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Instability and non-linearity in the EMU [*]

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Abstract

In this paper we evaluate the relative performance of linear, non-linear and time-varying models for about 500 macroeconomic variables for the countries in the Euro area, using a real-time forecasting methodology. It turns out that linear models work well for about 35% of the series under analysis, time-varying models for another 35% and non-linear models for the remaining 30% of the series. The gains in forecasting accuracy from the choice of the best model can be substantial, in particular for longer forecast horizons. These results emerge from a detailed disaggregated analysis, while they are hidden when an average loss function is used. To explore in more detail the issue of parameter instability, we then apply a battery of tests, detecting non-constancy in about 20-30% of the time series. For these variables the forecasting performance of the time-varying and non-linear models further improves, with larger gains for a larger fraction of the series. Finally, we evaluate whether non-linear models perform better for three key macroeconomic variables: industrial production, inflation and unemployment. It turns out that this is often the case. Hence, overall, our results indicate that there is a substantial amount of instability and non-linearity in the EMU, and suggest that it can be worth going beyond linear models for several EMU macroeconomic variables.

J.E.L. Classification: *C2, C53, E30*

Keywords: Instability, Non-linearity, Time-Varying models, Non-linear models, European Monetary Union

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1. Introduction

The many social, economic and political changes that occurred in the European countries since the early '80s can be expected to make modelling macroeconomic variables with constant parameter linear models particularly difficult. In this context, time-varying and non-linear models should have a comparative advantage, even though their estimation is complicated by the short time span usually available. A comparison of the in sample goodness of fit of linear and non-linear models would be biased in favor of the latter, because of their extensive parameterization. Hence, the relative performance of linear and non-linear models is better evaluated out of sample, with a real time forecasting exercise.

In this paper we conduct such a comparison, using a very large dataset of about 500 macroeconomic variables for the countries in the Euro area. A similar analysis is performed by Stock and Watson (1999) for the US. Here we have a larger dataset, for several countries, but for a shorter sample. Moreover, we consider more forecasting models, and evaluate the role of instability in explaining the results.

We compare three main forecasting methods. The linear method, which includes autoregressive (AR) models, exponential smoothing and random walk models. The time-varing method, which includes time-varying AR models and smooth transition AR models. The non-linear method, that includes artificial neural network models. Within each method we consider several alternative specifications, for a total of 58 models. We focus on three forecast horizons: one, three and six month a-head. Longer horizons are not worth analyzing because of the rather short sample available.

The competing forecasts are compared on the basis of three measures, in increasing level of disaggregation. First, we compute the average value over all variables of several loss functions, including the common mean absolute and mean square forecast error. Second, we rank the models on the basis of the percentage of variables for which they are among the top-N models, for several values of N. Finally, for each forecasting model we compute the empirical distribution function (over variables) of its mean square forecast error, relative to a benchmark AR model, and report selected percentiles of this distribution.

It turns out that linear models work well for about 35% of the series under analysis, time-varying models for another 35% and non-linear models for the remaining 30% of

the series. The gains in forecasting accuracy from the choice of the best model can be substantial, in particular for longer forecast horizons. These results emerge from a detailed disaggregated analysis, while they are hidden when an average loss function is used.

To explore whether the results are driven by extensive parameter instability, we then apply a battery of stability tests, including statistics for constancy of the parameters versus the alternative of random walk or stationary random coefficients, and recursive F-tests for parameter changes at unknown dates. We detect non-constancy in about 20-40% of the time-series, though the percentage decreases to 10-20% when using bootstrapped critical values for the test statistics. The forecasting performance of the time-varying and non-linear models for the unstable variables further improves, with larger gains for a larger fraction of the series.

Finally, we evaluate whether non-linear models perform better for three key macroeconomic variables: industrial production, inflation and unemployment. It turns out that this is often the case.

The structure of the paper is the following. The dataset is illustrated in Section 2. Section 3 describes the forecasting models and the evaluation criteria. The results of the forecast comparison are presented in Section 4. The issue of instability is analyzed in Section 5. Section 6 presents detailed results for industrial production, unemployment and inflation. Section 7 summarizes and offers some concluding remarks.

2. The data

The dataset we use is taken from Marcellino, Stock and Watson (2000,2001), to whom we refer for additional information. It includes the OECD main economic indicators, monthly, for the period 1982:1-1997:8, for the 11 countries originally in the EMU in the year 2000. The dataset and the sample range is chosen in order to have rather homogenous variables over countries, for a long enough comparable time span. Overall, there are 480 series.

