Forecasting growth and inflation in an enlarged Euro area

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Abstract

We compare models for forecasting growth and inflation in the enlarged euro area. Forecasts are built from univariate autoregressive and single equation models. Aggregate forecasts are constructed by both employing aggregate variables and by aggregating country-specific forecasts. Using financial variables for country-specific forecasts tends to add little to the predictive ability of a simple AR model. However, they can help to predict EU aggregates. Furthermore, forecasts from pooling individual country models usually outperform those of the aggregate itself, particularly for the EU25 grouping. This is particularly interesting from the perspective of the European Central Bank, who require forecasts of economic activity and inflation to formulate appropriate economic policy across the enlarged group.

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1. Introduction

Forecasting macroeconomic variables across a large number of diverse countries is a difficult task but one that is very much a reality for the European Central Bank (ECB) as it strives to formulate appropriate monetary policy for the enlarged Euro area. Marcellino *et al.* (2003) have examined this issue with relation to the original 11 members[1] of the common currency group. However with the accession of ten new member states in 2004, the group has become even more diverse and hence forecasting economic variables becomes even more hazardous. For this reason, we again examine the issue of the best method of forecasting economic activity and inflation in the individual member states as well as at the Euro zone aggregate level.

We concentrate on single equation linear models. Swanson and White (1997) show that linear models outperform non-linear alternatives for US forecasts of economic activity and inflation. Banerjee and Marcellino (2006) conclude that simple forecasting mechanisms work best and note the relatively good performance of the pure autoregressive model. Furthermore, these relatively simple models have often been found to outperform multivariate models in their out-of-sample forecast accuracy, especially in periods of economic change (see Marcellino *et al.* 2003). Given the recent period of economic and institutional change in European Union countries, especially the 10 new members, we favour the relatively low-parameterised single equation models. In particular we examine a range of nested models using the simple autoregressive model as a benchmark and augmenting it with a number of other economic and financial variables which the extant literature has shown to be useful in economic forecasting. We initially assess their forecasting ability by analysing their Mean Squared Forecast errors (MSFE). We extend this approach by testing for statistical differences in forecast accuracy, using statistics suggested by Diebold and Mariano (1995) and McCracken (2007). These tests give us a clear comparison of competing models and provide an advance on other studies of economic forecasting within the EU.

Having settled on the simple autoregressive model as a benchmark, our task is to choose a set of financial variables to include as predictors in alternative specifications.[2] A voluminous literature exists on the choice of candidate variables but there is little consensus as to what the appropriate variables should be. In particular, it appears that some variables do well in some periods but their performance does not seem to be robust across time or indeed across

[1] Greece was excluded from their analysis.
[2] For the US, Ang et al. (2006) show that the surveys out-perform macro and asset market variables in predicting inflation. However, such surveys are not available for the EU 25 countries.

countries.[3] We choose a set of variables that are ubiquitous in the literature. We include forward-looking financial variables – stock market returns, short-term interest rates and the dollar exchange rate – that are thought to embody future economic expectations. In the case of output growth, studies such as Barro (1990), Fama (1990), Lee (1992), Estrella and Mishkin (1998), Hassapis and Kalyvitis (2002), Hassapis (2003) and Panopoulou et al. (2005) among others find that stock market returns improve forecasting ability. Stock market returns are not generally found to be useful in predicting future inflation, e.g. Goodhart and Hoffman (2000a). Interest rate measures have also enjoyed success in predicting output growth. Both short term rates are used (see Bernanke and Blinder, 1992) and more usually term spreads (see Harvey, 1988; Stock and Watson, 1989 and Davis and Fagan, 1997).[4] These have mixed forecasting performance and there is evidence that in the US, their ability to predict output growth has fallen over the past two decades, e.g. Haubrich and Dombrosky (1996). In our inflation forecasts, we include the dollar exchange rate as a predictor. This is a potentially important channel through which inflation can be imported and has also been shown to be a useful predictor by Goodhart and Hoffman (2000b) for a range of countries. Stock and Watson (1999) find little evidence that exchange rates help the precision of output growth forecasts. We also investigate the forecast performance of the domestic money supply as well as extraneous data in the form of US aggregates of the variable to be forecast. Money supply growth has been used in both output and inflation forecasting exercises by Stock and Watson (2003), while the effect of US variables on their EU equivalents has been documented by Marcellino et al. (2003).

We find that in the vast majority of cases, financial variables add little predictive content over and above that already contained in the autoregressive model. US variables are only useful at the 1-month horizon, while other variables offer improvements at some longer horizons. However, consistent with the extant literature, it is difficult to identify any useful patterns that would help the researcher to forecast at the country level. For those forecasting aggregate variables, our results have stronger implications. We find that pooling forecasts from individual country models (using a GDP weighted average) is consistently better than directly forecasting from the aggregate variable. This always holds for output growth and for the EU25 group in the case of inflation.

[3] For an excellent review of the literature, see Stock and Watson (2003).
[4] We use short term rates as long yields are not available for many of the accession countries over our sample period.

Our paper is organized as follows. Section 2 presents our econometric methodology. Section 3 describes the data and presents our empirical findings, while section 4 offers some policy implications. Section 5 summarizes the main findings of the paper.

2. Econometric Methodology

In this section, we briefly review the forecasting methodology employed to evaluate the forecasting accuracy of various models in a parametric setup for output growth and inflation in the 25 countries of the enlarged euro area. Although similar to that of previous studies (see, inter alia, Marcellino *et al*., 2003 and Stock and Watson, 2003), we implement a different procedure to generate the out-of-sample forecasts. More specifically, our out-of-sample forecasting exercise is organized so that our benchmark model is always nested within the other estimated models. Thus, in contrast to other studies such as Stock and Watson (2004) and Favero and Marcellino (2005), we are able to perform formal statistical tests to compare the relative forecasting performance of alternative models.

We estimate several univariate models for each series to be forecast and focus on forecast horizons, *h,* of 1, 3, 6 and 12 periods. In general, there are two alternative methods to generate multiperiod-ahead forecasts of a series. Specifically, the multiperiod-ahead forecast is constructed by iterating forward a one-period ahead model or alternatively by estimating a horizon-specific model that can provide direct multiperiod-ahead forecasts. Asymptotic theory suggests that if the one-period ahead model is correctly specified, the MSFE of the iterated forecasts is lower than the MSFE of the direct forecasts (see Ing, 2003). However, if the models are mis-specified, asymptotic theory suggests that the direct forecasts are more accurate than the iterated forecasts (in terms of the MSFE criterion). In this study, we generate forecasts for the variables of interest based on simple univariate models that are most likely approximations of the true data generating mechanism. Therefore, we choose to implement the direct forecasting methodology based on the following horizon-specific model:

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

where c is a constant, $a(L)$ is a scalar lag polynomial, $B(L)$ is a vector lag polynomial, Z_t is a vector of financial (predictor) variables and $y_{t+h}^{h} = \sum_{s=t+1}^{t+h} y_s$. In our analysis, y_{t+h}^{h} represents the growth of output and consumer prices over the next h periods.[5] Our specification of Z_t

[5]The h-step ahead projection approach has an important advantage over the traditional one, in that no additional equations need to be estimated in order to simultaneously forecast the remaining variables of the model at hand.

differentiates the models. The number of lags for both y_t and Z_t is selected by the Schwartz Bayesian Information Criterion (SIC) setting the maximum lag length at 12 to avoid estimating models with low degrees of freedom.

Setting $B(L)$ equal to zero, provides us with the simple autoregressive model (AR) which will be used as a benchmark when evaluating our various forecasts. We estimate a number of alternative models (by changing the composition of Z_t) for each of the 25 countries. As already mentioned, the estimation procedure is designed to allow us to implement formal statistical tests for the comparison of the MSFEs of the alternative models. More specifically, we first estimate an AR model for each country by setting $B(L) = 0$. Out-of-sample forecasts are generated recursively. In each step, the AR model is re-estimated by keeping the lag-order fixed, providing us with a sequence of forecasts. We then estimate alternative models by adding Z_t to our model. We keep the order of $a(L)$ fixed[6] and once more use the SIC to select the order of *B(L)*. Consequently, the AR is always nested within the alternative models.

In addition to the individual countries, the preceding methodology is applied to three aggregated series (EU12, EU15 and EU25)[7]. The relevant aggregated series are constructed as the weighted average of the (transformed) country level data for all countries. A fixed-weighting scheme is employed using each country's GDP share in the euro area aggregate in PPP exchange rates averaged over 2005.[8]

For each of the 28 series (25 countries plus 3 aggregates), the forecasting performance of the various models is assessed by calculating the ratio of its MSFE to the MSFE of the benchmark AR model. A ratio less than one suggests superiority of the candidate model over the AR model and indicates that the candidate financial variable(s) is (are) a useful predictor for the variable of interest (i.e. output growth or inflation). However, a ratio lower than one does not necessarily mean that the alternative model generates better forecasts than the benchmark. The lower MSFE may be due to sample variation. In order to establish whether the ratio is really

[6] The lag-order of AR is allowed to be different across countries.
[7] EU12 corresponds to the 12 countries of the Euro zone, that is Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain. EU15 corresponds to the 12 aforementioned countries plus Denmark, Sweden and the UK. Finally, EU25 is EU15 plus the 10 new members of the Euro area, that is Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia.
[8] Source: Eurostat.

less than unity, one has to apply formal statistical tests. We use the following F-statistic proposed by McCracken (2007) to compare the forecasting performance of nested models:

$$OOS-F=\frac{\sum_{t=1}^{P}[\varepsilon_{1,t}^2-\varepsilon_{2,t}^2]}{P^{-1}\sum_{t=1}^{P}\varepsilon_{2,t}^2} \tag{2}$$

where $\varepsilon_{i,t}, i=1,2$ are the forecast errors of the restricted (AR) and the alternative unrestricted model respectively and P is the number of out-of-sample forecasts. Under the null hypothesis, the two models have equal MSFE, while under the alternative, the MSFE of the unrestricted model is less than that of the restricted. Thus, this is a one-sided test. The limiting distribution of the test statistic is non-standard but pivotal and numerical estimates of the asymptotic critical values for valid inference are provided by McCracken (2007). This statistic can be used for one-step ahead forecasts.

We use four different variables to forecast output growth and inflation. For each country (including EU12, EU15 and EU25), Z_t in the estimated models contains one of the four available predictors or all four predictors together. In the former case, the estimated model is nested within the "general" model that contains all predictors. Thus, we can implement the test statistic, OOS-F, to compare the relative forecasting performance between the general model and that which contains only one predictor. Finally, we can also compare the MSFEs among the models with a single predictor. However, in this case, we should apply a statistical test properly designed to compare the forecasting performance of non-nested models. Among the various statistics available in the literature, we choose that proposed by Diebold and Mariano (1995). Let $d_t=\varepsilon_{1,t}^2-\varepsilon_{2,t}^2$ where $\varepsilon_{i,t}, i=1,2$ is the forecast error of model *i*. Given the sequence of P forecasts, Diebold and Mariano (1995) show that $P^{1/2}(d_m-\mu)\rightarrow N(0,\Omega)$ where $d_m=P^{-1}\sum(\varepsilon_{1,t}^2-\varepsilon_{2,t}^2)$. The test statistic they propose is the following:

$$DM=P^{-1/2}\omega^{-1/2}\sum_{t=1}^{P}[\varepsilon_{1,t}^2-\varepsilon_{2,t}^2]$$

where ω is a consistent estimator of the asymptotic variance Ω. Under the null, the two non-nested models produce equal MSFEs and DM follows a N(0,1) distribution. In contrast to the OOS-F test, DM is a two-sided test. To overcome problems of small out-of-sample forecasts, Harvey *et al.* (1997) propose the following modification to the original DM test:

$$DM\text{-}modified=DM*\{[P+1-2h+P^{-1}h(h-1)]/P\}^{1/2} \tag{3}$$

where *DM-modified* follows the t-distribution with *(P-1)* degrees of freedom. They also report simulation results revealing that the modified statistic performs better than the original for

forecast horizons, h, greater than 1.

Apart from forecasting the euro area aggregates directly using the respective aggregated series, we also consider pooling country-specific forecasts in order to construct the euro area forecast. The pooled forecasts can be constructed in many different ways by varying the weighting scheme used. We consider the following: (i) the same fixed-weighting scheme (i.e. each country's GDP share) used for the construction of the aggregated series and (ii) the simple average of the country-specific forecasts, i.e. giving each country the same contribution in the euro area forecasts. Although the first pooling methodology seems more suitable, for comparison we apply both methodologies. Asymptotic theory suggests that the pooled forecasts will be more accurate than the ones based on the aggregated series if the country-specific models are time invariant, correctly specified and parameters differ across countries (See Lutkepohl, 1987). Finally, we should note that neither of the test statistics described above are valid for the comparison of the MSFEs produced by the forecasts of the aggregated series to those of the pooled forecasts.

3. Empirical Results

In this section, we report and discuss the results of applying the techniques outlined in the previous section to examine the empirical relationship between growth, inflation and financial variables in the euro area.[9]

3.1. Data

We focus on forecasting inflation and output growth. Inflation is measured as the growth in consumer prices. We follow Ang et al. (2006) in predicting the level rather than the change in inflation. They put forward a number of reasons for assuming that inflation is a stationary process. We perform unit root tests on all inflation variables to confirm the stationarity of the series.[10] To measure the growth rate of output, we use the industrial production index, which we transform in first logarithmic differences. Some US studies prefer the use of coincident indicators rather than industrial production as a proxy for economic growth on the basis that the latter is a shrinking share of the economy. However, for the range of countries in our analysis, such indicators are not available. Hence, we work with industrial production given that a consistent measure is available across all EU 25 countries.

[9] All the reported results were obtained by programs written in E-views 4.1 and are available from the authors upon request.

[10] Results are available upon request.

The predictive variables considered are short-term interest rates, stock market returns, money supply growth, exchange rates against the US dollar, US growth, US inflation, and domestic growth and inflation for the 25 countries. Our data set is monthly and covers the period from January 1995 to April 2006.[11] Many policymakers may prefer data measured at quarterly horizons but our choice of data frequency is driven by the need to have sufficient observations to produce meaningful econometric estimates and conduct an out-of-sample forecasting exercise. Our data sources are mainly Ecowin, Datasream, IFS and Eurostat.[12] Money supply and stock market indices were seasonally adjusted where necessary. With respect to interest rates and exchange rates, these series were transformed to their stationary counterparts, by employing the first difference and the first logarithmic difference, respectively. Aggregate euro area data were constructed by employing a fixed GDP-weighting scheme taking as weights each country's share in the euro area 2005 GDP in PPP terms.

3.2. Models and forecast evaluation

Our simulated out-of-sample forecasting experiment is conducted using a recursive methodology. The out-of-sample forecast period is 2003:05 to 2006:04 (36 observations) covering the recent period of monetary union and generating a ratio of out-of-sample (P) over in-sample observations (R) equal to approximately 0.36. In each step, we re-estimate all the candidate models by adding one observation at a time. The *h*-step ahead forecasts are generated for the periods of 1, 3, 6 and 12 months and the corresponding MSFEs are calculated. In an effort to conserve space, our forecasting analysis is restricted to the within-country and aggregate euro area forecasting ability of candidate variables. Including cross-country influences in this parametric setup would hugely increase the number of models and may obscure our main findings.

The models estimated in the forecasting experiment are as follows:

- Model (1): The benchmark AR model, i.e. Z_t is excluded from (1).
- Models (2)-(5): For output growth, the AR model is augmented with lags of either stock market returns, interest rate changes, money supply growth or US growth. For inflation, the candidate variables are output growth, exchange rate returns, money supply growth and US inflation. In each specification, Z_t contains only one predictor variable.

[11]To ensure homogemeity of our results, we employed the longest dataset possible for which data were available for the 25 euro area countries.

[12] A detailed description of data sources and variables is given in the Appendix.

- Model (6): All of the candidate variables are added to the AR specification simultaneously.

