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Market Value Added as an Investment Selection Tool: A Portfolio Separation Test

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Abstract

This paper explores whether Market Value Added (MVA) also has forecasting content that can be used to form a higher performing and a lower performing portfolio from a larger buy list. Our analysis is based on a "Portfolio Separation Test", which has its methodological roots in forecast evaluation criteria often employed to appraise a forecast's economic effectiveness. The success of a model's forecast is measured by its ability to determine the directional bet required to earn profits in excess of some benchmark. During our study period we found that MVA provides the basis for two portfolios with statistically different cumulative returns.

Key words: market value added, portfolio separation, forecast valuation, trading strategy.

Introduction

Market Value Added (MVA) – the difference between the market value and book value of a company's long-term debt and equity – has previously been identified as positively correlated with stock performance (Stewart, 1994). This paper explores whether MVA also has forecasting content that can be used to form a higher performing and a lower performing portfolio from a larger buy list.

The analysis is based on a "Portfolio Separation Test". First, the ratio of changes in MVA to average capital is used to identify those issues from a buy list which are expected to perform relatively better and those expected to perform relatively worse. The portfolios are created and rebalanced annually. The cumulative daily returns are then computed for each portfolio and graphed. A statistical test of the cumulative returns shows that there is separation between the two portfolios, with the portfolio of stocks favored ex ante by the MVA criterion outperforming those stocks which were expected to underperform according to the MVA criterion.

The idea of selecting a portfolio from a buy list and seeing how it compares to a benchmark to evaluate a forecasting method is not new. However, this paper's approach – using information to form "top" and "bottom" portfolios from a buy list and testing whether or not any difference in performance is statistically significant – is an extension of current practice.

Our Portfolio Separation Test has its methodological roots in forecast evaluation criteria often employed to appraise a forecast's economic effectiveness (for example, Granger and Newbold, 1977). The success of a model's forecast is measured by its ability to determine the directional bet required to earn profits in excess of some benchmark (plus any differential transaction costs). When the portfolio being studied is hypothesized to be "high performing" relative to a hypothesized "low performing" portfolio, the test of differences in returns is what we are calling a Portfolio Separation Test.

The Portfolio Separation Test paradigm may be recognized as similar to the practitioners' graphical approach of plotting top ranked and bottom ranked portfolios according to some analytical criterion such as large cap versus small cap portfolios. Such graphs are also often seen when discussing market neutral hedge portfolios. This paper goes beyond the practitioners' method by introducing and applying a test of whether the observed difference in cumulative returns is statistically significant.

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Literature Review

Typical academic applications measuring "excess returns" from forecasting based portfolios are concerned with testing "excess returns" relative to a benchmark such as the S&P 500 index. For example, in the area of financial options, Noh et al.(1994) found that forecasting volatility with the generalized autoregressive conditional heteroscedasticity (GARCH) model generates abnormally high rates of returns in the S&P 500 index European options market. The GARCH model has also been successfully employed on options on stocks, bonds, currencies, and commodities.

Research on technical analysis has focused mainly on the profitability of trading strategies that involve buying stocks on strength (Rouwenhorst, 1998), contrarian trading strategies that involve buying on weakness (Dechow and Sloan, 1997), and the analysis of profitability of simple technical trading rules in the US equity market (Knez and Ready, 1996).

Stoll and Whaley (1990), examining the causal relationship between the spot and futures markets, found that S&P 500 and MM index futures returns tend to lead the stock market returns by about 5 minutes on average, but occasionally as long as 10 minutes or more. Evidence from other markets also postulates a lead-lag relationship e.g. Nikkei index with the corresponding SIMEX trading futures contract (Tse, 1995), stock index futures and cash index prices in Hong Kong (Tang et al., 1992), FTSE 100 index spot and futures (Wahab and Lashgari, 1993).

A predictor of U.K. stock returns has been found in the gilt-equity yield ratio (GEYR), defined as the ratio of the income yield on long-term government bonds to the dividend yield on equities. The GEYR is assumed to have a long-run equilibrium level, deviations from which are taken to signal that equity prices are at an unsustainable level (Clare et al., 1994).

