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Determining S&P 500 Sector Weight by Relative Valuation Modeling:

An Empirical Analysis: 1999-2010

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Background:

A large number of investment managers use a top-down approach in selecting a portfolio of stocks. This approach involves a two-step process. First, the managers have to determine the sectors of the economy to overweight or underweight. Then they have to select the stocks within the sectors to invest in. Overweighting or underweighting sectors is typically based on the manager's analysis and judgments concerning present and future macroeconomic conditions in the economy in which they are investing. Stock selection is based either on fundamental or technical analysis or a combination of the two.

Purpose:

The purpose of this study is to develop and evaluate a quantitative approach to sector weighting based on relative valuation measures. It is hoped that sector weighting based on relative valuation modeling will result in improved expected returns for top-down investment strategies.

Model Specification:

$$R_S = f(\text{EPS}_S/\text{EPS}_{\text{SPX}}, (\text{E}/\text{P})_S/(\text{E}/\text{P})_{\text{SPX}}, (\text{B}/\text{M})_S/(\text{B}/\text{M})_{\text{SPX}}, (\text{CF}/\text{P})_S/(\text{CF}/\text{P})_{\text{SPX}}, (\text{S}/\text{P})_S/(\text{S}/\text{P})_{\text{SPX}}, \text{NPM}_S/\text{NPM}_{\text{SPX}}, \text{ROE}_S/\text{ROE}_{\text{SPX}}, \text{DY}_S/\text{DY}_{\text{SPX}})$$

S=Sector
 R_S = Return of the Sector
 EPS= Earnings per Share
 E/P= Earnings Yield
 B/M= Book to Market
 CF/P= Cash Flow Yield
 S/P= Sales per Share Yield
 NPM= Net Profit Margin
 ROE= Return on Equity
 DY= Dividend Yield
 SPX= S&P 500 Index

Sectors:

SPCCS – Consumer Discretionary
 SPCNS – Consumer Staples
 SPENS – Energy
 SPFN – Financial
 HCX – Health Care
 SPIN – Industrials
 SPHTI – Information Technology
 SPBMS – Materials
 SPCSS – Telecommunications
 SPUT – Utilities

Sector Weights:

$$W_S = \text{TFW}_S / \sum \text{TFW}_S$$

We then allocate that percentage of funds into that particular sector to get our dollar value invested in the sector.

Conclusion:

In conclusion, this model uses the S&P 500 Index to determine the relative value of each of the S&P 500 sectors against the S&P 500 as a whole. In doing this, it systematically finds a way to give a percentage weight that should be put into each S&P 500 sector. By weighting these sectors objectively and without human judgment, we have found that this model provides greater expected returns than the S&P 500.

Factor Weights:

$\text{EPS}_S/\text{EPS}_{\text{SPX}} = F_1$
 $(\text{E}/\text{P})_S/(\text{E}/\text{P})_{\text{SPX}} = F_2$
 $(\text{B}/\text{M})_S/(\text{B}/\text{M})_{\text{SPX}} = F_3$
 $(\text{CF}/\text{P})_S/(\text{CF}/\text{P})_{\text{SPX}} = F_4$
 $(\text{S}/\text{P})_S/(\text{S}/\text{P})_{\text{SPX}} = F_5$
 $\text{NPM}_S/\text{NPM}_{\text{SPX}} = F_6$
 $\text{ROE}_S/\text{ROE}_{\text{SPX}} = F_7$
 $\text{DY}_S/\text{DY}_{\text{SPX}} = F_8$
 $\sum F = \text{TFW}_S$

| Year | SPX | Model | Spread |
|------------------|--------------|---------------|---------------|
| 1999 | 19.53% | 13.78% | -5.75% |
| 2000 | -10.14% | 8.62% | 18.76% |
| 2001 | -13.04% | -11.85% | 1.20% |
| 2002 | -23.37% | -21.45% | 1.92% |
| 2003 | 26.38% | 22.78% | -3.60% |
| 2004 | 8.99% | 13.02% | 4.03% |
| 2005 | 3.00% | 4.79% | 1.79% |
| 2006 | 13.62% | 16.44% | 2.82% |
| 2007 | 3.53% | 8.49% | 4.96% |
| 2008 | -38.49% | -37.23% | 1.26% |
| 2009 | 23.45% | 21.68% | -1.77% |
| 2010 | 12.78% | 12.19% | -0.59% |
| 2011 | 0.00% | 2.06% | 2.07% |
| 1999-2011 | 2.31% | 37.51% | 35.20% |

Using the sector's earnings, valuation, profitability, and risk measures and comparing those same measures to the S&P 500 as a whole, the model was able to identify which sectors were undervalued or overvalued at the end of each year. Using the portfolio where I treated the sectors like a stock and invested more in the undervalued sectors, the portfolio made 37.51% compared to the S&P's 2.31%. This shows the effectiveness of looking at the overall value of a sector from an objective, quantifiable view.