The aforementioned models were estimated for the 25 European countries and the three euro area aggregates, i.e. EU12, EU15 and EU25.

3.3 Growth Forecasts

3.3.1. 1-step ahead forecasts

Results for the 1-month forecast horizon are reported in Tables 1A-1C. Specifically, the second row reports the MSFE of the benchmark AR model in decimal values, while rows 4 to 8 tabulate the ratio of the MSFE of the alternative models to that of the AR benchmark. A value lower than 1 suggests that the additional financial variable(s) improve the forecast accuracy of future output growth. Tables 1A and 1B report the results for EU12 and the remaining 13 countries respectively. Table 1C tabulates the results for the aggregated series with columns 2-4 presenting the results based on aggregate series, while columns 5-7 and 8-10 report the Euro area pooled forecasts generated using, firstly, the GDP-weighted average approach and secondly the simple (equally-weighted) average approach.

[INSERT TABLES 1A-1C HERE]

Focusing on the second row of Tables 1A and 1B reveals the forecasting performance of the simple autoregressive model of output growth. A striking feature is the huge difference in forecasting performance across countries. From the original members of the single currency area, relatively small MSFEs are recorded for Italy, Germany and Spain. On the other hand, the simple AR model produces large MSFEs for Luxembourg, Finland and Portugal, but the model fails spectacularly to predict output growth in Ireland. Ratios of similar magnitude are noted for the non-Euro countries, while MSFEs for the accession countries tend to be larger, though the dispersion of values is again large, ranging from low values in Malta and Hungary to very high errors in Latvia and Lithuania. Therefore the AR model has mixed success in predicting future output growth. This initial analysis shows the difficulty in forecasting economic activity across the enlarged European Union. Table 1C presents the MSFE for AR models of the aggregate variables and pooled forecasts of the individual AR models based on both a weighted- and simple-average. It is noteworthy that the forecast accuracy of the aggregate variable is consistently inferior to the pooled forecasts when the GDP weighted average is applied. This finding is similar to Marcellino *et al.* (2003) for their restricted group of EU countries. In contrast, pooled forecasts based on a simple average fare worst of all. This is due to over-weighting the smaller countries, such as Ireland, Latvia and Lithuania where forecast

performance is poorest. Hendry and Clements (2004) propose a number of reasons as to why pooled forecasts might out-perform the aggregate. They argue that pooling forecasts from various candidate models allows alternative models to act as 'intercept corrections', which have been shown to improve forecasts in the presence of structural breaks and / or model mis-specification. They interpret cross-country forecast combinations, as we employ here, as a specific type of 'intercept correction'. Finally, the superiority of the GDP-weighted pooled forecasts over the forecasts generated from the aggregated series also holds in regards to the minimum MSFE model.

Rows 4-8 present the ratio of the MSFE of the candidate model to the MSFE of the benchmark AR model. Ratios less than unity imply that the added variable has predictive power over and above that contained in the lagged dependent variables. Improvements in forecast accuracy are observed for models that include the stock market as an additional predictor in 48% of the analyzed countries, 40% for the short-term interest rate, 52% for the money supply, 64% for US growth and 60% for the model that includes all candidate variables. These improvements are more common in the EU15 countries than in the accession countries. Admittedly, many of the MSFE reductions are very small and may not be statistically different. An alternative interpretation is that the AR model does well vis-à-vis its competitors for the individual country forecasts. In contrast, the information in Table 1C shows that for the aggregate and the pooled forecasts, the augmented models generally do better than the AR model in terms of forecast precision. Ratios are generally less than one and often by a long way. Of course, all of these relative MSFEs are generated subject to estimation error and hence we should perform proper statistical testing in order to properly evaluate the significance of our results.

The second panel of Tables 1A-1C reports the OOS-F statistic calculated from (2). Under the null hypothesis, the MSFE of the AR model equals that of the alternative model.[13] Applying this statistical test lends more support to the adoption of the AR model as the best predictor of output growth. Very few of its competitors manage to outperform it – models including the stock market variable in only 12% of cases, 12% for the short-term interest rate, 24% for the money supply, 40% for US growth and 36% for the all-inclusive model. In the vast majority of

[13] Bold denotes rejection of the null hypothesis of equal forecasting ability at the 10% significance level. Given that McCracken (2007) does not tabulate critical values for P/R equal to 0.36, we base our inference on the critical values for P/R equal to 0.4.

cases, the AR model produces forecasts that are at least as accurate as the other models. This is particularly evident with regard to the accession countries where the competing models are superior in only 10% of all possible country/variable combinations. Furthermore, even in countries where the AR model generated poor forecasts, such as Ireland, the additional predictors fail to improve on forecast accuracy. At this forecast horizon, it is difficult to identify one economic variable that reliably predicts output growth. Of the reported candidates, US growth tends to be the best predictor, suggesting that US economic conditions tend to lead European growth. In line with other studies, financial variables fare poorly in enhancing the accuracy of output forecasts (see Stock and Watson (2003) and references therein).

An issue arises with respect to the selection of appropriate critical values for comparing the forecasting accuracy of alternative models in the case of pooled forecasts. The critical values depend on the number of additional parameters estimated in the unrestricted model. We set the number of parameters in the pooled statistic equal to the highest number of additional estimated parameters among the country-specific models. The results indicate that pooling the forecasts of the country-specific models that include US growth as a predictor generates statistically lower MSFEs than pooling the simple AR models. The same result holds for the models that include the stock market returns when the pooled forecasts are calculated based on the GDP-weights. Interestingly, pooling models that include money supply generates lower MSFEs compared to pooling the AR models but the differences are not statistically significant. Conversely, pooling the forecasts generated by models augmented with the interest rate variable produces larger MSFEs compared to the benchmark case.

The third panel of Tables 1A-1C reports the OOS-F statistic calculated from (2) that tests whether the MSFE of the "general" unrestricted model that contains all four predictors is lower than the MSFE of the single predictor model. Again, for the individual countries, there is little statistical difference between models. For groups of countries, such as Germany, Greece, Ireland and Italy, there is no statistical evidence that the more highly parameterized model performs any better than its restricted counterparts. Hence, at the country level, one should not automatically assume that larger models are preferred. However, this is completely reversed in Table 1C with consistent evidence that the most general model does better than almost all the constrained alternatives. The only case where the general model is not statistically superior (i.e. lower MSFE) to a restricted model is when the restricted model uses US growth as a predictor.

Finally, the bottom panel of Tables 1A-1C reports the Modified Diebold-Mariano statistic calculated from (3) to test for statistical differences between models in terms of forecasting ability. There is little evidence of statistical significant differences between pairs of competing models. Furthermore there is little pattern that would suggest which if any of the additional predictors should be chosen in the forecasting exercise.

3.3.2 h-step ahead forecasts

Tables 2-4 report the results for the longer forecast horizons. The Tables have the same format as before. The MSFE of the AR model generally increases with the forecast horizon. The model performs qualitatively the same as at the 1-month horizon, with countries such as Germany always at the low end and Ireland and Latvia constantly having huge errors.

[INSERT TABLES 2A-4C HERE]

Evidence of competing models outperforming the benchmark reduces also. The importance of US growth as a predictor disappears as we increase the horizon and only does better than the AR model in 8% and 12% of cases at the 6- and 12-month horizon respectively. In general, predictors perform worse as we go further into the future. At the 12-month horizon, ratios of less than unity are only produced in 32% of cases with the inclusion of the stock market return as a forecast variable, 28% for the short interest rate, 36% for the money supply, 12% for US growth and 28% for the general model. The main exception is the short-term interest rate in predicting future output growth in the ten accession countries. At all horizons, it has approximately a 50% success rate in beating the AR model. Interestingly, the short-rate does quite well at the three month horizon, outperforming the benchmark in over 70% of cases and across all country subsets. Similar to the one-month forecast horizon, the GDP-weighted pooled forecasts consistently produce lower MSFEs than the forecasts based on the aggregated series for all forecast horizons and all groups of countries (i.e. EU12, EU15 and EU25). This results holds for both the AR and the minimum MSFE model.

Once more we test if there is statistical evidence of model superiority over the benchmark. Again evidence in favour of the alternative model is weak and models are not robust across countries or time horizons. At these longer horizons, US growth has no additional predictive value. In some cases, there is evidence that certain variables do better in certain countries. For example, the model including stock market returns outperforms the benchmark in Germany and Czech Republic at all forecast horizons beyond one month while the money supply variable adds predictive content over and above the benchmark at the same horizons for both France and

Slovenia. In general, there is no definite pattern in our results to help the researcher to choose good predictors of output growth for individual countries or forecast horizons.

When comparing the aggregate variables, similar patterns are observed. Again the MSFE increases with the forecast horizon and as before, pooling the forecasts using a GDP weighted average produces lower errors than forecasting with the aggregate itself. Pooling using the simple average does worst of all. Consistent with results for individual countries, the US growth rate has nothing to add to the benchmark, but all other variables produce lower MSFEs. Furthermore, if we focus on the GDP-weighted forecasts, models including the stock market return represent an improvement over the benchmark and interestingly, this variable consistently adds predictive value at all forecast horizons and for all output growth aggregates. Moreover, pooling the forecasts of models that include money supply generates statistically significant lower MSFEs than pooling the benchmark model for both EU12 and EU15 (but not EU25) and for all forecast horizons greater than one month. Finally, contrary to the one-period horizon, the general model fails to outperform the restricted ones.

3.4 Inflation Forecasts

3.4.1. 1-step ahead forecasts

Results for our 1-month inflation forecasts are contained in Tables 5A-5C. The Tables follow the same format as for output growth.

[INSERT TABLES 5A-5C HERE]

Again, the simple AR model is our benchmark case. The first striking feature of our results is that relative to output growth, the MSFEs are much smaller for inflation forecasts. Furthermore, there are no large outliers as was the case in the previous analysis. On average, the AR model is more successful in predicting future inflation in the more traditional EU countries than in the accession countries, though it performs quite well for Poland and Czech Republic. With regard to the aggregate variables, there is a marginal improvement from using pooled country forecasts rather than directly forecasting the aggregate. However, this is not as pronounced as in the case of output growth. It is noteworthy, however, that the largest reduction in MSFE is for the broadest and most diverse group, i.e. the EU25.

The predictive content of the economic and financial variables is initially assessed by their relative MSFEs. As before a ratio less than unity implies a reduction in the forecast error. For our 1-month inflation forecasts, the candidate variables perform poorly relative to the pure AR

model. Focusing on the individual countries, the AR model is at least as good as it competitors in the majority of country/variable combinations. Additional predictive ability is only indicated in 32% of cases with the inclusion of the economic growth variable, 32% for the dollar exchange rate, 28% for the money supply, 44% for US inflation and 32% for the general model. As before, at the 1-month horizon, the most successful variable in terms of adding to the forecast accuracy of the AR model is the US equivalent. This predictor performs better for the EU12 group than the average with a reduction in MSFE recorded in 58% of countries. For the aggregate variables, augmenting the AR model with either economic growth or the exchange rate tends to reduce the forecast error for all country groups but poorer performance is associated with models including the money supply and US inflation.

Given that the reduction in MSFE is small in many instances, we test if the differences are statistically significant. For the individual countries, none of the candidate variables consistently added predictive content to the AR model. In fact, with the exception of US inflation, the number of statistically significant improvements is small – 1 for the money supply and 3 for both economic growth and the dollar exchange rate. Augmenting the AR model with US inflation results in a statistical improvement in forecast accuracy in 6 countries (with 4 in the EU12). Therefore at the country level, the AR model tends to be the dominant forecast model among our set of candidates. At the aggregate level, a similar story emerges. For EU12 and EU15 aggregate variables, nothing outperforms the AR forecast, while there is some evidence that the broadest EU25 aggregate is more accurately forecasted by models including economic growth and the exchange rate. In regards to the pooled forecasts, competing models fail to outperform the simple AR in almost all cases. The EU25 aggregate is a noteworthy exception, where pooling the forecasts of models (weighted by GDP share) including output growth produces statistically significant lower MSFE than pooling the benchmark.

Evidence of the poor performance of the forecasting variables is compounded in the third panel, where we show that in the majority of cases there is no statistical support for the hypothesis that the general model does better than the less parameterised versions. For the majority of countries, this hypothesis is always rejected. However, this unrestricted model has some support in Italy, Luxembourg and the Netherlands. The final panel presents the Modified Diebold-Mariano statistics for pairwise comparison of alternative models. As in the earlier analysis, there is no clear pattern. Some models outperform others in certain countries but there

is no specific pattern that may help researchers or policy makers to identify the 'best' model specification. Tests for the aggregate variable yield similar results.

3.4.2 h-step ahead forecasts

We next turn our attention to the accuracy of inflation forecasts at longer horizons, namely 3-, 6- and 12-months. Results are presented in Tables 6-8 and are discussed below with particular attention to the differences vis-à-vis the 1-month forecasts.

[INSERT TABLES 6A-8C HERE]

As expected, our benchmark forecasts become less precise as we increase the time horizon. Generally the same pattern of accuracy is observed across time periods, with relatively small errors in France and Italy compared to those for Estonia and Slovakia. In contrast to the unambiguous result for output growth that GDP-weighted pooled forecasts of the aggregate delivered smaller MSFEs than forecasting the aggregate directly, this does not consistently hold for inflation forecasts. The only case where the pooled forecasts regularly outperform the forecasts based on the aggregated series for all forecast horizons is for the EU25. For the EU12 and EU15, results depend on the forecast horizon. Specifically, at the 3- and 12-month horizons, the aggregate forecast records smaller errors than the pooled forecast. However, in most cases the difference in MSFE between the two methods is small.

Instances of improved forecast accuracy, as measured by reduction in the MSFE, are uncommon and decline with time. However, there are some notable exceptions. The most striking is the dollar exchange rate at the 3-month horizon. Here it delivers a lower MSFE in 68% of the countries under consideration. It performs best in the EU12, with 9 of 12 countries having a ratio less than unity. Even in the accession countries, the majority (6 of 10) experience improved prediction. As in the case of output growth, the US equivalent proves useful only at the 1-month horizon. Its additional value fades and has almost completely disappeared at the 12-month horizon. However, some variables have predictive content for certain countries and are robust across all time horizons beyond one month. The most prevalent of these is the exchange rate. This variable adds statistically significant forecast accuracy (as opposed to the benchmark) in Finland, Ireland, Denmark, Estonia and Poland. Money supply delivers similarly consistent gains in Cyprus and Luxembourg, while output growth generates more precise predictions in Poland. The unrestricted model outperforms the AR specification in Luxembourg, Denmark, Latvia and Slovenia.

For aggregate inflation forecasts, there is no single variable that consistently delivers error reduction vis-à-vis the benchmark, though the unrestricted model improves accuracy for the EU25 aggregate. At 3- and 6-month horizons, the exchange rate has predictive value but this disappears at the longest horizon. For the pooled forecasts, only two models manage to outperform the simple AR. First, for h = 6 and 12, the weighted average of models including the money supply produce MSFEs that are statistically lower than those of the AR. Second, the same result holds at the 3-month horizon for models that include the exchange rate. Finally, the general model consistently fails to outperform the restricted ones.

3.4 Overview and in-sample results

A number of important points emerge from our analysis. For forecasters of the aggregate variables, pooling forecasts of the individual countries models generally delivers better forecasts than directly forecasting from the aggregate. This is particularly true for output growth. Table 9 presents the MSFEs of both the AR and the best performing alternative model. Across all country groupings and all forecast horizons, pooled forecasts of economic activity are more precise than those generated directly from the aggregate variable. These differences are quite large, especially for the best models at the longer horizons. Given the wide range of output growth rates across countries, pooling is important in that it allows the 'correction' to the benchmark not facilitated by the direct forecast. The picture for inflation forecasts is not as clear but importantly, for the EU25 aggregate, pooled forecasts again outperform the aggregate at all time horizons. For the other country groupings, there is no clear pattern across time but at the shorter horizons the difference between the two forecasting methods is small.