This paper uses a slightly different methodology than the above: instead of focusing on excess returns relative to a benchmark, this paper explores whether a buy list can be separated into higher performing and lower performing portfolios. The methodological extension of this paper is to test the cumulative returns for statistical, rather than simply numerical, significance.

Methodology and Results

The buy list used for this analysis is the US 1000 – a list of the top 1,000 publicly traded firms ranked by FORTUNE magazine annually. Using Stern-Stewart Performance 1000 database, which is built for the same group of firms, we gathered the year-end MVA for 919 US firms from 1990 to 1999 (the period for which the Stern-Stewart coverage lists were available).

For each year, two 100-stock portfolios are created. The stocks for each portfolio, equally weighted, are selected based on the prior year's list of the top and bottom 100 firms ranked by the ratio of changes in MVA to average capital (dmva2cap). The numerator is the changes in MVA from the previous year, while the denominator is the average book value of long-term debt and equity for the current and the previous years. We employ this ratio for two concerns. First, we aim at minimizing the effects of extreme sizes. Second, we attempt to mitigate the effects of high beta firms.

The portfolios are rebalanced annually on July 15. For example, the 1991 list of the top-/bottom-100 firms by dmva2cap is used in creating a portfolio as of July 15, 1992. The holding period is from July 15, 1992 to July 14, 1993. On July 15, 1993, a new list of the top-/bottom-100 firms based on the 1992 year-end dmva2cap is employed for a new portfolio whose holding period is from July 15, 1993 to July 14, 1994, and so forth. The returns performance for the top-100 and bottom-100 firms is assessed as of July 14, 1999.

If the two portfolios are selected by using a factor without economic content, then these are two randomly selected portfolios from the same population and would be expected to have similar returns over the same time period. If the factor used to form the portfolios has economic content, then the portfolios would be expected to perform differently over the same time period.

This null hypothesis can be stated that there is no difference in cumulative returns, in excess of differential transactions costs, between the two portfolios. An equivalent statement of the null hypothesis is that there is no portfolio separation. The alternative hypothesis is that of portfolio separation, shown by a returns differential in excess of the differential transactions costs (denoted as c in the equations below) expressed proportionally to the benchmark return.

This null hypothesis can be written:

Ho: dmva2caphigh ≤ dmva2caplow(1 + c) with the alternative being written:

Ha: dmva2caphigh > dmva2caplow(1 + c).

The null hypothesis can be tested using a linear regression of the form

$$dmva2caphigh = \beta dmva2caplow + \varepsilon , \tag{1}$$

under the null hypothesis of $\beta \le (1+c)$ and the alternative hypothesis of $\beta > (1+c)$. The t-statistic is then computed as $(\beta - (1+c))/S.E.$, where S.E. is the standard error of the regression coefficient. Because of the nature of the null hypothesis, this is a 1-tailed test.