In particular, for each country there are output variables (industrial production and sales, disaggregated by main sectors); labour market variables (employment,

unemployment, wages and unit labour costs); prices (consumer and producer, disaggregated by type of goods); monetary aggregates, interest rates (different maturities), stock prices; exchange rates (effective and nominal); imports, exports and net trade; and other miscellaneous series. A complete list of the variables is reported in the Appendix.

3 Forecasting methods

The formulation of a generic forecasting model is

$$y_{t+h}^{h} = f(Z_t;\boldsymbol{q}_{ht}) + \boldsymbol{e}_{t+h}, \qquad (1)$$

where y_t is the variable being forecast, *h* indicates the forecast horizon, Z_t is a vector of predictor variables, $\boldsymbol{e}_t$ is an error term, and $\boldsymbol{q}_h$ is a vector of parameters, possibly evolving over time. We introduce a distinction between forecasting methods and forecasting models. Forecasting methods differ for the choice of the functional form of the relationship between y_{t+h}^{h} and Z_t, f. Within each method, different models are determined by the choice of the regressors Z_t and the stationarity transformation applied to y_t.

The h-step forecast is

$$\hat{y}_{t+h}^{h} = f(Z_t;\hat{\boldsymbol{q}}_{ht}), \qquad (2)$$

with associated forecast error

$$e_{t+h} = y_{t+h}^{h} - \hat{y}_{t+h}^{h}. \qquad (3)$$

When y_t is treated as stationary, it is $y_{t+h}^{h} = y_{t+h}$, while if y_t is I(1) then $y_{t+h}^{h} = y_{t+h} - y_t$. We present results for both cases. Moreover, we also consider a pre-test forecast where the decision on the stationarity of y_t is based on a unit root test, which often improves the forecasting performance, see e.g. Diebold and Kilian (2000). In particular, we use the Elliott, Rothenberg and Stock (1996) DF-GLS statistics, which performed best in the simulation experiments in Stock (1996). Note that $e_{t+h} = y_{t+h} - \hat{y}_{t+h}$, independently of

whether y_t is treated as stationary or not, so that forecast errors from the three different cases (stationary, I(1) and pre-test) are directly comparable.

Because of the short sample period available, the forecast horizons we consider are 1, 3 and 6 months. When *h* is larger than one, the "*h*-step ahead projection" approach in (1), also called dynamic estimation (e.g. Clements and Hendry (1996)), differs from the standard approach of estimating a one-step ahead model, then iterating that model forward to obtain *h*-step ahead predictions. The *h*-step ahead projection approach has two main advantages in this context. First, the potential impact of specification error in the one-step ahead model can be reduced by using the same horizon for estimation as for forecasting. Second, we need not resort to simulation methods to obtain forecasts from non-linear models. The resulting forecasts could be slightly less efficient, see e.g. Granger and Terasvirta (1993, Ch.8), but the computational savings in our real time exercise with many series are substantial.

A few forecast errors from the non-linear and time-varying methods are very large. This is due to problems in the estimation of these models, because of multiple local optima and the short estimation sample available (1982:1-1993:12). In order not to bias the comparison against these methods, we automatically trim the forecasts. In particular, when the absolute value of a forecasted change is larger than any previously observed change, a no change forecast is used.

Let us now list the methods and models we compare, and briefly discuss their main characteristics and estimation issues. More details can be found in Stock and Watson (1996, 2000).

Linear methods

Autoregression (AR). Box and Jenkins (1970) popularized the use of these models for forecasting economic variables, and they have performed rather well in forecast comparison exercises, see e.g. Meese and Geweke (1984), or Marcellino, Stock and Watson (2001) for the Euro area. The f function in (1) is linear, and Z_t includes lags of the y variable and a deterministic component. The latter can be either a constant or also a linear trend. The lag length is either fixed at 4, or it is chosen by AIC or BIC with a

maximum of 6 lags. Recalling that the y_t variable can be treated as stationary, I(1), or pre-tested for unit roots, overall we have 18 models in this class.

Exponential smoothing (ES). Exponential smoothing is a rather simple forecasting technique that can be shown to be optimal in the mean square forecast error sense only when the underlying process follows a particular ARMA structure, see e.g. Granger and Newbold (1986, Ch.5). Yet, Makridakis et al. (1982) found this method to perform rather well in practice in a forecast comparison exercise. We consider both single and double exponential smoothing, which are usually adopted for, respectively, stationary and trending series. Estimation of the parameters is conducted by means of (recursive) non-linear least squares (see e.g. Tiao and Xu (1993)). The third model in this class is given by a combination of the single and double models, based on the outcome of the unit root test.