At the country level, the forecasting performance of the predictor variables is poor. Most often the simple AR specification is not surpassed by more richly specified models. There are particular time horizons and countries when additional variables deliver statistically significant forecast improvements but these are rarely consistent over time or across countries. While most candidate variables receive some statistical support at some horizon, no definite pattern emerges which would allow the researcher to be confident that a given variable will improve forecast accuracy across a broad range of countries and over different forecast horizons. This is consistent with Banerjee and Marcellino (2006), who find that leading indicators change over time so real time forecasts may be unreliable. Of course, this may be simply due to the fact that the variables that we have identified from the extant literature are just not suitable. To examine this possibility, we analyse their in-sample performance using likelihood ratio tests. For output

growth, we note two features. Firstly, in-sample significance increases with the horizon e.g. US growth is only statistically significant in 28% of countries at the 1-month horizon but for the 12-month forecast, this proportion grows to 76%. Secondly, in-sample significant relationships are more common for the older EU countries than the new accession states, e.g. at the 6-month horizon, US growth is significant for 80% of the EU15 as opposed to 30% for the new members.[14] In general, in-sample predictability does not imply out-of-sample forecast accuracy. Similar to previous studies, variables that perform well within sample, often fail to repeat this success out of sample. This is indicative of instability in the forecasting relationships which has been documented by Stock and Watson (2003) and is likely to be present in the new enlarged EU as macroeconomic policies become streamlined across countries and economic and financial institutions change in many member states – radically in some cases.

4. Policy Implications

Our analysis has a number of policy implications. At the country level, simple models appear to do well. Our benchmark model is as good as its competitors in the vast majority of cases. Forecasters should be wary of over-parameterising forecasting equations because there is little evidence to suggest that in-sample predictability carries over to the out-of-sample period. This is consistent with Stock and Watson (2003). In our analysis, forward-looking financial variables enjoy limited success at horizons beyond one month, e.g. stock market return and exchange rates, but one should be cautious about the stability of the relationship.

From a European Union perspective, a more interesting question may be how to forecast aggregate variables across the new enlarged group. Here our results provide an interesting insight. For output growth, our results are clear. As in Marcellino *et al*. (2003), for their sample of the original Euro members, we find that pooling forecasts from individual country models is more accurate than directly forecasting the aggregate. The flexibility offered by this approach appears to deliver more accurate predictions. Moreover, the larger the group, the bigger the gains in forecast error reduction. This is likely to be important with the accession of the new, highly-diverse, states. We have already noted that these country variables are most difficult to predict, so therefore this result offers hope to the researcher that individual errors can be reduced. Furthermore when combining forecasts, one should use a GDP weighted-average to reflect the contribution of each member to the variable under consideration. Given that

[14] For brevity, we do not report all of these results in the paper but they are available from the authors upon request.

forecasts for larger countries tend to be more precise, this contributes to the relative accuracy of the aggregate. Directly forecasting from the aggregate appears to unduly constrain the estimated parameters across countries, resulting in a poorer out-of-sample prediction.

However, in the case of inflation, the analysis is more ambiguous. For the EU12 and EU15 variables, pooled forecasts are more accurate at the 1- and 6-month horizons but less accurate at 3- and 12-months. However, differences between the two methods are smaller than for output growth. As expected inflation rates have less diversity, given that a criterion for becoming a member of the Euro area was that inflation rates could not vary by more than 2% of the lowest inflation country. Therefore with less diversity in inflation rates, the gains in accuracy of one forecast method above another are likely to be small. However for the EU25 country grouping, pooled forecasts are consistently more precise than those generated by the aggregate. Given the enlargement process now in place, this is a strong result for forecasters in the ECB charged with the development of appropriate economic policy across this diverse set of countries. Taking both forecast variables together for the enlarged group, our results support the use of pooling country-specific forecasts to predict the aggregate variable.

5. Conclusions

We compare forecasting models of economic growth and inflation in the context of an enlarged European Union which now seeks to formulate economic policy to accommodate 25 countries. These countries differ greatly in terms of economic and financial development and this diversity makes the forecaster's problem even more difficult. We focus on single linear equations which have been shown to perform relatively well in times of economic change. Specifically we focus on a range of nested models using a simple AR as our benchmark. We augment this with a number of financial variables and test if they add predictive content over and above that contained in the benchmark.

Our main findings can be summarised in two parts. Firstly, at the country level, none of the financial variables systematically outperform the benchmark. Admittedly, most variables manage to improve forecast precision for some country and at some horizon but it is not possible to identify patterns that would allow a forecaster to be confident that a particular variable adds predictive value across countries. Furthermore, their performance is not robust to the forecast horizon. An important feature of our study is that we apply statistical tests to the evaluation of forecast accuracy and find that even when models deliver a lower MSFE, this is

often not statistically significant. Furthermore, there is little statistical evidence that the general model should be preferred to its more restricted alternatives.

Secondly, at the aggregate level, our results are more promising. For output growth, using pooled forecasts from individual country models deliver lower MSFEs than those generated directly from the aggregated variable. This is always true as long as the pooled forecasts are a GDP-weighted average. This is likely to be a result of allowing the estimated parameters in the former approach to differ across countries whereas the latter unnecessarily restricts coefficients. This is important for ECB forecasters to bear in mind when constructing forecasts. For inflation, a similar conclusion is reached when dealing with the EU25 country grouping – again an average of country forecasts weighted by GDP shares consistently outperforms forecasts of the aggregated variable for both the benchmark and best performing models. For the EU12 and EU15 variable forecasts, our findings are less definite. Both approaches to forecasting the aggregate variable have horizons where they outperform the other. However, at shorter horizons, the differences are small. In general, our results prescribe that forecasts should be formed by constructing GDP weighted averages of country forecasts, especially for the most diverse EU25 group.

Furthermore, our chosen financial variables also deliver more consistent performance over differing forecast horizons. In particular, we find that adding stock market returns to the benchmark model improves the forecast accuracy of output growth for the EU12 and EU15 aggregates at all time horizons. Likewise for inflation, the economic growth variables always adds a statistically significant improvement to the precision of the forecast in the EU25.

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Data Appendix

Growth: Industrial Production Index
IFS: Austria, Cyprus, Czech Republic, Hungary, Belgium, Finland, Slovakia and Slovenia. *Ecowin*: Latvia. *Datastream:* Lithuania. *Eurostat:* The remaining. *Fred Database*: US. Malta growth was proxied by interpolated GDP growth (source: *IFS*).

Inflation: Harmonised Consumer Price Index
IFS: The majority of countries with the exception of Cyprus, Portugal (*Datastream*), Ireland (*Ecowin*) and US (*FRED Database).*

Exchange rates: vis-à-vis the US dollar
Source: *IFS* (Lithuania was not included due to a fixed exchange rate regime).

Monetary aggregates
Eurostat (M3 money supply): Austria, Belgium, Finland, France, Germany, Greece, Ireland,Luxembourg, Malta, Netherlands, Portugal, Spain; *Central bank (M2 money supply):* Cyprus, Czech Republic, Hungary, Lithuania, Poland, Slovakia, Slovenia; *Ecowin (M2 money supply):*Estonia, Latvia; *Ecowin (M3 money supply):* Denmark, Italy, Sweden, UK

Stock market: Aggregate stock market index
Datastream: The majority of countries (series TOTMKxx) with the exception of Estonia, Latvia, Lithuania, Malta, Slovakia and Slovenia (*Ecowin*).

Interest Rates: Short-term
Ecowin (3-month T-bill): Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Spain, Sweden, UK; *Ecowin (3-month deposit rate):* Estonia, Greece, Ireland, Latvia, Portugal; *Central bank(T-bill)*: Cyprus; *IFS (T-bill):* Czech Republic, Hungary, Malta; *IFS (Money-market rate):* Lithuania; *IFS (deposit rate):* Poland, Slovakia and Slovenia; *Ecowin (Government benchmark bond):* Luxembourg.

Notes to Tables 1A-8C

- Tables xA and xB (x=1 to 8) report the results for EU12 and the remaining 13 countries respectively, while Tables xC tabulate the results for euro area aggregates.

- Columns headed EU12, EU15, and EU25 refer to the forecasts generated by aggregate series, while columns headed Pooled(1)_EU and Pooled(2)_EU report the Euro area pooled forecasts generated by the GDP-weighted average approach and by the simple (equally-weighted) average approach, respectively.

- Min MSFE model refers to the forecasts generated by the pooling of the best performing model for each country at hand.

- OOS-F test statistic denotes the McCracken statistic for testing the performance of nested models given by equation (2) in text. This test is performed for each of the models (2) to (6) versus the simple AR model (1) and for models (2) to (5) versus the full model (6). The ratio of out-of-sample over the in-sample observations, i.e. *P/R,* is 0.36. Given that McCracken (2004) does not tabulate critical values for this, we base our inference on the critical values for *P/R* equal to 0.4.

- Diebold- Mariano denotes the DM-modified test statistic given by (3) in text for testing the performance of non-nested models. All combinations of non-nested models are tested against each other. The out of sample observations (*P*) is equal to 36.

- Bold typesetting denotes significance at a minimum 10% level.

Table 1A. Growth/Out of sample forecasts: 1-month forecast horizon

Out of sample MSFE	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(1) AR	1.051	2.376	5.844	1.180	0.719	3.041	33.872	0.629	5.687	2.367	6.153	0.719
MSFE relative to AR												
(2) AR+stock market	0.983	1.004	1.007	0.961	1.040	1.075	1.011	0.988	0.996	1.005	0.984	0.942
(3) AR+interest rate	1.061	0.998	0.970	1.000	0.954	0.992	1.002	1.011	1.044	1.004	0.993	1.027
(4) AR+money supply	0.953	0.996	1.001	0.991	1.040	1.012	0.998	1.000	1.001	1.030	0.971	0.920
(5) AR+US growth	0.942	0.942	0.935	0.888	1.034	0.999	1.009	0.983	0.894	0.899	0.981	0.830
(6) AR+all	0.995	0.939	0.933	0.851	1.020	1.093	1.022	0.980	0.976	0.937	0.925	0.836
OOS-F test statistic vs (1)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+stock market	0.631	-0.154	-0.254	**1.461**	-1.391	-2.520	-0.399	0.427	0.129	-0.197	0.580	**2.226**
(3) AR+interest rate	-2.077	0.059	**1.096**	-0.007	**1.729**	0.275	-0.083	-0.402	-1.513	-0.134	0.243	-0.955
(4) AR+money supply	**1.762**	0.150	-0.044	0.335	-1.392	-0.431	0.073	0.017	-0.029	-1.047	**1.071**	**3.109**
(5) AR+US growth	**2.237**	**2.236**	**2.503**	**4.535**	-1.169	0.052	-0.304	0.626	**4.249**	**4.034**	0.684	**7.390**
(6) AR+all	0.192	**2.324**	**2.580**	**6.288**	-0.691	-3.063	-0.789	0.723	0.896	**2.420**	**2.929**	**7.060**
OOS-F test statistic vs (6)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+stock market	-0.431	**2.488**	**2.854**	**4.639**	0.728	-0.584	-0.394	0.293	0.764	**2.631**	**2.313**	**4.553**
(3) AR+interest rate	**2.407**	**2.261**	**1.440**	**6.296**	-2.309	-3.312	-0.707	1.137	**2.514**	**2.564**	**2.669**	**8.234**
(4) AR+money supply	-1.497	**2.165**	**2.627**	**5.898**	0.729	-2.664	-0.860	0.706	0.925	**3.571**	**1.805**	**3.637**
(5) AR+US growth	-1.925	0.083	0.072	**1.556**	0.494	-3.110	-0.489	0.095	-3.000	-1.452	**2.203**	-0.273
Diebold-Mariano	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) vs (3)	-1.608	0.337	**2.393**	-0.537	**2.060**	**2.435**	1.259	-0.372	-0.661	0.185	-0.652	**-2.339**
(2) vs (4)	0.281	0.624	0.635	-0.393	-0.001	1.665	1.657	-0.211	-0.081	-1.378	0.865	0.360
(2) vs (5)	0.257	0.762	0.886	0.614	0.081	**2.209**	0.087	0.061	**1.737**	1.286	0.088	0.888
(3) vs (4)	0.843	0.405	**-2.426**	1.277	**-1.959**	**-3.633**	**2.908**	0.428	**2.418**	**-1.880**	0.949	**2.254**
(3) vs (5)	0.665	0.854	0.437	1.239	-1.180	-0.877	-0.233	0.416	**2.524**	1.182	0.364	1.515
(4) vs (5)	0.110	0.768	0.762	1.144	0.077	1.207	-0.407	0.247	**1.870**	1.387	-0.291	0.679

Table 1B. Growth/Out of sample forecasts: 1-month forecast horizon

Out of sample MSFE	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(1) AR	5.699	1.150	0.418	5.195	4.386	5.263	2.637	15.521	21.239	0.089	2.995	4.092	1.736
MSFE relative to AR													
(2) AR+stock market	1.061	0.979	0.994	0.989	0.973	0.986	1.058	1.037	1.115	1.724	0.981	1.012	1.017
(3) AR+interest rate	1.063	0.999	1.046	1.040	0.999	0.994	0.954	0.988	1.001	1.002	1.002	1.003	1.002
(4) AR+money supply	0.975	0.930	1.002	1.060	1.016	0.988	1.014	0.990	1.012	0.985	1.045	0.895	0.987
(5) AR+US growth	1.014	0.966	0.870	1.036	0.997	0.999	1.020	1.010	1.010	1.089	1.043	0.962	0.992
(6) AR+all	1.086	0.911	0.933	1.189	0.985	0.973	0.998	1.075	1.193	1.815	1.107	0.930	1.004
OOS-F test statistic vs (1)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+stock market	-2.076	0.786	0.210	0.398	**0.982**	0.515	-1.972	-1.281	-3.723	-15.119	0.684	-0.434	-0.610
(3) AR+interest rate	-2.128	0.028	-1.573	-1.379	0.045	0.229	**1.736**	0.447	-0.042	-0.061	-0.074	-0.090	-0.073
(4) AR+money supply	**0.938**	**2.697**	-0.069	-2.048	-0.582	0.429	-0.483	0.376	-0.440	0.535	-1.540	**4.220**	0.479
(5) AR+US growth	-0.494	**1.267**	**5.360**	-1.256	0.100	0.036	-0.705	-0.344	-0.352	-2.936	-1.492	**1.405**	0.284
(6) AR+all	-2.856	**3.520**	**2.578**	-5.727	0.543	1.002	0.074	-2.518	-5.830	-16.168	-3.474	**2.722**	-0.127
OOS-F test statistic vs (6)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+stock market	-0.827	**2.676**	**2.354**	-6.058	-0.427	0.480	**2.165**	-1.283	-2.351	-1.807	-4.080	**3.194**	0.491
(3) AR+interest rate	-0.774	**3.489**	**4.341**	-4.521	0.497	0.768	-1.585	-2.928	-5.795	-16.134	-3.406	**2.819**	-0.054
(4) AR+money supply	-3.698	0.765	**2.652**	-3.901	**1.144**	0.567	0.564	-2.864	-5.457	-16.458	-2.020	-1.341	-0.597
(5) AR+US growth	-2.395	**2.176**	-2.421	-4.632	0.442	0.965	0.795	-2.194	-5.532	-14.407	-2.068	**1.267**	-0.408
Diebold-Mariano	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) vs (3)	-0.031	-0.740	-0.882	-1.508	-1.040	-0.130	**3.166**	1.378	0.930	**2.031**	-1.124	**2.346**	0.652
(2) vs (4)	1.585	0.798	-0.368	-1.467	**-1.734**	-0.023	1.641	0.738	0.788	**2.122**	**-3.216**	**1.996**	0.867
(2) vs (5)	1.019	0.439	**1.925**	-1.652	-0.775	-0.222	**1.813**	0.645	0.839	1.516	-1.510	**2.772**	0.465
(3) vs (4)	1.301	1.334	0.748	-0.327	-0.822	0.101	**-1.695**	-0.061	-0.643	1.126	**-2.015**	**1.781**	0.379
(3) vs (5)	0.981	1.525	**2.695**	0.116	0.125	-0.176	**-2.864**	-0.478	-0.554	-0.751	-1.077	**2.072**	0.168
(4) vs (5)	-0.730	-0.953	**2.127**	0.454	0.703	-0.170	-0.205	-0.327	0.129	-0.863	0.031	-1.032	-0.067