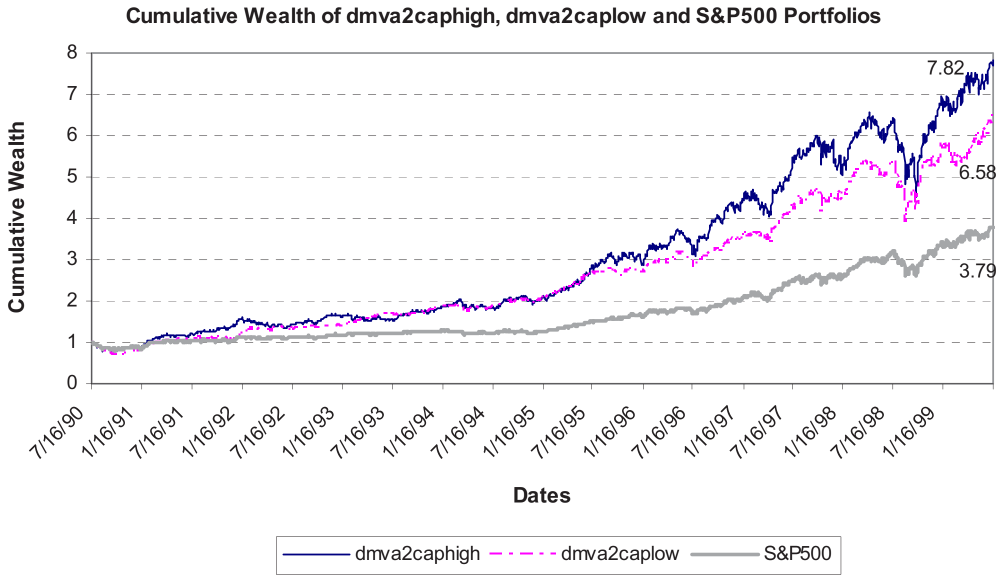

Fig. 1. Shareholders' Wealth for Top-/Bottom-100 Firms by dmva2cap and for S&P 500, 7/15/1990 – 7/15/1999

Figure 1 illustrates the cumulative wealth produced for shareholders by holding portfolios of the top- and the bottom-100 firms categorized by dmva2cap. Irrespective of the components or economic drivers, the portfolios do appear to add value to shareholders, with those of the top-100 dmva2cap companies outperforming their bottom-100 counterparts (both dmva2cap portfolios were superior to the S&P 500 index).

We run a regression of the cumulative returns for the top-100 dmva2cap portfolio on the cumulative returns for the bottom-100 dmva2cap portfolio and obtain the following estimates:

β = 1.1758

$S.E.$ = 0.0017, with adjusted R^2 = 0.9830

We compute the t-statistic = (1.1758 – 1)/0.0017 = 103.41, which is statistically significant at the p = 0 level whether using a 1- or a 2-tailed test. Consequently, we reject the null hypothesis. It does appear that there is economically useful information in the MVA measure that can be used to obtain two portfolios from a buy list, one portfolio with higher returns and one with lower returns. However, one could still debate that the better performance of the top-100 dmva2cap portfolio over the bottom-100 portfolio is a result of outliers. Figures 2 and 3 are employed to address this issue.

In Figure 2, we sort the daily returns of the top-/bottom-100 dmva2cap portfolios in ascending order. Both cumulative curves intersect the x-axis in the vicinity of observation 1000, which is below the median. This suggests that indeed both portfolios outperformed the market during our study period. Further, for positive returns, the cumulative curve for the top-100 dmva2cap is consistent above that of the bottom-100. Thus, we show that the top-100 portfolio consistently outperforms the bottom-100 portfolio, and the result is not attributed to outliers.

