Earnings forecasting in a global stock selection model and efficient portfolio construction and management

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ARTICLE INFO

ABSTRACT

Stock selection models often use analysts' expectations, momentum, and fundamental data. We find support for composite modeling using these sources of data for global stocks during the period 1997–2011. We also find evidence to support the use of SunGard APT and Axioma multi-factor models for portfolio construction and risk control. Three levels of testing for stock selection and portfolio construction models are developed and estimated. We create portfolios for January 1997–December 2011. We report three conclusions: (1) analysts' forecast information was rewarded by the global market between January 1997 and December 2011; (2) analysts' forecasts can be combined with reported fundamental data, such as earnings, book value, cash flow and sales, and also with momentum, in a stock selection model for identifying mispriced securities; and (3) the portfolio returns of the multi-factor risk-controlled portfolios allow us to reject the null hypothesis for the data mining corrections test. The earnings forecasting variable dominates our composite model in terms of its impact on stock selection.

1. Introduction

Expected returns on assets are a key input in the mean–variance portfolio selection process. One can estimate models of expected returns by using earnings expectations data, price momentum variables, and reported financial data. In this analysis, we construct and estimate a global stock selection model by using these data for the period from January 1997 to December 2011. Earnings expectations information has been being rewarded in global stocks for the past fifteen years or so, and we expect it to continue to be the primary variable driving global

stocks. Despite the recent volatility of the momentum factor, momentum is still associated statistically with security returns, and can be used with other factors to rank stocks for purchase. A composite model of earnings expectations information, value, and momentum factors is estimated for global stocks in order to identify potentially mispriced stocks. In addition, the regression-weighting of factors enhanced the information coefficients relative to equally-weighted factors. Analysts' forecast and momentum variables are dominant in the regression-based composite model of expected returns. We create portfolios for the period January 1997–December 2011, and simulate portfolio returns which we compare with a set of global stock benchmark returns.

We begin with a review of the literature on stock selection models in Section 2. In Section 3, we discuss the testing of a composite model of stock selection, incorporating

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earnings forecast information. We use an APT-based multi-factor risk model to create efficient portfolios in Section 4. In Section 5, we present and estimate the data mining corrections test. In Section 6, we discuss the relevance of the "alpha alignment factor" and show its relevance. Section 7 presents our summary and conclusions.

2. A literature review of expected returns modeling and stock selection models

There are many different approaches to security valuation and the creation of expected returns. One seeks to select expected returns inputs that are associated statistically with stock returns. The correlation coefficient between the strategy and the subsequent returns is referred to as the information coefficient, IC (Grinold & Kahn, 1999). The expected returns input normally consists of variables that are denoted anomalies, which can be used as inputs to the portfolio construction process in order to produce portfolios that outperform the market. The early approaches to security analysis and stock selection involved the use of valuation techniques that used reported earnings and other financial data. Graham, Dodd, and Cottle (1934) recommended that stocks be purchased on the basis of the price-to-earnings (P/E) ratio. They suggested that no stock should be purchased if its price-to-earnings ratio exceeded 1.5 times the P/E multiple of the market. Graham and Dodd established the P/E criteria, and it was then discussed by Williams (1938), who wrote the monograph that influenced Harry Markowitz's thinking on portfolio construction. It is interesting that Graham and Dodd proposed the low P/E model at the height of the Great Depression. Basu (1977) reported evidence supporting the low P/E model. The recent literature on financial anomalies is summarized by Fama and French (2008) and Levy (1999).

There is an extensive body of literature on the impact of individual value ratios on the cross-section of stock returns. We go beyond using just one or two of the standard value ratios (EP and BP), and also include the cash-to-price ratio (CP) and/or the sales-to-price ratio (SP). The major papers on the combination of value ratios for the prediction of stock returns (including at least CP and/or SP) include those of Bloch, Guerard, Markowitz, Todd, and Xu (1993), Chan, Hamao, and Lakonishok (1991), Guerard, Rachev, and Shao (2013), Haugen and Baker (2010) and Lakonishok, Shleifer, and Vishny (1994).

Chan et al. (1991) used seemingly unrelated regressions (SUR) to model CAPM excess returns as functions of traditional fundamental variables such as earnings, book values and cash flows relative to price, denoted as EP, BP and CP. Moreover, size was measured as the natural logarithm of market capitalization (LS).[1] Betas were estimated simultaneously, and cross-sectional correlations of residuals were addressed. When fractal portfolios were constructed by sorting on the EP ratio, the highest EP quintile portfolio outperformed the lowest EP quintile portfolio, and the EP

effect was not statistically significant. The portfolios composed of and sorted by the highest BP and CP outperformed the portfolios composed of the lowest BP and CP stocks. In the authors' multiple regressions, the size and book-to-market variables were positive and statistically significant. The EP coefficient was negative and statistically significant at the 10% level. Applying an adaptation of the Fama and MacBeth (1973) time series of portfolio cross-sections to the Japanese market produced negative and statistically significant coefficients on EP and size, but positive and statistically significant coefficients for the BP and CP variables. Chan et al. (1991, p. 1760) summarized their findings as follows: "The performance of the book-to-market ratio is especially noteworthy; this variable is the most important of the four variables investigated".

Bloch et al. (1993) built fundamental-based stock selection models for Japanese and United States stocks. The investable stock universe was the first section, non-financial Tokyo Stock Exchange common stocks from January 1975 to December 1990 in Japan, and the 1000 largest market-capitalized common stocks from November 1975 to December 1990 in the United States. They found that a series of Markowitz (1952, 1959) mean–variance efficient portfolios using the higher EP values in Japan underperformed the universe benchmark, whereas the BP, CP, and SP (sales-to-price, or sales yield) variables outperformed the universe benchmark. For the United States, the optimized portfolios using the BP, CP, SP, and EP variables outperformed the U.S. S&P 500, providing support for the Graham and Dodd concept of using the relative rankings of value-focused fundamental ratios to select stocks.[2] Bloch et al. (1993) used relative ratios as well as current ratio values. Not only might an investor want to purchase a low P/E stock, one might also wish to purchase when the ratio is at a relatively low value compared to its historical value, in this case a low P/E relative to its average over the last five years. Bloch et al. (1993) estimated Eq. (1) in order to assess empirically the relative explanatory power of each of the eight value ratios in the equation:

$$TR = w_0 + w_1 EP + w_2 BP + w_3 CP + w_4 SP$$
$$\quad + w_5 REP + w_6 RBP + w_7 RCP + w_8 RSP + e_t. \quad (1)$$

Given concerns about both outlier distortion and multicollinearity, Bloch et al. (1993) tested the relative explanatory and predictive merits of alternative regression estimation procedures: OLS, robust regression using the Beaton and Tukey (1974) bi-square criterion to mitigate the impact of outliers, latent roots to address the issue of multicollinearity (see Gunst, Webster, & Mason, 1976), and

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[1] Chan et al. (1991) define cash as the sum of earnings and depreciation, without explicit correction for other noncash revenue or expenses.

[2] One finds the Price/Earnings, Price/Book and Price/Sales ratios listed among the accounting anomalies by Levy (1999, p. 434). Levy also discusses the dividend yield as a (positive) stock anomaly. Malkiel (1996) cites evidence in support of buying low P/E, low P/B, and high D/P (dividend yield) stocks for a good performance, provided that the low P/E stocks have modest growth prospects (pp. 204–210). Malkiel speaks of a "double bonus"; that is, if growth occurs, earnings increase and the price-to-earnings multiple may increase, driving the price up even further. Of course, should growth fail to occur, both earnings and the P/E multiple may fall.