Table 1C. Growth/Out of sample forecasts: 1-month forecast horizon

Out of sample MSFE	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(1) AR	0.411	0.335	0.346	0.373	0.306	0.332	0.445	0.346	0.501
Min MSFE model				0.303	0.245	0.283	0.336	0.263	0.440
MSFE relative to AR									
(2) AR+stock market	0.919	0.933	0.991	0.963	0.972	0.945	0.994	1.000	0.961
(3) AR+interest rate	1.037	1.036	1.045	0.995	1.003	1.007	1.000	1.023	1.013
(4) AR+money supply	0.847	0.818	0.877	0.993	0.989	0.984	0.983	0.976	0.982
(5) AR+US growth	0.850	0.835	0.880	0.837	0.809	0.875	0.920	0.893	1.008
(6) AR+all	0.791	0.772	0.833	0.822	0.816	0.850	0.899	0.899	1.000
OOS-F test statistic vs (1)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+stock market	**3.154**	**2.566**	0.312	**1.395**	**1.039**	**2.110**	0.230	-0.004	**1.450**
(3) AR+interest rate	-1.286	-1.257	-1.555	0.190	-0.115	-0.261	-0.009	-0.821	-0.459
(4) AR+money supply	**6.526**	**8.019**	**5.042**	0.271	0.408	0.601	0.621	0.893	0.660
(5) AR+US growth	**6.370**	**7.094**	**4.888**	**7.017**	**8.490**	**5.133**	**3.139**	**4.296**	-0.270
(6) AR+all	**9.532**	**10.658**	**7.206**	**7.774**	**8.123**	**6.372**	**4.049**	**4.040**	-0.001
OOS-F test statistic vs (6)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+stock market	**5.864**	**7.554**	**6.835**	**6.141**	**6.885**	**4.026**	**3.795**	**4.044**	-1.395
(3) AR+interest rate	**11.218**	**12.346**	**9.157**	**7.544**	**8.264**	**6.682**	**4.059**	**4.975**	0.464
(4) AR+money supply	**2.545**	**2.158**	**1.899**	**7.447**	**7.628**	**5.676**	**3.370**	**3.071**	-0.648
(5) AR+US growth	**2.686**	**2.977**	**2.041**	0.633	-0.297	1.084	0.837	-0.229	0.271
Diebold-Mariano	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) vs (3)	-0.896	-0.789	-0.345	-0.817	-0.791	-1.407	-0.142	-0.447	-0.929
(2) vs (4)	0.644	1.142	0.929	-0.754	-0.481	-1.220	0.480	0.717	-0.533
(2) vs (5)	0.530	0.745	0.787	1.057	1.238	0.680	0.576	0.720	-0.442
(3) vs (4)	1.532	**2.086**	**2.271**	0.080	0.572	0.863	0.467	1.110	0.901
(3) vs (5)	**1.696**	**1.952**	**1.934**	1.377	1.607	1.417	0.631	1.014	0.056
(4) vs (5)	-0.028	-0.196	-0.044	1.255	1.371	1.015	0.502	0.613	-0.231

Table 2A. Growth/Out of sample forecasts: 3-month forecast horizon

Out of sample MSFE	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(1) AR	2.039	4.583	9.216	1.484	1.242	3.964	28.988	1.310	6.179	4.443	5.800	0.857
MSFE relative to AR												
(2) AR+stock market	0.996	1.008	0.990	0.891	0.862	1.011	1.009	1.034	1.016	0.980	1.005	0.915
(3) AR+interest rate	0.947	0.964	0.985	0.999	0.875	1.063	0.996	0.992	1.011	0.997	0.979	1.002
(4) AR+money supply	0.971	0.995	1.000	0.901	1.012	1.037	0.983	1.000	0.982	1.003	1.006	0.931
(5) AR+US growth	0.987	1.053	0.990	0.932	1.020	1.167	1.020	1.111	1.024	0.999	1.010	1.237
(6) AR+all	0.936	1.035	0.975	0.805	0.824	1.255	1.016	1.111	1.053	1.000	0.982	1.079
OOS-F test statistic vs (1)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+stock market	0.147	-0.269	0.372	**4.395**	**5.755**	-0.403	-0.315	-1.184	-0.557	0.725	-0.195	**3.340**
(3) AR+interest rate	**2.004**	**1.333**	0.540	0.043	**5.151**	-2.143	0.131	0.290	-0.381	0.116	0.783	-0.081
(4) AR+money supply	**1.075**	0.183	-0.014	**3.958**	-0.417	-1.288	0.610	0.001	0.662	-0.105	-0.223	**2.663**
(5) AR+US growth	0.470	-1.807	0.364	**2.624**	-0.723	-5.143	-0.715	-3.589	-0.842	0.020	-0.352	-6.904
(6) AR+all	**2.450**	-1.210	0.933	**8.735**	**7.674**	-7.319	-0.563	-3.592	-1.815	-0.013	0.659	-2.626
OOS-F test statistic vs (6)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+stock market	**2.293**	-0.948	0.555	**3.868**	**1.654**	-6.994	-0.250	-2.490	-1.278	-0.724	0.858	-5.460
(3) AR+interest rate	0.423	-2.452	0.388	**8.682**	**2.207**	-5.504	-0.691	-3.851	-1.449	-0.129	-0.122	-2.551
(4) AR+money supply	**1.335**	-1.386	0.948	**4.304**	**8.186**	-6.255	-1.153	-3.593	-2.432	0.091	0.887	-4.925
(5) AR+US growth	**1.954**	0.628	0.563	**5.696**	**8.569**	-2.539	0.155	-0.004	-0.996	-0.033	1.020	**5.292**
Diebold-Mariano	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) vs (3)	0.627	1.117	0.165	-0.832	-0.076	**-1.705**	0.813	0.519	0.098	-0.203	**2.024**	-1.432
(2) vs (4)	0.499	0.936	-0.375	-0.077	-0.919	-1.171	1.443	0.567	0.746	-0.269	-0.022	-0.221
(2) vs (5)	0.128	-0.963	-0.004	-0.355	-0.796	-1.088	-0.62	-0.583	-0.107	-0.289	-0.613	-1.333
(3) vs (4)	-0.354	-1.077	-0.492	0.835	**-2.114**	**1.772**	**2.153**	-0.175	0.838	-1.429	-0.837	1.065
(3) vs (5)	-0.687	-1.278	-0.067	0.960	-0.999	-0.750	-1.492	**-1.837**	-0.217	-0.086	**-1.809**	-1.012
(4) vs (5)	-0.292	-1.140	0.142	-0.273	-0.055	-0.900	**-1.790**	-1.254	-0.650	0.104	-0.093	-1.556

Table 2B. Growth/Out of sample forecasts: 3-month forecast horizon

Out of sample MSFE	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(1) AR	4.655	1.126	0.789	5.712	7.599	5.672	4.070	20.653	28.059	1.313	7.143	3.804	3.466
MSFE relative to AR													
(2) AR+stock market	1.245	1.111	0.962	1.091	0.950	0.939	0.997	0.999	1.026	1.550	0.996	1.027	0.998
(3) AR+interest rate	0.998	0.998	1.035	1.542	0.999	0.993	1.002	0.952	0.989	0.998	1.001	0.986	0.960
(4) AR+money supply	1.012	1.013	1.010	0.984	1.004	1.042	0.997	1.005	1.002	0.986	1.088	0.960	0.957
(5) AR+US growth	1.031	1.047	1.145	1.001	1.006	1.158	1.212	1.002	1.026	1.217	1.072	1.032	1.088
(6) AR+all	1.290	1.134	1.107	1.774	0.941	0.940	1.147	0.988	1.013	1.620	1.124	1.036	1.020
OOS-F test statistic vs (1)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+stock market	-7.076	-3.585	**1.411**	-3.003	**1.881**	**2.335**	0.091	0.041	-0.903	-12.768	0.142	-0.947	0.059
(3) AR+interest rate	0.070	0.059	-1.205	-12.649	0.019	0.259	-0.059	**1.835**	0.392	0.088	-0.046	0.526	**1.504**
(4) AR+money supply	-0.418	-0.479	-0.358	0.575	-0.147	-1.441	0.091	-0.188	-0.075	0.507	-2.926	**1.497**	**1.630**
(5) AR+US growth	-1.084	-1.629	-4.571	-0.042	-0.200	-4.921	-6.303	-0.081	-0.918	-6.409	-2.416	-1.129	-2.897
(6) AR+all	-8.103	-4.267	-3.489	-15.706	**2.271**	**2.313**	-4.604	0.423	-0.467	-13.773	-3.978	-1.246	-0.706
OOS-F test statistic vs (6)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+stock market	-1.278	-0.757	-4.715	-13.859	0.370	-0.020	-4.682	0.381	0.447	-1.558	-4.104	-0.307	-0.765
(3) AR+interest rate	-8.157	-4.319	-2.363	-4.713	**2.250**	**2.040**	-4.552	-1.343	-0.851	-13.827	-3.937	-1.746	-2.122
(4) AR+money supply	-7.775	-3.840	-3.162	-16.025	**2.428**	**3.911**	-4.683	0.614	-0.393	-14.082	-1.144	-2.633	-2.235
(5) AR+US growth	-7.236	-2.764	**1.239***	-15.682	**2.485**	**8.379**	**2.060**	0.505	0.462	-8.959	-1.674	-0.121	**2.382**
Diebold-Mariano	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) vs (3)	1.009	1.347	-0.782	-0.924	-1.395	-0.386	-0.095	0.91	0.421	1.310	-0.266	**2.094**	0.827
(2) vs (4)	0.907	1.109	-0.55	**2.165**	-0.875	-0.789	0.000	-0.112	0.288	1.431	**-2.047**	1.358	0.532
(2) vs (5)	0.843	0.676	**-1.728**	**2.410**	-1.134	**-1.822**	**-1.931**	-0.064	-0.005	0.818	-1.126	-0.074	-0.736
(3) vs (4)	-0.667	-0.413	0.489	1.165	-0.116	**-1.717**	0.168	-1.621	-1.557	0.149	**-1.752**	0.399	0.067
(3) vs (5)	-0.957	-0.987	-1.318	1.125	-0.326	-1.497	**-2.034**	-1.023	**-2.008**	**-2.092**	-1.233	-0.696	-1.078
(4) vs (5)	-0.515	-0.791	-1.388	-0.555	-0.032	-1.200	**-1.992**	0.130	-1.125	-1.622	0.251	-0.743	-1.119

Table 2C. Growth/Out of sample forecasts: 3-month forecast horizon

Out of sample MSFE	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(1) AR	0.598	0.507	0.551	0.543	0.459	0.511	0.807	0.700	0.731
Min MSFE model				0.480	0.406	0.460	0.524	0.447	0.637
MSFE relative to AR									
(2) AR+stock market	0.803	0.805	0.774	0.849	0.844	0.829	0.954	0.975	0.966
(3) AR+interest rate	0.963	0.980	0.984	0.956	0.972	0.987	1.002	1.011	1.062
(4) AR+money supply	0.929	0.901	0.952	0.926	0.927	0.976	0.933	0.941	0.966
(5) AR+US growth	1.266	1.313	1.382	1.208	1.239	1.282	1.141	1.145	1.203
(6) AR+all	1.016	1.068	1.212	0.984	1.008	1.029	1.040	1.071	1.179
OOS-F test statistic vs (1)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+stock market	**8.812**	**8.743**	**10.524**	**6.426**	**6.651**	**7.445**	**1.744**	0.918	1.285
(3) AR+interest rate	**1.402**	0.735	0.570	**1.640**	1.033	0.477	-0.085	-0.376	-2.101
(4) AR+money supply	**2.739**	**3.935**	**1.833**	**2.873**	**2.838**	0.885	**2.597**	**2.258**	**1.264**
(5) AR+US growth	-7.571	-8.575	-9.947	-6.200	-6.941	-7.925	-4.437	-4.551	-6.065
(6) AR+all	-0.550	-2.278	-6.295	0.583	-0.275	-1.016	-1.390	-2.390	-5.470
OOS-F test statistic vs (6)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+stock market	-7.522	-8.868	-13.014	-4.958	-5.846	-7.011	-2.989	-3.226	-6.522
(3) AR+interest rate	-1.879	-2.953	-6.758	-1.011	-1.272	-1.474	-1.309	-2.035	-3.578
(4) AR+money supply	-3.056	-5.601	-7.734	-2.120	-2.886	-1.856	-3.719	-4.374	-6.505
(5) AR+US growth	**8.890**	**8.266**	**5.047**	**8.194**	**8.259**	**8.859**	**3.476**	**2.474**	0.716
Diebold-Mariano	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) vs (3)	-1.153	-1.32	-1.213	-1.069	-1.176	**-1.930**	-0.798	-0.427	-1.14
(2) vs (4)	-0.841	-0.559	-1.144	-0.836	-0.683	-1.504	0.434	0.388	-0.009
(2) vs (5)	**-2.359**	**-2.367**	**-2.359**	**-2.045**	**-2.110**	**-2.003**	-1.632	-1.506	-1.536
(3) vs (4)	0.275	0.799	0.201	0.369	0.671	0.171	1.559	1.671	1.365
(3) vs (5)	-1.628	**-1.816**	**-1.994**	-1.386	-1.569	-1.521	-1.239	-1.394	-1.26
(4) vs (5)	**-2.208**	**-2.618**	**-2.376**	**-2.023**	**-2.109**	**-1.697**	**-1.931**	**-1.902**	-1.655

Table 3A. Growth/Out of sample forecasts: 6-month forecast horizon

Out of sample MSFE	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(1) AR	3.212	6.307	18.515	1.700	2.537	5.165	42.010	2.059	7.251	4.680	7.037	1.219
MSFE relative to AR												
(2) AR+stock market	0.974	1.005	0.776	1.021	0.700	1.019	1.030	1.011	1.002	0.985	0.996	1.006
(3) AR+interest rate	0.865	0.985	0.979	0.978	0.938	1.024	1.025	1.017	0.992	0.998	0.974	1.060
(4) AR+money supply	0.943	1.002	0.998	0.832	1.004	1.047	0.970	0.839	0.977	1.007	1.015	1.072
(5) AR+US growth	0.852	1.033	1.065	1.116	1.127	1.053	1.027	1.189	0.888	1.006	1.014	1.287
(6) AR+all	0.815	1.037	0.844	0.954	0.912	1.143	1.024	1.042	0.901	1.003	1.002	1.115
OOS-F test statistic vs (1)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+stock market	**0.947**	-0.185	**10.381**	-0.748	**15.407**	-0.658	-1.040	-0.375	-0.057	0.545	0.141	-0.227
(3) AR+interest rate	**5.642**	0.549	0.768	0.798	**2.390**	-0.847	-0.873	-0.593	0.280	0.054	**0.960**	-2.039
(4) AR+money supply	**2.183**	-0.066	0.057	**7.291**	-0.142	-1.616	**1.100**	**6.896**	**0.847**	-0.247	-0.516	-2.410
(5) AR+US growth	**6.246**	-1.141	-2.209	-3.747	-4.068	-1.818	-0.953	-5.734	**4.554**	-0.218	-0.483	-8.030
(6) AR+all	**8.171**	-1.275	**6.668**	**1.728**	**3.495**	-4.500	-0.827	-1.448	**3.975**	-0.100	-0.086	-3.718
OOS-F test statistic vs (6)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+stock market	**7.038**	-1.096	-2.883	**2.528**	-8.342	-3.914	0.220	-1.085	**4.038**	-0.635	-0.226	-3.514
(3) AR+interest rate	**2.187**	-1.797	**5.777**	0.909	1.036	-3.741	0.047	-0.869	**3.666**	-0.154	-1.019	-1.780
(4) AR+money supply	**5.646**	-1.212	**6.600**	-4.627	**3.651**	-3.019	-1.870	-7.003	**3.056**	0.148	0.436	-1.403
(5) AR+US growth	**1.640**	-0.139	**9.457**	**6.111**	**8.526**	-2.825	0.129	**5.097**	-0.515	0.119	0.402	**5.550**
Diebold-Mariano	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) vs (3)	0.739	1.108	**-1.876**	0.388	-1.207	-0.23	0.222	-0.063	0.2	-0.155	1.15	-0.183
(2) vs (4)	0.408	0.28	**-2.297**	0.542	**-2.172**	-1.062	**2.304**	**2.299**	0.936	-0.252	-1.533	-0.241
(2) vs (5)	0.399	-0.434	-1.551	-0.280	-1.204	-0.255	0.117	-0.983	1.272	-0.213	-1.466	-0.931
(3) vs (4)	-0.807	-0.714	-0.530	0.560	-0.524	-1.430	**2.694**	1.604	0.353	-1.222	**-1.738**	-0.056
(3) vs (5)	0.047	-0.616	-0.684	-0.544	-0.903	-0.229	-0.172	-1.360	0.932	-0.172	-1.659	-0.612
(4) vs (5)	0.314	-0.476	-0.493	-1.176	-0.425	-0.050	**-2.850**	**-1.833**	0.903	0.018	0.109	-0.701