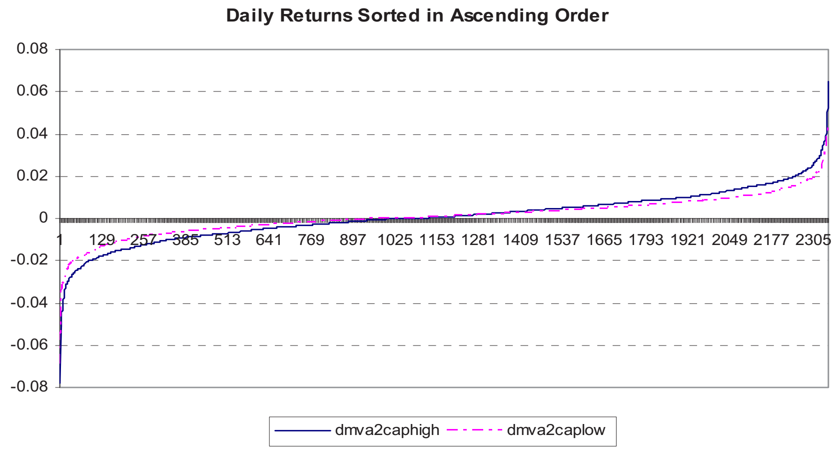

Fig. 2. Cumulative Curve for Top-/Bottom-100 dmva2cap Daily Returns

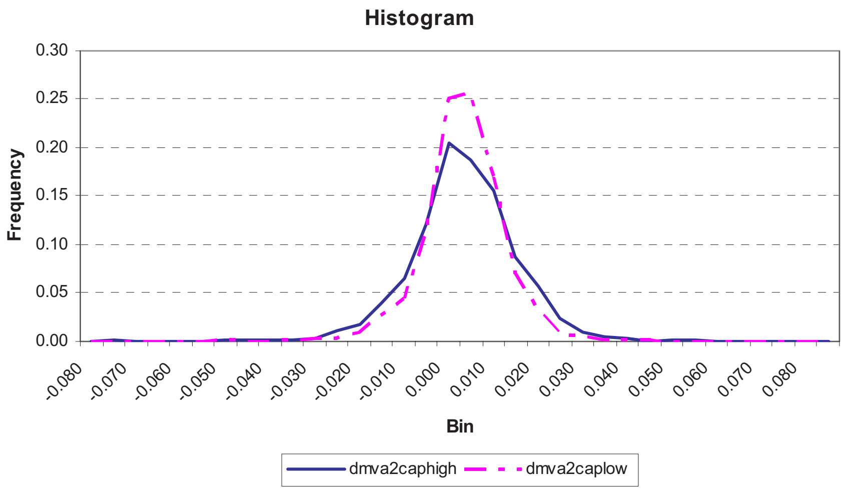

Fig. 3. Histograms for Top-/Bottom-100 dmva2cap Daily Returns

The conclusion drawn by viewing Figure 2 is essentially replicated by Figure 3, in the form of a histogram. Both histograms are skewed to the left, exhibiting higher mean daily return than the market. Comparing the histograms of the top-/bottom-100 portfolios, more of the bottom-100 daily returns are centered round its mean whereas the returns for the top-100 portfolio are at the tails. This implies lower volatility for the bottom-100 portfolio. Once again, it’s obvious from the chart that there are hardly any outliers contributing to the better performance of the top-100 portfolio over the bottom-100.

Conclusion

While there are numerous methods for evaluating the possible financial significance of investment data, the portfolio separation test described here is a straightforward analysis that is readily implemented. In the current application, it demonstrates that at least during the period of 1990-1999, the change in market value added as a percentage of market capitalization was able to provide the basis for two portfolios with statistically different cumulative returns. The ongoing performance of MVA based portfolios in comparison to those formed using other criteria remains a topic for future research.

References

1. Clare A.D., S.H. Thomas, M.R. Wickens. Is the Gilt-Equity Yield Ratio Useful for Predicting U.K. Stock Returns? // Economic Journal, 1994. - No 104. - pp. 303 - 315.
2. Dechow P., R. Sloan. Returns on Contrarian Investment Strategies: Tests of Naïve Expectations Hypothesis // Journal of Financial Economics, 1997. - No 43. - pp. 3 - 27.
3. Granger C.W.J., P. Newbold. Forecasting Economic Time Series. Academic Press, New York, 1977.
4. Knez P., M. Ready. Estimating the Profits from Trading Strategies // Review of Financial Studies, 1996. - No 9. - pp. 1121 - 1164.
5. Noh J., R.F. Engle, A. Kane. Forecasting Volatility and Option Prices of the S&P 500 Index // Journal of Derivatives, 1994. - pp. 17 - 30.
6. Rouwenhorst K. International Momentum Strategies // Journal of Finance, 1998. - No 53. - pp. 267 - 284.
7. Stewart III G. EVA: Fact and Fantasy // Journal of Applied Corporate Finance, 1994. - No 7. - pp. 71 - 84.
8. Stoll H.R., R.E. Whaley. The Dynamics of Stock Index and Stock Index Futures Returns // Journal of Financial and Quantitative Analysis, 1990. - No 25. - pp. 441 - 468.
9. Tang Y.N., S.C. Mak, D.F.S. Choi. The Causal Relationship Between Stock Index Futures and Cash Index Prices in Hong Kong // Applied Financial Economics, 1992. - No 2. - pp. 187 - 190.
10. Tse Y.K. Lead-Lag Relationships Between Spot Index and Futures Price of the Nikkei Stock Average // Journal of Forecasting, 1995. - No 14. - pp. 553 - 563.
11. Wahab M., M. Lashgari. Price Dynamics and Error Correction in Stock Index and Stock Index Futures Markets: A Cointegration Approach // Journal of Futures Markets, 1993. - No 13. - pp. 711 - 742.