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International Journal of Forecasting 23 (2007) 695 – 705
international journal of forecasting
www.elsevier.com/locate/ijforecast

Predictive financial models of the euro area: A new evaluation test

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Abstract

This paper investigates the predictive ability of financial variables for euro area growth. Our forecasts are built from univariate autoregressive and single equation models. Euro area aggregate forecasts are constructed both by employing aggregate variables and by aggregating country-specific forecasts. The forecast evaluation is based on a recently developed test for equal predictive ability between nested models. Employing a monthly dataset from the period between January 1988 and May 2005 and setting the out-of-sample period to be from 2001 onwards, we find that the single most powerful predictor on a country basis is the stock market returns, followed by money supply growth. However, for the euro area aggregate, the set of most powerful predictors includes interest rate variables as well. The forecasts from pooling individual country models outperform those from the aggregate itself for short run forecasts, while for longer horizons this pattern is reversed. Additional benefits are obtained when combining information from a range of variables or combining model forecasts.

JEL classification: E52; C14

Keywords: Forecasting accuracy; Financial variables; Output growth; Aggregation

1. Introduction

A vast body of literature in finance and macroeconomics is devoted to the forecasting ability of financial variables for real economic activity. The empirical evidence is mixed, and the results are not robust with respect to model specification, sample choice or forecast horizon (see Stock & Watson, 2003, for a review of the empirical literature).

A voluminous body of literature exists on the choice of candidate variables, but there is little consensus as to what the most appropriate variables. We choose a set of variables that are the ones most frequently used in the literature. We include forward-looking financial variables – stock market returns, short-term interest rates, interest rates spreads and the dollar exchange rate – that are thought to embody future economic expectations. Studies such as Barro (1990), Fama (1990), Lee (1992), Estrella and Mishkin (1998), Hassapis and Kalyvitis (2002), Hassapis (2003) and Panopoulou, Pittis, and Kalyvitis (2006), among others, find that stock market

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doi:10.1016/j.ijforecast.2007.04.001

returns improve forecasting ability. Interest rate measures have also enjoyed success in predicting output growth. Both short-term rates (see Bernanke & Blinder, 1992) and (more usually term) spreads are used (see Boulier & Stekler, 2000; Davis & Fagan, 1997; Estrella & Hardouvelis, 1991; Estrella & Mishkin, 1997, 1998; Harvey, 1988; Stock & Watson, 2003). These have mixed forecasting performance, and there is evidence that in the US that these variables' ability to predict output growth has fallen over the past two decades. We also investigate the forecasting performance of the domestic money supply, the dollar exchange rate as well as extraneous data such as US growth and oil prices. Money supply growth, exchange rates and oil prices have been employed by Stock and Watson (2003), among others, while the effect of US variables on their EU equivalents has been documented by Marcellino, Stock, and Watson (2003) and Banerjee, Masten, and Marcellino (2005).

With the exception of a few cases, the aforementioned studies have concentrated on and examined the predictive ability of financial variables for forecasting US future growth. Similar evidence for the euro area countries is quite scarce, and what there is is more recent. Studies such as Davis and Fagan (1997), Forni, Hallin, Lippi, and Reichlin (2003), Sensier, Artis, Osborn, and Birchenhall (2004), Marcellino et al. (2003), Moneta (2005), Duarte, Venetis, and Paya (2005), and Banerjee et al. (2005), among others, confirm the widely held belief that a variety of variables act as leading indicators for output growth, albeit in some counties more than others, and at different horizons.

We concentrate on single equation linear models, which are often found to outperform both non-linear alternatives (Banerjee & Marcellino, 2006) and multivariate models (Marcellino et al., 2003). Specifically, we examine a range of nested models, using the simple autoregressive model as a benchmark and augmenting it with a number of the aforementioned candidate variables. We initially assess the forecasting ability of the models by analysing their Mean Squared Forecast errors (MSFE). We then extend this approach by testing for statistical differences in forecasting accuracy, using the OOS-F statistic of equal predictive ability for nested models developed by McCracken (2004). The employment of this testing methodology gives us a clear comparison between the competing models, and thus provides an advance on other studies of economic forecasting within the euro area.

Our results from testing the forecasting accuracy of the variables at hand are in line with the consensus that for some countries and horizons, some variables contain useful information for predicting future growth. On a country basis, we find that in the vast majority of cases, financial variables add significant predictive content over and above that already contained in the autoregressive model, with the exception of the 3-month horizon where only marginal gains are observed. However, at the aggregate euro area level, our results are more promising, as a longer list of candidate variables proves to provide more accurate forecasts either at an aggregate level or when pooled forecasts from country-specific models are considered.

The layout of this paper is as follows: Section 2 outlines the methodology for testing the out-of-sample predictability of financial variables for growth. Section 3 presents and comments on the empirical results for the euro area countries and the euro area as a whole, and Section 4 summarizes the main findings of the paper.

2. Construction of out-of-sample forecasts and evaluation

In this section, we briefly review the forecasting methodology, which is fairly standard (see, inter alia, Marcellino et al., 2003; Stock & Watson, 2003). Specifically, we estimate several univariate models for each series to be forecast, and focus on forecast horizons (h) of 1, 3, 6 and 12 months. Contrary to the textbook approach of estimating a one-step ahead model and then iterating it forward to get the h-step predictions, we set the h-step ahead variable to be forecast, y_{t+h}^h, to be equal to $\sum_{s=t+1}^{t+h} y_s$ In our case, the variable of interest is the output growth, y_{t+h}^h, which represents the growth of output over the next h periods. The models considered are all nested within the following class of Autoregressive Distributed Lag (ADL) models:

$$y_{t+h}^h = c + \alpha(L)y_t + B(L)^{'}Z_t + \varepsilon_{t+h}^h, \quad (1)$$

where c is a constant, $\alpha(L)$ is a scalar lag polynomial, $B(L)$ is a vector lag polynomial, and Z_t is a vector of