Table 3B. Growth/Out of sample forecasts: 6-month forecast horizon

Out of sample MSFE	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(1) AR	4.732	1.538	1.118	8.010	12.362	8.208	4.884	20.858	26.145	4.855	14.919	5.894	5.111
MSFE relative to AR													
(2) AR+stock market	1.068	0.983	1.021	1.020	0.912	0.880	1.043	1.095	1.032	1.348	1.000	1.195	1.004
(3) AR+interest rate	0.989	1.003	1.003	1.015	0.998	1.485	1.069	0.959	0.987	1.021	1.003	0.995	0.947
(4) AR+money supply	0.991	1.008	0.992	1.006	1.023	1.065	1.013	1.000	1.032	0.953	1.152	0.957	0.909
(5) AR+US growth	1.006	1.070	1.363	1.000	1.016	1.037	1.395	1.018	1.030	1.212	1.093	1.058	1.028
(6) AR+all	1.082	0.992	1.267	1.099	0.945	1.365	1.296	1.182	0.978	1.503	1.236	1.217	0.889
OOS-F test statistic vs (1)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+stock market	-2.298	0.617	-0.724	-0.689	**3.495**	**4.920**	-1.499	-3.121	-1.111	-9.294	0.004	-5.864	-0.160
(3) AR+interest rate	0.404	-0.090	-0.102	-0.516	0.065	-11.761	-2.315	**1.551**	0.488	-0.724	-0.090	0.177	**2.020**
(4) AR+money supply	0.319	-0.287	0.276	-0.214	-0.826	-2.184	-0.462	-0.016	-1.124	**1.769**	-4.759	**1.619**	**3.596**
(5) AR+US growth	-0.220	-2.351	-9.597	-0.011	-0.558	-1.289	-10.191	-0.644	-1.047	-6.308	-3.056	-1.965	-0.974
(6) AR+all	-2.724	0.306	-7.583	-3.238	**2.093**	-9.636	-8.212	-5.553	0.817	-12.044	-6.878	-6.424	**4.479**
OOS-F test statistic vs (6)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+stock market	-0.455	-0.306	-7.000	-2.599	-1.277	-12.806	-7.004	-2.663	**1.989**	-3.708	-6.881	-0.669	**4.660**
(3) AR+interest rate	-3.093	0.398	-7.503	-2.762	**2.025**	**3.157**	-6.302	-6.811	0.324	-11.553	-6.805	-6.568	**2.328**
(4) AR+money supply	-3.016	0.599	-7.800	-3.042	**2.988**	-7.933	-7.850	-5.540	**2.003**	-13.166	-2.441	-7.696	0.803
(5) AR+US growth	-2.520	**2.843**	**2.746**	-3.229	**2.693**	-8.657	**2.761**	-4.999	**1.919**	-6.955	-4.177	-4.716	**5.605**
Diebold-Mariano	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) vs (3)	0.441	-0.135	0.352	0.056	**-2.106**	-1.421	-0.247	0.772	0.704	1.274	-0.064	1.231	1.238
(2) vs (4)	0.474	-0.168	0.374	0.148	**-2.604**	-1.254	0.258	0.529	-0.008	1.628	**-1.715**	1.549	**2.068**
(2) vs (5)	0.358	-0.606	-1.152	0.23	-1.082	-1.034	-1.454	0.52	0.035	0.592	-0.984	0.923	-0.537
(3) vs (4)	-0.092	-0.767	0.185	0.09	**-2.031**	0.995	1.188	-1.515	-0.734	1.055	**-1.955**	0.851	0.641
(3) vs (5)	-0.710	-0.431	-1.292	0.157	-0.277	1.028	-1.216	-1.000	-1.375	**-2.258**	-1.089	-1.019	-1.293
(4) vs (5)	-0.457	-0.380	-1.260	0.302	0.125	0.495	-1.399	-0.507	0.053	**-2.247**	0.568	-1.274	-1.615

Table 3C. Growth/Out of sample forecasts: 6-month forecast horizon

Out of sample MSFE	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(1) AR	1.182	0.936	1.138	0.998	0.806	1.011	1.756	1.528	1.367
Min MSFE model				0.792	0.657	0.897	0.916	0.750	1.121
MSFE relative to AR									
(2) AR+stock market	0.771	0.783	0.958	0.872	0.888	0.895	0.945	0.975	1.039
(3) AR+interest rate	0.977	0.986	1.133	0.907	0.905	0.938	0.951	0.955	0.939
(4) AR+money supply	0.990	0.988	1.024	0.930	0.925	1.014	0.907	0.914	0.931
(5) AR+US growth	1.205	1.301	1.397	1.225	1.301	1.387	1.087	1.096	1.198
(6) AR+all	1.035	1.146	1.418	0.935	0.972	1.137	0.935	0.955	1.046
OOS-F test statistic vs (1)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+stock market	**10.680**	**9.957**	**1.562**	**5.278**	**4.533**	**4.234**	**2.099**	0.906	-1.357
(3) AR+interest rate	**0.863**	0.497	-4.214	**3.695**	**3.772**	**2.366**	**1.845**	**1.712**	**2.349**
(4) AR+money supply	0.354	0.424	-0.828	**2.716**	**2.919**	-0.514	**3.699**	**3.374**	**2.677**
(5) AR+US growth	-6.123	-8.326	-10.233	-6.614	-8.337	-10.053	-2.873	-3.167	-5.944
(6) AR+all	-1.225	-4.573	-10.620	**2.507**	**1.055**	-4.329	**2.503**	**1.714**	-1.576
OOS-F test statistic vs (6)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+stock market	-9.182	-11.382	-11.675	-2.416	-3.089	-7.662	0.381	0.788	-0.227
(3) AR+interest rate	-2.040	-5.001	-7.255	-1.077	-2.459	-6.283	0.625	0.002	-3.684
(4) AR+money supply	-1.564	-4.939	-10.022	-0.194	-1.724	-3.871	-1.085	-1.518	-3.958
(5) AR+US growth	**5.902**	**4.883**	-0.540	**11.174**	**12.223**	**7.942**	**5.842**	**5.352**	**5.232**
Diebold-Mariano	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) vs (3)	-1.100	-1.087	-0.600	-0.213	-0.103	-0.358	-0.062	0.194	1.061
(2) vs (4)	-1.235	-1.014	-0.344	-0.315	-0.213	-0.718	0.543	0.784	1.030
(2) vs (5)	-1.348	-1.406	-1.299	-0.936	-0.959	-1.316	-0.718	-0.576	-0.738
(3) vs (4)	-0.151	-0.020	0.417	-0.237	-0.232	-0.845	0.806	0.800	0.194
(3) vs (5)	-1.137	-1.336	-0.746	-1.263	-1.296	-1.518	-1.033	-1.034	-1.388
(4) vs (5)	-1.042	-1.405	-1.573	-1.022	-1.117	-1.201	-1.026	-1.006	-1.521

Table 4A. Growth/Out of sample forecasts: 12-month forecast horizon

Out of sample MSFE	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(1) AR	6.014	7.083	27.311	4.241	4.415	9.135	101.136	3.307	7.380	8.306	12.894	1.964
MSFE relative to AR												
(2) AR+stock market	0.969	1.046	0.781	0.845	0.715	1.323	1.011	0.971	1.013	0.964	1.026	1.059
(3) AR+interest rate	0.990	1.003	1.002	1.008	1.003	1.033	1.001	1.583	1.020	1.001	1.007	1.327
(4) AR+money supply	0.934	1.016	1.002	0.797	1.003	0.389	0.733	1.002	0.929	1.002	1.005	1.016
(5) AR+US growth	1.329	1.115	1.116	1.512	1.293	1.321	1.132	1.476	1.140	1.001	0.754	1.745
(6) AR+all	1.412	1.176	0.919	1.153	1.063	0.847	0.894	1.606	1.191	0.975	0.797	1.233
OOS-F test statistic vs (1)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+stock market	**1.159**	-1.571	**10.078**	**6.610**	**14.347**	-8.788	-0.391	**1.081**	-0.453	**1.327**	-0.919	-1.999
(3) AR+interest rate	0.375	-0.112	-0.079	-0.282	-0.120	-1.141	-0.044	-13.256	-0.710	-0.041	-0.240	-8.877
(4) AR+money supply	**2.528**	-0.553	-0.089	**9.191**	-0.100	**56.610**	**13.085**	-0.059	**2.747**	-0.076	-0.170	-0.551
(5) AR+US growth	-8.909	-3.699	-3.748	-12.189	-8.166	-8.747	-4.208	-11.603	-4.431	-0.047	**11.716**	-15.368
(6) AR+all	-10.497	-5.383	**3.177**	-4.789	-2.122	**6.512**	**4.257**	-13.583	-5.770	0.919	**9.141**	-6.809
OOS-F test statistic vs (6)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+stock market	-11.293	-3.986	-5.391	-9.631	-11.776	**20.241**	**4.700**	-14.236	-5.385	-0.393	**10.324**	-5.093
(3) AR+interest rate	-10.760	-5.287	**3.264**	-4.543	-2.008	**7.904**	**4.307**	-0.517	-5.162	0.962	**9.444**	**2.744**
(4) AR+money supply	-12.170	-4.905	**3.274**	-11.137	-2.027	-19.474	-6.474	-13.546	-7.914	0.997	**9.356**	-6.356
(5) AR+US growth	-2.110	-1.877	**7.729**	**11.188**	**7.817**	**20.157**	**9.586**	-2.921	-1.527	0.967	-1.943	**14.934**
Diebold-Mariano	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) vs (3)	-0.251	1.038	-0.775	-0.798	-1.087	0.879	0.731	-1.129	-0.078	-0.914	0.491	-0.420
(2) vs (4)	0.432	0.862	-0.789	0.141	-1.096	**2.141**	**3.061**	-0.409	1.261	-1.091	0.487	0.167
(2) vs (5)	-0.692	-0.353	-0.872	-1.298	-1.218	0.006	-0.845	**-1.706**	-0.785	-1.143	1.493	-1.216
(3) vs (4)	0.744	-0.774	-0.03	0.612	0.01	**2.205**	**3.141**	1.183	0.932	-0.062	0.061	0.51
(3) vs (5)	-0.721	-0.653	-0.742	-1.327	-0.755	-0.98	-0.946	0.199	-0.776	-0.005	1.397	-0.516
(4) vs (5)	-0.748	-0.555	-0.707	-1.396	-0.666	**-2.307**	**-1.890**	-1.617	-1.215	0.047	1.439	-1.662

Table 4B. Growth/Out of sample forecasts: 12-month forecast horizon

Out of sample MSFE	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(1) AR	8.161	1.906	2.815	16.385	25.916	9.103	8.844	22.307	28.452	18.046	29.245	7.134	8.568
MSFE relative to AR													
(2) AR+stock market	1.031	1.270	1.030	1.005	0.929	1.024	1.043	1.506	1.235	1.206	1.030	1.085	0.993
(3) AR+interest rate	1.021	1.016	0.955	0.983	0.996	2.093	0.712	0.978	1.011	1.026	0.995	1.009	1.003
(4) AR+money supply	1.049	1.040	1.004	1.008	0.984	1.349	1.007	1.010	0.996	0.824	1.282	1.024	0.873
(5) AR+US growth	1.039	1.927	1.360	1.034	1.011	1.000	2.051	1.064	0.831	1.040	1.133	0.995	1.051
(6) AR+all	1.184	1.893	1.310	1.064	0.922	2.721	1.772	1.768	1.010	1.088	1.374	1.216	0.873
OOS-F test statistic vs (1)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+stock market	-1.098	-7.643	-1.047	-0.174	**2.757**	-0.837	-1.476	-12.095	-6.862	-6.143	-1.032	-2.820	0.241
(3) AR+interest rate	-0.740	-0.551	**1.677**	0.630	0.160	-18.801	**14.566**	0.800	-0.382	-0.900	0.171	-0.306	-0.094
(4) AR+money supply	-1.674	-1.383	-0.158	-0.276	0.593	-9.305	-0.248	-0.368	0.144	**7.692**	-7.916	-0.849	**5.246**
(5) AR+US growth	-1.344	-17.320	-9.523	-1.198	-0.377	0.001	-18.445	-2.165	**7.301**	-1.398	-4.213	0.170	-1.748
(6) AR+all	-5.591	-16.985	-8.522	-2.153	**3.029**	-22.769	-15.686	-15.641	-0.370	-2.923	-9.806	-6.407	**5.247**
OOS-F test statistic vs (6)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+stock market	-4.634	-11.860	-7.699	-1.988	0.253	-22.455	-14.817	-5.339	**8.021**	**3.883**	-9.033	-3.891	**4.973**
(3) AR+interest rate	-4.953	-16.689	-9.745	-2.734	**2.856**	-8.307	-21.537	-16.083	0.013	-2.074	-9.930	-6.153	**5.355**
(4) AR+money supply	-4.108	-16.225	-8.401	-1.891	**2.396**	-18.158	-15.545	-15.430	-0.511	-8.746	-2.423	-5.692	0.001
(5) AR+US growth	-4.411	0.646	**1.361**	-0.987	**3.442**	-22.770	**5.658**	-14.338	-6.378	-1.587	-6.334	-6.546	**7.352**
Diebold-Mariano	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) vs (3)	0.067	0.574	1.207	0.165	-1.256	-1.43	1.282	**1.858**	1.323	0.636	0.71	0.197	-0.165
(2) vs (4)	-0.113	0.55	0.399	-0.169	-1.403	-1.111	0.314	**1.819**	1.326	0.955	**-1.940**	0.179	0.383
(2) vs (5)	-0.041	-0.923	-1.306	-1.201	-1.609	0.139	**-2.150**	1.574	1.445	0.644	-1.093	0.233	-0.596
(3) vs (4)	-0.755	-0.301	-1.187	-0.191	0.403	0.888	-1.398	-1.034	0.577	0.775	**-2.327**	-0.178	0.409
(3) vs (5)	-0.126	-1.34	**-1.787**	-0.34	-0.563	1.504	**-2.081**	**-2.520**	1.121	-0.154	-1.448	1.301	-1.009
(4) vs (5)	0.081	-1.366	-1.543	-0.83	-1.203	**1.705**	**-1.975**	-1.302	1.059	-0.738	1.236	0.339	-0.548

