USING RATES OF RETURN TO FORECAST RETURNS

An Abstract

George S. Lowry, PhD, Department of Economics/Business, Randolph-Macon College, glowry@rmc.edu

Wesley M. Jones, Jr., PhD, School of Business Administration, The Citadel, wes.jones.edu

INTRODUCTION

In a recent pilot study, errors in forecasts of future returns showed little differences when arithmetic and geometric mean calculations served as the basis for the projections. Using annual returns on the DJIA and S&P for 1954 to 2007, 1-year-, 5-year-ahead, and 10-year-ahead forecasts were made based on 5-, 10-, 15-, and 20-year histories based on both arithmetic and geometric averages. This study proposes to incorporate short-term treasury securities in the analysis as well, but also to incorporate Blume’s formula (a weighted average of geometric and arithmetic means) into the analysis to assess the efficacy of the forecasts. Forecasts will be compared against the actual returns earned for the period.

BACKGROUND

Drawing from a recent pilot study [6], forecasts of future rates of return performed with equally poor results when arithmetic and geometric means served as the foundation for the forecasts. This research draws on that pilot study to (1) fully incorporate the use of an alternative model, Blume’s formula [1], (2) improve the analytic models employed, and (3) add US treasury securities to the data set.

Calculation Models

Calculating actual returns on investments relies on an arithmetic mean. It generates accurate and unambiguous results. Using arithmetic means of historical returns as a forecast for the future, however, can be upwardly biased depending on the forecast period. Longer-term forecasts benefit from the use of geometric means, however in the shorter time horizons, a downward bias may occur. Blume [1] explores the biases of both estimation methods and offers a weighted average approach that combines the two methods in a way that counteracts the inherent bias each. Work by others in finance that extends beyond common finance texts have explored this condition [2, 3, 4, 5] and interestingly, other disciplines face the same dilemma of choosing an appropriate metric [8, 9].

Building on prior work, this paper will evaluate the efficacy of return forecasts using arithmetic, geometric, and averaged means (via Blume’s formula) when applied to specific data sets of market returns. In particular, data from the Dow Jones Industrial Average (DJIA), Standard and Poor’s 500 index (S & P 500), United States treasury securities (short-term) are of interest to continuing research. Evaluating the accuracy of forecasts built on historical data
(histories covering 5-, 10-15-, and 20-years) for varying investment time horizons (1-, 5-, and 10-years) and errors can provide some guidance to future research in estimating rates of return. Of special interest to future research is the impact of varying investment strategies (proportions invested in each of the sample sets) on realized returns when those strategies are dependent upon mean return forecasts.

**DATA AND METHOD**

Daily closing values for the various securities and indices will be used as the basis for forecast returns within each class of assets. For example, annual data from the DJIA spanning 1954 through 2007 will be included. Forecasts for each n-period will be calculated using either arithmetic or geometric approaches where the returns using the arithmetic mean for time period “t” \((A_t)\) are given by:

\[
A_t = \frac{1}{n} \sum_{i=1}^{n} (1 + r_i) - 1
\]

Similarly, annual returns for less than yearly periodic rates of return using the geometric mean for time period “t” \((G_t)\) are given by

\[
G_t = \left( \prod_{i=1}^{n} \frac{1 + r_i}{n} \right) - 1
\]

Blume’s [1] formula, as adapted by Ross, et al. [7], suggests using a weighted average of the geometric and arithmetic means of annual values to generate an expected return \((R_t)\), where the weighting factors are determined as the proportion of the forecast period to the historical review period, such that,

\[
R_t = \left( \frac{T-1}{N-1} \right) G_t + \left( \frac{N-T}{N-1} \right) A_t
\]

where \(N\) is the number of periods of historical data used and \(T\) is the forecast horizon.

Calculating forecasts using the three methods for the various investment horizons will be compared against the actual returns for those periods. Tests for differences and significance should provide insight into the efficiency of each.

**RESULTS**

To be determined.

**CONCLUSIONS**

To be determined.

**REFERENCES**


