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Instability of return prediction models ☆

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Abstract

This study examines evidence of instability in models of ex post predictable components in stock returns related to structural breaks in the coefficients of state variables such as the lagged dividend yield, short interest rate, term spread and default premium. We estimate linear models of excess returns for a set of international equity indices and test for stability of the estimated regression parameters. There is evidence of instability for the vast majority of countries. Breaks do not generally appear to be uniform in time: different countries experience breaks at different times. For the majority of international indices, the predictable component in stock returns appears to have diminished following the most recent break. We assess the adequacy of the break tests and model selection procedures in a set of Monte Carlo experiments.
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1. Introduction

Predictability of stock returns has been well documented in the empirical finance literature and is now routinely used in studies of mutual fund performance (Christopherson et al., 1998; Ferson and Schadt, 1996), tests of the conditional CAPM (Ferson and Harvey, 1991; Ghysels, 1998) and optimal asset allocation (Ait-Sahalia and Brandt, 2001; Barberis, 2000; Brandt, 1999; Campbell and Viceira, 1998; Kandel and Stambaugh, 1996). Variables commonly used to predict stock returns include the dividend yield, the short term interest rate, and term and default premia. Most

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studies assume a stable prediction model in which the coefficients on the state variables do not change over time.[1]

Recent empirical studies have, however, cast doubt upon the assumed stability of return forecasting models. In a forecasting model based on the dividend and earnings yield, Lettau and Ludvigsson (2001) find some evidence of instability in the second half of the 1990s. Likewise, Goyal and Welch (2003) uncover instability in return models based on the dividend yield when data from the 1990s is added to the sample. Ang and Bekaert (2004) also find evidence of deterioration in predictability patterns in US returns in the second half of the 1990s.

Signs of instability in financial prediction models have also emerged from studies that specifically address the question of whether stock market investors could have exploited predictability to earn abnormal returns in real time. These studies have generally found that although stock returns were predictable ex post (or in-sample), the evidence of genuine ex ante (or out-of-sample) predictability appears to be much weaker. Bossaerts and Hillion (1999) find that stock returns on a range of US and international portfolios are largely unpredictable during an out-of-sample period (1990–95), while Cooper, Gutierrez and Marcum (2005) conclude that the relative returns on portfolios of stocks sorted on firm size, book-to-market value and past returns were not ex ante predictable during the period 1974–97.[2] Marquering and Verbeek (2004) study the economic significance of predictability in both the conditional mean and conditional variance of stock returns and conclude that the profitability of trading strategies they examine is concentrated in the first half of the sample period. Sullivan, Timmermann and White (1999) find that technical trading rules cease to identify profitable trading strategies for the period 1986–96, although there was some evidence that they managed to do so prior to this period.

While these studies find evidence of instability in return forecasting models, they do not determine the time where the return models may have changed, nor do they consider the possibility of earlier structural breaks or the time of their occurrence. These are important issues to address since a plausible explanation for the discrepancy between the apparent strong in-sample predictability and the weak out-of-sample predictability is that the predictive relations are structurally unstable and change over time. Furthermore, if financial prediction models are unstable, the economic significance of return predictability can only be assessed provided it is determined how widespread such instability is both internationally and over time and the extent to which it affects the predictability of stock returns.

This study investigates these questions. Using data on a sample of excess returns on international equity indices we analyze both how widespread the evidence of structural breaks is and to what extent breaks affected the predictability of stock returns. We focus on ex post or full-sample predictability, while many earlier studies have studied ex ante predictability. There are several advantages of this approach over an ex ante approach that splits stock return data into estimation and forecasting sub-samples (as is traditionally done in the literature). First, our approach allows us to date the possible time of changes in the return prediction models. In real time it is very difficult to

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[1] An incomplete list of studies on predictability of stock returns includes Ait-Sahalia and Brandt (2001), Avramov and Chordia (2002), Bekaert and Hodrick (1992), Bossaerts and Hillion (1999), Brandt (1999), Campbell (1987), Campbell and Shiller (1988), Cochrane (1991), Fama and Schwert (1977), Fama and French (1988), Ferson and Harvey (1991), French, Schwert and Stambaugh (1987), Keim and Stambaugh (1986), Lamont (1998), Lettau and Ludvigsson (2001), Lewellen (2004), Perez-Quiros and Timmermann (2000), Pesaran and Timmermann (1995), Valkanov (2003), Whitelaw (1994). Bekaert (2001) discusses recent research on predictability.

[2] In contrast, Avramov and Chordia (2002) report evidence of ex-ante predictability in individual stock returns over the period 1965–1999 by using standard predictor variables but also including firm-specific characteristics such as book-to-market ratio, turnover, previous-year returns and idiosyncratic volatility.

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