Table 4C. Growth/Out of sample forecasts: 12-month forecast horizon

Out of sample MSFE	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(1) AR	2.091	1.750	1.851	2.078	1.740	1.684	5.818	5.141	3.658
Min MSFE model				1.367	1.194	1.523	1.381	1.267	2.323
MSFE relative to AR									
(2) AR+stock market	0.839	0.859	1.632	0.725	0.777	0.923	0.852	0.869	1.008
(3) AR+interest rate	2.386	2.102	1.397	1.047	0.998	0.994	0.982	0.976	0.948
(4) AR+money supply	0.898	0.892	0.987	0.837	0.842	1.000	0.715	0.746	0.828
(5) AR+US growth	1.771	1.908	2.053	1.726	1.824	2.045	1.221	1.229	1.358
(6) AR+all	2.139	2.079	1.759	1.254	1.301	1.661	0.855	0.872	1.107
OOS-F test statistic vs (1)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+stock market	**6.893**	**5.909**	-13.937	**13.634**	**10.357**	**2.983**	**6.261**	**5.426**	-0.287
(3) AR+interest rate	-20.913	-18.874	-10.225	-1.603	0.082	0.210	0.665	**0.893**	**1.992**
(4) AR+money supply	**4.102**	**4.369**	0.458	**7.017**	**6.756**	0.009	**14.352**	**12.241**	**7.490**
(5) AR+US growth	-15.675	-17.132	-18.462	-15.148	-16.264	-18.398	-6.522	-6.705	-9.500
(6) AR+all	-19.170	-18.687	-15.538	-7.293	-8.331	-14.329	**6.092**	**5.278**	-3.470
OOS-F test statistic vs (6)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+stock market	-21.875	-21.128	-2.612	-15.178	-14.512	-15.987	-0.144	-0.128	-3.208
(3) AR+interest rate	**4.158**	0.393	-7.421	-5.955	-8.394	-14.454	**5.329**	**4.279**	-5.175
(4) AR+money supply	-20.892	-20.561	-15.795	-11.976	-12.703	-14.334	-5.905	-5.196	-9.072
(5) AR+US growth	-6.191	-2.967	**6.002**	**13.562**	**14.472**	**8.323**	**15.404**	**14.726**	**8.192**
Diebold-Mariano	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) vs (3)	-0.921	-0.744	0.611	-0.793	-0.599	-0.241	-0.679	-0.548	0.285
(2) vs (4)	-0.253	-0.139	0.917	-0.521	-0.311	-0.306	1.117	0.873	1.15
(2) vs (5)	-1.298	-1.360	-0.461	-1.506	-1.532	-1.632	-1.093	-1.09	-1.145
(3) vs (4)	0.962	0.757	0.661	0.708	0.603	-0.022	**2.509**	**2.724**	1.319
(3) vs (5)	0.489	0.154	-0.716	-1.387	-1.587	-1.635	-0.948	-1.017	-1.506
(4) vs (5)	-1.542	-1.630	**-1.769**	-1.524	-1.676	**-1.717**	-1.594	-1.621	**-1.850**

Table 5A. Inflation/Out of sample forecasts: 1-month forecast horizon

Out of sample MSFE	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(1) AR	0.035	0.056	0.043	0.033	0.035	0.118	0.052	0.023	0.151	0.043	0.046	0.027
MSFE relative to AR												
(2) AR+growth	0.998	1.013	1.004	0.998	1.005	0.995	1.011	1.021	1.002	1.007	1.021	1.015
(3) AR+exchange rate	1.016	1.011	0.986	0.988	1.053	1.068	1.009	0.980	1.001	1.009	1.038	0.928
(4) AR+money supply	1.039	1.010	0.996	1.006	1.019	1.014	1.111	0.997	0.970	1.012	1.004	1.003
(5) AR+US inflation	1.008	1.044	0.976	1.045	1.002	0.983	0.985	0.871	0.770	0.860	0.992	1.025
(6) AR+all	1.046	1.064	0.968	1.039	1.058	1.098	1.105	0.873	0.712	0.896	1.059	0.968
OOS-F test statistic vs (1)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+growth	0.086	-0.461	-0.134	0.062	-0.187	0.187	-0.405	-0.739	-0.062	-0.241	-0.729	-0.547
(3) AR+exchange rate	-0.579	-0.392	0.525	0.440	-1.811	-2.294	-0.314	0.750	-0.039	-0.312	-1.320	**2.801**
(4) AR+money supply	-1.344	-0.343	0.134	-0.197	-0.668	-0.481	-3.604	0.105	**1.112**	-0.434	-0.152	-0.096
(5) AR+US inflation	-0.288	-1.516	**0.872**	-1.552	-0.072	0.640	0.564	**5.342**	**10.776**	**5.882**	0.307	-0.882
(6) AR+all	-1.589	-2.172	1.174	-1.363	-1.979	-3.204	-3.408	**5.214**	**14.550**	**4.198**	-1.998	1.180
OOS-F test statistic vs (6)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+growth	-1.671	-1.734	**1.312**	-1.423	-1.802	-3.373	-3.038	**6.078**	**14.637**	**4.469**	-1.296	**1.754**
(3) AR+exchange rate	-1.027	-1.800	0.639	-1.782	-0.177	-0.971	-3.121	**4.373**	**14.605**	**4.550**	-0.704	-1.504
(4) AR+money supply	-0.254	-1.847	1.036	-1.173	-1.335	-2.759	0.218	**5.094**	**13.036**	**4.689**	-1.854	**1.280**
(5) AR+US inflation	-1.311	-0.685	0.294	0.197	-1.911	-3.777	-3.911	-0.111	**2.904**	-1.447	-2.286	**2.114**
Diebold-Mariano	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) vs (3)	-0.346	0.014	0.475	0.223	-1.027	-1.53	0.182	0.934	0.013	-0.694	-0.393	1.675
(2) vs (4)	-1.309	0.036	0.686	-0.349	-0.699	-1.231	**-1.857**	1.043	0.62	-0.163	0.455	1.114
(2) vs (5)	-0.182	-0.349	0.318	**-2.957**	0.123	0.558	0.345	**2.063**	1.632	1.398	0.509	-0.457
(3) vs (4)	-0.532	0.014	-0.247	-0.553	0.6	1.147	-1.513	-0.405	0.369	-0.097	**1.891**	-1.524
(3) vs (5)	0.102	-0.342	0.097	-1.336	0.838	**2.388**	0.331	1.426	**1.834**	1.438	1.445	**-2.075**
(4) vs (5)	0.503	**-2.160**	0.235	**-1.782**	0.547	1.06	1.234	**1.912**	1.185	1.226	0.466	-1.41

Table 5B. Inflation /Out of sample forecasts: 1-month forecast horizon

Out of sample MSFE	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(1) AR	0.044	0.044	0.020	0.177	0.084	0.205	0.126	0.104	0.136	0.176	0.043	0.263	0.182
MSFE relative to AR													
(2) AR+growth	1.006	1.003	0.959	1.032	1.071	1.016	0.999	1.011	0.929	1.030	0.924	1.007	0.997
(3) AR+exchange rate	0.971	1.025	1.010	1.013	1.098	0.885	0.999	1.059	---	1.036	0.998	1.018	1.028
(4) AR+money supply	1.035	1.007	1.000	0.997	0.995	1.015	1.025	0.996	1.031	1.031	1.116	1.055	0.982
(5) AR+US inflation	1.017	1.114	1.046	0.811	1.005	1.019	0.994	0.987	1.020	1.064	0.860	1.023	1.029
(6) AR+all	1.053	1.156	1.012	0.892	1.304	0.938	1.015	1.047	1.024	1.077	0.950	1.117	1.019
OOS-F test statistic vs (1)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+growth	-0.198	-0.123	**1.538**	-1.121	-2.395	-0.566	0.045	-0.391	**2.744**	-1.060	**2.980**	-0.235	0.091
(3) AR+exchange rate	**1.075**	-0.869	-0.366	-0.465	-3.201	**4.684**	0.022	-2.004	---	-1.254	0.059	-0.636	-0.996
(4) AR+money supply	-1.225	-0.255	-0.013	0.120	0.175	-0.543	-0.888	0.152	-1.085	-1.093	-3.738	-1.886	0.666
(5) AR+US inflation	-0.616	-3.696	-1.572	**8.390**	-0.177	-0.671	0.204	0.485	-0.694	-2.157	**5.882**	-0.820	-1.031
(6) AR+all	-1.811	-4.857	-0.442	**4.366**	-8.393	**2.389**	-0.529	-1.619	-0.844	-2.571	**1.904**	-3.785	-0.669
OOS-F test statistic vs (6)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+growth	-1.623	-4.750	-1.899	**5.663**	-6.426	**3.002**	-0.574	-1.241	-3.334	-1.558	-0.994	-3.573	-0.759
(3) AR+exchange rate	-2.803	-4.086	-0.077	**4.894**	-5.699	-2.031	-0.551	0.408	---	-1.365	**1.842**	-3.205	0.336
(4) AR+money supply	-0.608	-4.635	-0.429	**4.231**	-8.527	**2.976**	0.367	-1.763	0.249	-1.525	**6.295**	-2.003	-1.311
(5) AR+US growth	-1.217	-1.294	**1.182**	-3.264	-8.256	**3.118**	-0.729	-2.076	-0.153	-0.441	-3.419	-3.033	0.373
Diebold-Mariano	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) vs (3)	1.133	-1.332	**-2.562**	0.475	-0.167	1.491	-0.018	-0.812	---	-0.146	-0.852	-0.669	-0.868
(2) vs (4)	-0.476	-0.162	**-2.392**	0.486	1.057	0.018	**-2.348**	0.697	**-1.810**	-0.018	**-2.038**	**-2.080**	0.397
(2) vs (5)	-0.289	-0.973	-1.568	**2.002**	1.486	-0.177	0.175	0.511	**-1.933**	-0.242	0.395	-1.061	-1.64
(3) vs (4)	-1.004	0.750	0.543	0.250	0.58	-1.479	-0.619	1.278	---	0.238	-1.537	-1.281	0.794
(3) vs (5)	-1.095	-0.770	-0.593	**2.085**	0.561	-1.639	0.135	0.966	---	-0.269	1.324	-0.274	-0.034
(4) vs (5)	0.293	-1.032	-0.960	1.639	-0.118	-0.135	0.974	0.174	0.354	-0.353	1.669	1.07	-1.113

Table 5C. Inflation /Out of sample forecasts: 1-month forecast horizon

Out of sample MSFE	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(1) AR	0.015	0.012	0.015	0.014	0.012	0.013	0.014	0.012	0.014
Min MSFE model				0.014	0.011	0.012	0.024	0.017	0.012
MSFE relative to AR									
(2) AR+growth	0.980	0.986	0.900	0.995	0.990	0.971	0.999	0.997	1.002
(3) AR+exchange rate	0.990	0.984	0.994	0.995	0.984	0.983	1.001	0.990	0.980
(4) AR+money supply	1.001	1.003	1.005	1.010	1.015	1.006	1.014	1.014	1.023
(5) AR+US inflation	1.073	1.098	1.112	1.004	1.017	1.001	0.956	0.978	1.004
(6) AR+all	1.050	1.078	1.083	0.990	0.992	0.965	0.952	0.967	1.008
OOS-F test statistic vs (1)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+growth	0.723	0.523	**3.988**	0.190	0.362	**1.093**	0.054	0.116	-0.078
(3) AR+exchange rate	0.365	0.588	**0.219**	0.184	0.592	0.638	-0.045	0.382	0.738
(4) AR+money supply	-0.043	-0.105	-0.162	-0.342	-0.516	-0.215	-0.503	-0.503	-0.815
(5) AR+US inflation	-2.459	-3.199	-3.617	-0.141	-0.590	-0.037	**1.664**	0.808	-0.147
(6) AR+all	-1.720	-2.603	-2.764	0.351	0.289	**1.289**	**1.832**	**1.229**	-0.272
OOS-F test statistic vs (6)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+growth	-2.395	-3.081	-6.078	0.160	-0.073	0.191	**1.776**	1.110	-0.195
(3) AR+exchange rate	-2.064	-3.140	-2.965	0.167	-0.298	0.639	**1.879**	0.839	-0.990
(4) AR+money supply	-1.679	-2.505	-2.613	0.700	0.817	**1.513**	**2.368**	**1.756**	0.555
(5) AR+US inflation	0.793	0.654	0.948	0.494	0.893	**1.327**	0.160	0.412	-0.126
Diebold-Mariano	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) vs (3)	-0.13	0.027	-1.407	-0.003	0.106	-0.213	-0.04	0.126	0.304
(2) vs (4)	-1.238	-0.913	**-2.671**	-0.862	-1.432	-1.623	-0.801	-0.673	-1.228
(2) vs (5)	**-2.732**	**-1.927**	**-2.240**	-0.459	-0.804	-0.941	1.288	0.831	-0.055
(3) vs (4)	-0.144	-0.267	**-0.127**	-0.23	-0.593	-0.376	-0.201	-0.432	-0.649
(3) vs (5)	-1.043	-1.28	-0.924	-0.132	-0.477	-0.259	0.656	0.178	-0.286
(4) vs (5)	**-2.931**	**-2.139**	-1.328	0.406	-0.084	0.122	1.334	1.113	0.421

Table 6A. Inflation /Out of sample forecasts: 3-month forecast horizon

Out of sample MSFE	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(1) AR	0.066	0.110	0.181	0.086	0.123	0.154	0.225	0.043	0.415	0.379	0.125	0.094
MSFE relative to AR												
(2) AR+growth	0.995	1.111	1.005	1.013	1.019	1.011	1.015	1.032	1.016	0.997	1.018	1.039
(3) AR+exchange rate	1.024	0.963	0.891	0.985	0.998	1.053	0.967	0.931	0.998	0.974	1.076	0.924
(4) AR+money supply	1.014	1.002	0.991	1.006	1.018	1.044	1.094	0.999	0.796	0.992	1.021	1.081
(5) AR+US inflation	1.118	1.144	0.989	0.973	1.033	1.050	1.053	0.937	1.048	1.022	1.034	1.029
(6) AR+all	1.146	1.233	0.888	0.973	1.068	1.165	1.139	0.908	0.858	0.996	1.158	1.031
OOS-F test statistic vs (1)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+growth	0.167	-3.601	-0.169	-0.478	-0.683	-0.399	-0.532	-1.103	-0.552	0.096	-0.623	-1.339
(3) AR+exchange rate	-0.858	**1.394**	**4.411**	0.554	0.072	-1.801	**1.246**	**2.685**	0.084	**0.955**	-2.540	**2.960**
(4) AR+money supply	-0.500	-0.065	0.314	-0.231	-0.625	-1.521	-3.098	0.041	**9.243**	0.288	-0.734	-2.694
(5) AR+US inflation	-3.790	-4.519	0.399	**1.001**	-1.135	-1.723	-1.816	**2.400**	-1.641	-0.789	-1.197	-1.026
(6) AR+all	-4.578	-6.800	**4.558**	1.016	-2.303	-5.096	-4.381	**3.645**	**5.968**	0.162	-4.924	-1.087
OOS-F test statistic vs (6)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+growth	-4.724	-3.555	**4.749**	**1.515**	-1.651	-4.750	-3.907	**4.899**	**6.622**	0.066	-4.377	0.261
(3) AR+exchange rate	-3.811	-7.888	0.131	0.456	-2.370	-3.469	-5.439	0.894	**5.870**	-0.772	-2.565	-3.739
(4) AR+money supply	-4.136	-6.747	**4.208**	**1.255**	-1.707	-3.733	-1.404	**3.601**	-2.606	-0.125	-4.277	**1.737**
(5) AR+US inflation	-0.882	-2.608	**4.113**	0.015	-1.205	-3.543	-2.701	**1.167**	**7.972**	0.972	-3.855	-0.063
Diebold-Mariano	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) vs (3)	-0.694	1.384	1.136	1.295	0.445	-0.608	1.455	1.291	0.611	0.414	-1.141	**3.058**
(2) vs (4)	-0.997	1.457	1.248	0.339	0.042	-0.852	-1.180	1.586	1.556	0.190	-0.136	-0.395
(2) vs (5)	-1.246	-0.426	0.223	0.665	-0.645	-0.733	-1.322	1.481	-0.986	-0.391	-0.230	0.293
(3) vs (4)	0.224	-0.870	-1.027	-0.941	-0.288	0.117	-1.416	-1.091	1.345	-0.318	0.803	-1.448
(3) vs (5)	-0.860	-1.242	-0.842	0.195	-0.675	0.036	**-1.782**	-0.061	-1.258	-0.533	0.374	**-2.667**
(4) vs (5)	-1.002	-1.136	0.034	0.530	-0.340	-0.085	0.575	0.880	-1.650	-0.408	-0.207	0.479

