilant) and that the benefits are enormous in terms of gaining rewards and avoiding risks. However, in investments the rewards *with* the costs of informational research are not likely to exceed the rewards with*out* the costs of additional informational research. Thus relatively better performances are associated with lower research costs, and there are no benefits to stock picking, but there are additional costs—and these costs diminish the returns to a portfolio.

However, as noted by Lorie and Hamilton [1973], some informational costs must be borne regardless and as such these costs have a minimal *marginal* cost. Examples here include the necessary analysis incidental to additions or withdrawals to portfolios because of the otherwise necessary transactions/activities exogenous to the portfolio itself. In such cases then some stock picking can be of merit, especially if it brings the portfolio toward optimal goal(s). But even here, proactive stock picking activities beyond those necessary for exogenous transactions would not be merited.

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