Table 6B. Inflation /Out of sample forecasts: 3-month forecast horizon

Out of sample MSFE	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(1) AR	0.136	0.147	0.048	0.465	0.307	0.867	0.598	0.534	0.521	0.318	0.379	1.002	0.983
MSFE relative to AR													
(2) AR+growth	1.009	1.015	0.995	1.004	1.060	1.005	1.007	0.770	0.995	1.050	0.710	0.994	1.006
(3) AR+exchange rate	0.897	0.970	1.009	0.986	1.196	0.793	1.017	1.029	---	1.059	0.938	0.985	0.982
(4) AR+money supply	1.015	1.010	0.998	0.962	1.021	0.994	1.002	0.999	1.004	1.023	1.132	1.162	0.800
(5) AR+US inflation	1.002	1.023	1.052	0.909	1.031	0.990	1.044	1.023	1.054	0.971	1.022	1.066	1.021
(6) AR+all	0.928	1.026	1.058	0.836	1.405	0.824	1.074	0.810	1.024	1.073	0.894	1.180	0.850
OOS-F test statistic vs (1)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+growth	-0.305	-0.525	0.179	-0.140	-2.038	-0.182	-0.237	**10.782**	0.164	-1.711	**14.720**	0.209	-0.224
(3) AR+exchange rate	**4.136**	**1.128**	-0.328	0.511	-5.908	**9.420**	-0.588	-1.020	---	-2.003	**2.360**	0.557	0.651
(4) AR+money supply	-0.529	-0.345	0.090	**1.417**	-0.738	0.205	-0.062	0.044	-0.152	-0.819	-4.186	-5.006	**8.988**
(5) AR+US inflation	-0.080	-0.800	-1.784	**3.617**	-1.097	0.363	-1.516	-0.813	-1.829	**1.060**	-0.789	-2.229	-0.752
(6) AR+all	**2.809**	-0.899	-1.958	**7.075**	-10.385	**7.676**	-2.482	**8.458**	-0.837	-2.434	**4.275**	-5.486	**6.363**
OOS-F test statistic vs (6)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+growth	**3.141**	-0.379	-2.126	**7.243**	-8.847	**7.897**	-2.260	-1.789	-0.996	-0.759	-7.414	-5.662	**6.628**
(3) AR+exchange rate	-1.191	-1.965	-1.645	**6.473**	-5.356	-1.382	-1.926	**9.754**	---	-0.456	**1.798**	-5.951	**5.610**
(4) AR+money supply	**3.388**	-0.559	-2.043	**5.445**	-9.849	**7.429**	-2.425	**8.404**	-0.688	-1.652	**9.574**	-0.557	-2.101
(5) AR+US inflation	**2.895**	-0.101	-0.183	**3.142**	-9.580	**7.240**	-1.008	**9.485**	1.045	-3.394	**5.178**	-3.472	**7.267**
Diebold-Mariano	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) vs (3)	**2.319**	0.976	**-2.190**	0.850	-0.493	1.380	-0.478	**-2.323**	---	-0.130	-1.127	0.272	0.458
(2) vs (4)	**-1.749**	0.520	-0.043	1.039	0.732	0.088	0.386	**-2.602**	-0.319	0.398	**-2.449**	**-2.085**	**2.776**
(2) vs (5)	0.118	-0.149	-0.551	1.154	0.585	0.360	-0.402	**-2.336**	**-1.866**	0.667	-1.284	-1.516	-0.173
(3) vs (4)	**-2.495**	-0.786	0.194	0.605	0.591	-1.272	0.600	0.760	-0.576	1.195	-0.905	-1.731*	**2.669**
(3) vs (5)	-1.425	-1.405	-0.419	0.953	0.550	-1.371	-0.311	0.111	---	1.151	-0.831	-1.347	-0.427
(4) vs (5)	0.243	-0.220	-0.447	0.742	-0.182	0.043	-0.410	-0.647	---	0.851	0.464	1.162	**-2.388**

Table 6C. Inflation /Out of sample forecasts: 3-month forecast horizon

Out of sample MSFE	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(1) AR	0.054	0.047	0.067	0.055	0.047	0.057	0.055	0.048	0.082
Min MSFE model				0.052	0.045	0.052	0.126	0.088	0.056
MSFE relative to AR									
(2) AR+growth	1.063	1.074	0.812	1.027	1.024	0.969	1.024	1.023	0.990
(3) AR+exchange rate	0.925	0.931	0.979	0.932	0.932	0.909	0.910	0.906	0.888
(4) AR+money supply	1.014	1.017	1.015	1.018	1.013	0.999	1.026	1.025	1.040
(5) AR+US inflation	1.026	1.026	1.025	1.031	1.034	1.035	1.043	1.041	1.023
(6) AR+all	1.034	1.056	0.813	1.006	0.998	0.931	1.002	0.994	0.965
OOS-F test statistic vs (1)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+growth	-2.143	-2.480	**8.315**	-0.947	-0.827	**1.142**	-0.832	-0.798	0.376
(3) AR+exchange rate	**2.936**	**2.673**	0.757	**2.611**	**2.613**	**3.606**	**3.555**	**3.716**	**4.561**
(4) AR+money supply	-0.514	-0.593	-0.529	-0.646	-0.471	0.022	-0.911	-0.892	-1.390
(5) AR+US inflation	-0.929	-0.928	-0.866	-1.075	-1.170	-1.203	-1.476	-1.421	-0.813
(6) AR+all	-1.168	-1.911	**8.261**	-0.216	0.062	**2.684**	-0.070	0.213	**1.317**
OOS-F test statistic vs (6)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+growth	1.036	0.612	-0.044	0.750	**0.909**	**1.494**	0.780	**1.034**	**0.931**
(3) AR+exchange rate	-3.795	-4.266	**7.349**	-2.636	-2.379	-0.838	-3.299	-3.175	-2.879
(4) AR+money supply	-0.664	-1.340	**8.921**	0.437	0.540	**2.660**	0.863	**1.133**	**2.817**
(5) AR+US inflation	-0.246	-1.008	**9.352**	**0.885**	**1.273**	**4.021**	**1.466**	**1.701**	**2.180**
Diebold-Mariano	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) vs (3)	**2.340**	**2.428**	-1.448	1.516	1.565	0.828	1.486	1.504	1.087
(2) vs (4)	**2.030**	**2.636**	-1.484	0.513	0.622	-0.649	-0.046	-0.067	-1.361
(2) vs (5)	0.581	0.639	**-1.873**	-0.167	-0.238	-1.090	**-1.867**	-0.584	-0.921
(3) vs (4)	**-1.796**	-1.651	-0.406	-1.345	-1.465	-1.168	-1.439	-1.587	**-1.779**
(3) vs (5)	-1.339	-1.075	-0.450	-1.527	-1.485	-1.433	**-1.723**	-1.674	-1.438
(4) vs (5)	-0.175	-0.115	-0.161	-0.387	-0.414	-0.423	-0.360	-0.337	0.545

Table 7A. Inflation /Out of sample forecasts: 6-month forecast horizon

Out of sample MSFE	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(1) AR	0.119	0.175	0.305	0.126	0.253	0.111	0.619	0.059	0.766	1.156	0.186	0.186
MSFE relative to AR												
(2) AR+growth	1.009	1.012	1.004	1.013	0.999	1.010	1.023	1.025	1.004	1.002	1.002	1.014
(3) AR+exchange rate	1.011	0.990	0.652	1.016	0.998	1.110	0.924	1.030	1.008	1.000	1.033	1.032
(4) AR+money supply	0.820	1.001	0.985	0.978	1.010	1.030	0.986	0.993	0.683	0.985	1.031	1.063
(5) AR+US inflation	1.098	1.282	1.033	1.044	1.030	0.997	1.044	1.023	1.012	0.996	1.041	1.061
(6) AR+all	0.879	1.342	0.682	1.094	1.045	1.256	0.979	1.078	0.688	0.983	1.157	1.153
OOS-F test statistic vs (1)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+growth	-0.323	-0.423	-0.140	-0.446	0.029	-0.347	-0.795	-0.876	-0.126	-0.060	-0.076	-0.480
(3) AR+exchange rate	-0.389	0.364	**19.223**	-0.579	0.058	-3.564	**2.960**	-1.058	-0.275	0.009	-1.140	-1.110
(4) AR+money supply	**7.920**	-0.042	0.543	0.811	-0.357	-1.045	0.501	0.243	**16.742**	0.545	-1.086	-2.139
(5) AR+US inflation	-3.222	-7.927	-1.160	-1.531	-1.064	0.104	-1.513	-0.809	-0.431	0.128	-1.416	-2.056
(6) AR+all	**4.952**	-9.170	**16.760**	-3.095	-1.540	-7.342	0.759	-2.600	**16.339**	0.625	-4.879	-4.785
OOS-F test statistic vs (6)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+growth	**5.323**	-8.851	**16.965**	-2.683	-1.568	-7.063	**1.590**	-1.767	**16.522**	0.686	-4.814	-4.363
(3) AR+exchange rate	**5.399**	-9.438	-1.606	-2.558	-1.595	-4.193	-2.033	-1.588	**16.742**	0.616	-3.862	-3.792
(4) AR+money supply	-2.433	-9.138	**15.976**	-3.820	-1.194	-6.485	0.255	-2.824	-0.275	0.079	-3.912	-2.813
(5) AR+US inflation	**8.978**	-1.593	**18.517**	-1.634	-0.491	-7.425	**2.372**	-1.832	**16.972**	0.496	-3.606	-2.894
Diebold-Mariano	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) vs (3)	-0.045	1.180	1.621	-0.140	0.033	-0.673	**1.928**	-0.128	-0.501	0.136	-1.210	-0.767
(2) vs (4)	0.974	0.967	1.055	0.413	-0.341	-0.341	0.437	0.871	**2.019**	1.313	-0.146	-0.292
(2) vs (5)	-0.731	-1.137	-1.174	-0.803	-0.599	0.139	-0.417	0.029	-0.167	0.238	-1.070	-0.853
(3) vs (4)	0.891	-0.662	-1.622	0.377	-0.258	0.673	-0.621	**1.986**	**1.982**	0.835	0.008	-0.192
(3) vs (5)	-0.738	-1.266	**-1.775**	-0.544	-0.587	0.534	-1.622	0.083	-0.086	0.119	-0.181	-0.447
(4) vs (5)	-1.382	-1.212	-1.419	-0.783	-0.319	0.268	-0.762	-0.357	**-2.203**	-0.402	-0.047	0.014

Table 7B. Inflation /Out of sample forecasts: 6-month forecast horizon

Out of sample MSFE	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(1) AR	0.295	0.229	0.083	0.649	0.903	1.763	1.840	1.742	1.277	0.186	1.156	2.826	1.935
MSFE relative to AR													
(2) AR+growth	1.002	1.050	1.003	1.007	1.013	1.011	1.007	0.850	1.011	1.013	0.764	1.001	1.009
(3) AR+exchange rate	0.947	0.919	1.005	1.025	1.088	0.852	1.042	1.036	---	1.071	0.919	1.050	0.914
(4) AR+money supply	0.545	1.015	0.989	0.890	0.949	0.976	1.008	1.044	1.006	1.082	1.078	1.220	0.994
(5) AR+US inflation	1.011	1.004	1.065	0.961	1.011	0.990	0.975	1.023	1.028	1.052	0.996	1.064	1.007
(6) AR+all	0.519	0.996	1.044	0.862	1.216	0.888	1.022	0.949	1.056	1.144	0.784	1.320	0.920
OOS-F test statistic vs (1)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+growth	-0.081	-1.705	-0.097	-0.263	-0.446	-0.378	-0.242	**6.377**	-0.375	-0.452	**11.121**	-0.051	-0.315
(3) AR+exchange rate	**2.006**	**3.188**	-0.178	-0.873	-2.919	**6.240**	-1.453	-1.259	---	-2.383	**3.189**	-1.703	**3.382**
(4) AR+money supply	**30.037**	-0.533	0.403	**4.471**	**1.921**	0.886	-0.270	-1.501	-0.210	-2.743	-2.596	-6.488	0.214
(5) AR+US inflation	-0.379	-0.131	-2.200	**1.474**	-0.389	0.378	**0.912**	-0.825	-0.972	-1.773	0.128	-2.157	-0.233
(6) AR+all	**33.391**	0.145	-1.515	**5.776**	-6.389	**4.562**	-0.787	**1.925**	-1.920	-4.534	**9.908**	-8.736	**3.140**
OOS-F test statistic vs (6)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+growth	**33.548**	**1.942**	-1.422	**6.084**	-6.018	**4.993**	-0.549	-3.782	-1.561	-4.134	-0.927	-8.697	**3.485**
(3) AR+exchange rate	**29.728**	-2.795	-1.343	**6.814**	-3.776	-1.430	0.695	**3.300**	---	-2.304	**6.172**	-7.382	-0.221
(4) AR+money supply	**1.828**	0.689	-1.897	**1.161**	-7.889	**3.588**	-0.520	**3.576**	-1.720	-1.939	**13.475**	-2.742	**2.908**
(5) AR+US inflation	**34.128**	0.277	0.730	**4.133**	-6.066	**4.141**	-1.657	**2.815**	-0.974	-2.904	**9.746**	-6.998	**3.395**
Diebold-Mariano	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) vs (3)	**2.679**	1.528	-0.123	-0.644	-0.322	1.114	-0.640	-1.620	---	-0.391	-0.993	-0.407	0.446
(2) vs (4)	**2.335**	1.136	0.065	**2.513**	**2.919**	0.288	-0.052	**-2.410**	0.164	-0.999	**-2.394**	**-1.970**	0.374
(2) vs (5)	-0.206	0.991	-0.972	0.634	0.042	0.557	0.682	**-1.765**	-0.452	-0.549	-1.325	**-1.920**	0.100
(3) vs (4)	**2.058**	-1.301	0.076	**2.113**	0.666	-0.863	0.639	-0.088	---	-0.103	-0.891	-1.072	-0.364
(3) vs (5)	-1.041	-1.120	-0.950	0.709	0.314	-0.899	0.834	0.148	---	0.169	-0.989	-0.105	-0.416
(4) vs (5)	**-2.190**	0.382	-0.356	-0.835	-1.147	-0.138	0.644	0.339	-0.576	0.689	0.590	1.489	-0.266

Table 7C. Inflation /Out of sample forecasts: 6-month forecast horizon

Out of sample MSFE	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(1) AR	0.114	0.090	0.166	0.100	0.078	0.110	0.103	0.083	0.187
Min MSFE model				0.096	0.073	0.099	0.412	0.262	0.106
MSFE relative to AR									
(2) AR+growth	1.006	1.005	0.723	1.000	1.001	0.938	1.004	1.006	0.980
(3) AR+exchange rate	0.996	0.985	0.961	0.988	0.979	0.930	0.937	0.913	0.882
(4) AR+money supply	1.063	1.051	1.016	0.972	0.963	0.947	0.932	0.858	1.000
(5) AR+US inflation	1.038	1.045	0.988	1.046	1.039	1.039	1.112	1.088	1.067
(6) AR+all	1.120	1.100	0.669	1.007	0.980	0.880	0.977	0.850	0.960
OOS-F test statistic vs (1)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+growth	-0.232	-0.181	**13.759**	-0.016	-0.034	**2.378**	-0.144	-0.221	0.752
(3) AR+exchange rate	0.161	0.531	**1.451**	0.448	0.778	**2.690**	**2.439**	**3.413**	**4.794**
(4) AR+money supply	-2.133	-1.752	-0.554	**1.031**	**1.392**	**2.002**	**2.623**	**5.981**	-0.001
(5) AR+US inflation	-1.317	-1.549	0.430	-1.581	-1.340	-1.340	-3.639	-2.916	-2.257
(6) AR+all	-3.870	-3.283	**17.823**	-0.259	0.717	**4.913**	0.863	**6.376**	**1.500**
OOS-F test statistic vs (6)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+growth	-3.662	-3.118	**2.940**	-0.243	0.752	**2.378**	**1.011**	**6.638**	0.733
(3) AR+exchange rate	-4.014	-3.759	**15.738**	-0.698	-0.060	**2.069**	-1.476	**2.707**	-2.907
(4) AR+money supply	-1.847	-1.610	**18.665**	-1.254	-0.650	**2.757**	-1.640	0.339	**1.501**
(5) AR+US inflation	-2.650	-1.812	**17.188**	**1.383**	**2.137**	**6.495**	**5.008**	**10.112**	**4.008**
Diebold-Mariano	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) vs (3)	0.108	0.301	-1.543	0.750	1.113	0.116	1.039	1.420	1.000
(2) vs (4)	-1.366	-1.277	**-2.961**	0.807	1.484	-0.214	0.843	**1.789**	-0.928
(2) vs (5)	-0.713	-0.904	**-2.538**	-1.041	-1.116	**-2.596**	-1.463	-1.510	**-2.191**
(3) vs (4)	-0.530	-0.762	-0.634	0.368	0.774	-0.264	0.035	0.579	-1.145
(3) vs (5)	-0.361	-0.777	-0.278	-1.432	**-1.772**	**-2.058**	**-2.109**	**-2.489**	**-1.883**
(4) vs (5)	0.479	0.130	0.577	-1.624	**-2.053**	**-2.092**	**-2.225**	**-3.394**	**-1.859**

Table 8A. Inflation /Out of sample forecasts: 12-month forecast horizon

Out of sample MSFE	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(1) AR	0.316	0.415	1.098	0.375	0.415	0.173	0.879	0.069	1.869	4.600	0.396	0.373
MSFE relative to AR												
(2) AR+growth	1.004	1.005	1.007	1.010	1.006	1.031	1.004	1.004	0.994	1.004	1.007	1.015
(3) AR+exchange rate	1.032	1.026	0.920	0.967	1.028	1.166	0.926	1.120	1.026	1.009	0.992	1.019
(4) AR+money supply	0.880	1.002	1.015	0.656	1.002	1.004	1.176	0.999	0.429	0.997	1.023	1.026
(5) AR+US inflation	1.034	1.078	1.028	1.058	1.029	1.112	1.033	1.015	1.015	1.000	1.060	1.017
(6) AR+all	0.892	1.120	0.971	0.758	1.074	1.646	1.138	1.129	0.449	1.008	1.114	1.065
OOS-F test statistic vs (1)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+growth	-0.156	-0.167	-0.238	-0.370	-0.231	-1.079	-0.128	-0.151	0.209	-0.144	-0.257	-0.522
(3) AR+exchange rate	-1.132	-0.917	**3.111**	**1.228**	-0.988	-5.132	**2.864**	-3.849	-0.909	-0.304	0.280	-0.677
(4) AR+money supply	**4.907**	-0.068	-0.538	**18.873**	-0.062	-0.139	-5.386	0.027	**47.967**	0.106	-0.800	-0.905
(5) AR+US inflation	-1.184	-2.616	-0.996	-1.982	-1.013	-3.630	-1.155	-0.523	-0.535	0.010	-2.036	-0.590
(6) AR+all	**4.337**	-3.855	1.077	**11.512**	-2.483	-14.135	-4.377	-4.109	**44.168**	-0.291	-3.683	-2.196
OOS-F test statistic vs (6)	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) AR+growth	**4.513**	-3.705	**1.324***	**12.005**	-2.267	-13.459	-4.264	-3.975	**43.705**	-0.147	-3.450	-1.698
(3) AR+exchange rate	**5.647**	-3.014	-1.872	**9.945**	-1.538	-10.500	-6.708	-0.292	**46.245**	0.013	-3.932	-1.548
(4) AR+money supply	-0.501	-3.794	**1.640**	-4.830	-2.426	-14.050	**1.186**	-4.133	-1.629	-0.396	-2.948	-1.324
(5) AR+US inflation	**5.709**	-1.336	**2.132**	**14.280**	-1.513	-11.684	-3.329	-3.639	**45.378**	-0.300	-1.746	-1.633
Diebold-Mariano	*Austria*	*Belgium*	*Finland*	*France*	*Germany*	*Greece*	*Ireland*	*Italy*	*Luxembourg*	*Netherlands*	*Portugal*	*Spain*
(2) vs (3)	-0.450	-0.432	1.193	0.857	-0.751	-0.690	0.657	-0.672	**-2.509**	-0.222	0.806	-0.096
(2) vs (4)	0.280	0.322	-1.070	**2.609**	0.970	1.368	**-2.364**	0.000	**2.964**	0.606	-0.199	-0.067
(2) vs (5)	-0.276	-0.523	-0.753	-0.601	-0.211	-0.446	-0.561	-0.410	-0.483	0.195	-0.701	-0.050
(3) vs (4)	0.315	0.540	-1.298	**2.315**	0.790	0.910	**-1.789**	0.748	**3.143**	0.630	-0.402	-0.036
(3) vs (5)	-0.020	-0.377	-1.559	-0.797	-0.008	0.167	-0.831	0.579	0.300	0.320	-0.983	0.056
(4) vs (5)	-0.324	-0.531	-0.451	**-2.145**	-0.248	-0.538	**1.888**	-0.486	**-2.939**	-0.101	-0.386	0.049

Table 8B. Inflation /Out of sample forecasts: 12-month forecast horizon

Out of sample MSFE	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(1) AR	0.650	0.387	0.238	0.484	4.138	4.236	4.682	6.301	3.740	1.078	4.600	7.853	7.408
MSFE relative to AR													
(2) AR+growth	1.004	1.012	1.005	1.013	1.058	1.014	1.009	1.011	0.996	1.025	0.954	1.009	1.004
(3) AR+exchange rate	0.972	1.077	1.009	0.987	1.035	0.923	1.042	0.501	---	1.018	0.929	1.093	0.734
(4) AR+money supply	0.799	1.024	1.006	0.948	0.976	1.130	1.007	1.020	1.005	0.999	0.962	1.173	0.987
(5) AR+US inflation	1.022	1.122	1.008	1.091	1.019	1.069	1.057	1.014	0.992	0.927	1.000	1.002	1.046
(6) AR+all	0.811	1.268	1.016	1.046	1.219	1.163	1.135	0.515	1.052	0.947	1.058	1.266	0.776
OOS-F test statistic vs (1)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+growth	-0.137	-0.413	-0.175	-0.454	-1.989	-0.485	-0.336	-0.406	0.142	-0.864	**1.729**	-0.324	-0.135
(3) AR+exchange rate	**1.047**	-2.576	-0.309	0.479	-1.230	**3.017**	-1.452	**35.851**	---	-0.638	**2.745**	-3.056	**13.053**
(4) AR+money supply	**9.054**	-0.850	-0.219	**1.992**	**0.888**	-4.149	-0.252	-0.710	-0.189	0.053	**1.433**	-5.299	0.481
(5) AR+US inflation	-0.786	-3.918	-0.302	-2.996	-0.657	-2.339	-1.933	-0.511	0.284	**2.848**	0.010	-0.065	-1.574
(6) AR+all	**8.385**	-7.620	-0.562	-1.590	-6.471	-5.048	-4.279	**33.896**	-1.779	**2.033***	-1.986	-7.553	**10.411**
OOS-F test statistic vs (6)	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) AR+growth	**8.555**	-7.290	-0.389	-1.151	-4.744	-4.625	-3.980	**34.694**	-1.913	**2.968**	-3.545	-7.294	**10.585**
(3) AR+exchange rate	**7.131**	-5.433	-0.255	-2.042	-5.427	-7.441	-2.946	-0.979	---	**2.719**	-4.396	-4.914	-1.939
(4) AR+money supply	-0.534	-6.934	-0.345	-3.394	-7.182	-1.016	-4.055	**35.302**	-1.599	**1.977**	-3.288	-2.643	**9.799**
(5) AR+US inflation	**9.376**	-4.154	-0.263	**1.534**	-5.922	-2.897	-2.479	**34.903**	-2.047	-0.755	-1.996	-7.502	**12.533**
Diebold-Mariano	*Denmark*	*Sweden*	*UK*	*Cyprus*	*Czech*	*Estonia*	*Hungary*	*Latvia*	*Lithuania*	*Malta*	*Poland*	*Slovakia*	*Slovenia*
(2) vs (3)	0.870	-0.572	-0.431	0.156	0.110	0.430	-0.425	**2.421**	---	0.065	0.250	-0.618	1.117
(2) vs (4)	0.866	0.000	-0.035	1.123	**2.805**	-0.604	0.223	-0.305	-0.327	0.580	-0.012	-1.304	0.477
(2) vs (5)	-0.506	-1.189	-0.171	-0.734	0.000	-0.592	-0.518	-0.041	0.071	0.179	-1.175	0.359	-0.939
(3) vs (4)	0.789	0.452	0.076	0.216	0.295	-0.875	0.468	**-2.462**	---	0.271	-0.056	-0.420	-1.055
(3) vs (5)	-0.676	-0.285	0.010	-0.413	0.074	-0.638	-0.161	**-2.344**	---	0.186	-0.539	0.688	-1.198
(4) vs (5)	-0.887	-1.092	-0.052	-1.105	-0.678	0.286	-0.531	0.081	0.347	0.140	-0.059	1.428	-0.910

Table 8C. Inflation /Out of sample forecasts: 12-month forecast horizon

Out of sample MSFE	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(1) AR	0.086	0.074	0.197	0.130	0.107	0.139	0.090	0.068	0.358
Min MSFE model				0.116	0.097	0.133	1.417	0.861	0.168
MSFE relative to AR									
(2) AR+growth	1.008	1.012	0.895	1.006	1.005	0.972	1.010	1.009	1.016
(3) AR+exchange rate	1.085	1.082	1.025	1.036	1.041	1.090	1.028	1.022	0.956
(4) AR+money supply	1.052	1.024	0.960	0.856	0.868	0.665	1.039	1.010	1.105
(5) AR+US inflation	1.079	1.057	1.014	1.045	1.037	1.051	1.110	1.106	1.079
(6) AR+all	1.272	1.210	0.919	0.966	0.963	0.904	1.160	1.122	1.265
OOS-F test statistic vs (1)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+growth	-0.287	-0.413	**4.236**	-0.217	-0.183	1.053	-0.343	-0.335	-0.566
(3) AR+exchange rate	-2.830	-2.714	-0.870	-1.258	-1.424	-2.967	-0.980	-0.779	**1.652**
(4) AR+money supply	-1.765	-0.838	**1.489**	**6.057**	**5.484**	**18.097**	-1.359	-0.371	-3.412
(5) AR+US inflation	-2.621	-1.945	-0.493	-1.564	-1.271	-1.734	-3.564	-3.443	-2.631
(6) AR+all	-7.688	-6.257	**3.163**	**1.275**	**1.368**	**3.804**	-4.976	-3.923	-7.531
OOS-F test statistic vs (6)	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) AR+growth	-7.460	-5.911	-0.960	**1.501**	**1.559**	**2.673**	-4.678	-3.622	-7.076
(3) AR+exchange rate	-5.272	-3.831	**4.133**	**2.624**	**2.907**	**7.379**	-4.108	-3.214	-8.780
(4) AR+money supply	-6.228	-5.548	**1.608**	-4.094	-3.572	-9.511	-3.759	-3.589	-4.550
(5) AR+US inflation	-5.464	-4.558	**3.707**	**2.967**	**2.736**	**5.818**	-1.568	-0.532	-5.286
Diebold-Mariano	*EU12*	*EU15*	*EU25*	*Pooled(1)_EU12*	*Pooled(1)_EU15*	*Pooled(1)_EU25*	*Pooled(2)_EU12*	*Pooled(2)_EU15*	*Pooled(2)_EU25*
(2) vs (3)	-0.354	-0.380	-0.315	-1.239	-1.314	-0.874	-0.178	-0.106	0.391
(2) vs (4)	-1.058	-0.613	-0.211	1.613	1.589	1.566	-0.104	-0.004	-0.868
(2) vs (5)	-0.576	-0.447	-0.371	-0.570	-0.512	-1.423	-0.728	-0.656	-0.689
(3) vs (4)	0.141	0.301	0.398	**1.806**	**1.853**	**2.696**	-0.035	0.040	-0.732
(3) vs (5)	0.028	0.120	0.067	-0.162	0.080	0.303	-0.478	-0.395	-0.808
(4) vs (5)	-0.246	-0.357	-1.029	**-1.734**	**-1.797**	**-1.801**	-0.275	-0.442	0.180

Table 9. MSFE of the forecasts of the aggregate series

			AR Model			
	Output Growth			*Inflation*		
h=1	*EU12*	*EU15*	*EU25*	*EU12*	*EU15*	*EU25*
Pooled	**0.373**	**0.306**	**0.332**	**0.014**	**0.012**	**0.013**
Aggregated	0.411	0.335	0.346	0.015	0.012	0.015
h=3	*EU12*	*EU15*	*EU25*	*EU12*	*EU15*	*EU25*
Pooled	**0.543**	**0.459**	**0.511**	0.055	0.047	**0.057**
Aggregated	0.598	0.507	0.551	**0.054**	**0.047**	0.067
h=6	*EU12*	*EU15*	*EU25*	*EU12*	*EU15*	*EU25*
Pooled	**0.998**	**0.806**	**1.011**	**0.100**	**0.078**	**0.110**
Aggregated	1.182	0.936	1.138	0.114	0.090	0.166
h=12	*EU12*	*EU15*	*EU25*	*EU12*	*EU15*	*EU25*
Pooled	**2.078**	**1.740**	**1.684**	0.130	0.107	**0.139**
Aggregated	2.091	1.750	1.851	**0.086**	**0.074**	0.197
			Best Model			
	Output Growth			*Inflation*		
h=1	*EU12*	*EU15*	*EU25*	*EU12*	*EU15*	*EU25*
Pooled	**0.303**	**0.245**	**0.283**	**0.014**	**0.011**	**0.012**
Aggregated	0.325	0.259	0.288	0.015	0.012	0.014
h=3	*EU12*	*EU15*	*EU25*	*EU12*	*EU15*	*EU25*
Pooled	**0.480**	**0.406**	0.460	0.052	0.045	**0.052**
Aggregated	0.480	0.408	**0.426**	**0.050**	**0.044**	0.054
h=6	*EU12*	*EU15*	*EU25*	*EU12*	*EU15*	*EU25*
Pooled	**0.792**	**0.657**	**0.897**	**0.096**	**0.073**	**0.099**
Aggregated	0.911	0.733	1.090	0.114	0.089	0.111
h=12	*EU12*	*EU15*	*EU25*	*EU12*	*EU15*	*EU25*
Pooled	**1.367**	**1.194**	**1.523**	0.116	0.097	**0.133**
Aggregated	1.754	1.503	1.827	**0.087**	**0.075**	0.176

Notes: MSFEs of GDP-weighted pooled forecasts. Bold denotes the lower MSFE,. Best model refers to the model with the minimum MSFE.