No change. This simple forecast is based on a random walk model, so that it is $\hat{y}_{t+h} = y_t$. Notwithstanding its simplicity, in a few cases it was found to outperform even forecasts from large-scale structural models, see e.g. Artis and Marcellino (2001).

Time-varying methods

Time-varying autoregression (TVAR). In this case the parameters of the AR models evolve according to the following multivariate random walk model (see e.g. Nyblom (1989)):

$$\boldsymbol{q}_{ht} = \boldsymbol{q}_{ht-1} + u_{ht}, \qquad u_{ht} \sim iid\,(0, \boldsymbol{l}^2 \boldsymbol{s}^2 Q), \qquad (4)$$

where $\boldsymbol{s}^2$ is the variance of the error term $\boldsymbol{e}$ in (1), $Q = (E(Z_t Z_t^{'}))^{-1}$, and we inspect several values of $\boldsymbol{l}$: 0 (no evolution), 0.0025, 0.005, 0.0075, 0.01, 0.015, or 0.020. We consider first a specification with a constant, 3 lags and $\boldsymbol{l}$ = 0.005, and then we allow for selection of the number of lags (1,3,6) jointly with the value of $\boldsymbol{l}$ by either AIC or BIC. In each case, y_t can be either stationary, or I(1) or pre-tested, so that we have a total of 9 TVAR models. The models are estimated by the Kalman filter.

Logistic smooth transition autoregression (LSTAR). The generic model can be written as

$$y_{t+h}^h = \boldsymbol{a}^{'} \boldsymbol{z}_t + d_t \boldsymbol{b}^{'} \boldsymbol{z}_t + \boldsymbol{e}_{t+h}, \qquad (5)$$

where $d_t = 1/(1+\exp(\gamma_0 + \gamma_1 z_t))$, and $z_t = (1, y_t, y_{t-1}, ..., y_{t-p+1})$ if y_t is treated as stationary or $z_t = (1, \Delta y_t, \Delta y_{t-1}, ..., \Delta y_{t-p+1})$ if y_t is I(1). The smoothing parameters γ_1 regulate the shape of parameter change over time. When $\gamma_1 = 0$ the model becomes linear, while for large values of γ_1 the model tends to a self-exciting threshold model, see e.g. Granger and Terasvirta (1993), Terasvirta (1998) for details. For models specified in levels we consider the following choices for the threshold variable in d_t: $z_t = y_t$, $z_t = y_{t-2}$, $z_t = y_{t-5}$, $z_t = y_t - y_{t-6}$, $z_t = y_t - y_{t-12}$. For differenced variables, it can be $z_t = \Delta y_t$, $z_t = \Delta y_{t-2}$, $z_t = \Delta y_{t-5}$, $z_t = y_t - y_{t-6}$, $z_t = y_t - y_{t-12}$. In each case the lag length of the model was either 1 or 3 or 6. We report results for the following models: 3 lags and $z_t = y_t$ (or $z_t = \Delta y_t$ for the I(1) case); 3 lags and $z_t = y_t - y_{t-6}$; AIC or BIC selection of both the number of lags and the specification of z_t. In each case, y_t can be either stationary, or I(1) or pre-tested, so that overall there are 12 LSTAR models. Estimation is carried out by (recursive) non-linear least squares, using an optimizer developed by Stock and Watson (1999).

Non-linear methods

Artificial neural network (ANN). Artificial neural networks can provide a valid approximation to the generating mechanism of a vast class of non-linear processes, see e.g. Hornik, Stinchcombe and White (1989), and Swanson and White (1997) for their use as forecasting devices. The so called single layer feedforward neural network model with n_1 hidden units (and a linear component) is specified as:

$$y_{t+h}^h = \beta_0' z_t + \sum_{i=1}^{n_1} \gamma_{1i} g(\beta_{1i}' z_t) + \varepsilon_{t+h}, \qquad (6)$$

where $g(x)$ is the logistic function, $g(x) = 1/(1+e^x)$. Note that when n_1=1 the model can be interpreted as a logistic smooth transition autoregression, with the parameter evolution being determined by the linear combination of variables $\beta_{11}' z_t$. A more complex model is the double layer feedforward neural network with n_1 and n_2 hidden units:

$$y_{t+h}^h = \beta_0' z_t + \sum_{j=1}^{n_2} \gamma_{2i} g\left(\sum_{i=1}^{n_1} \beta_{2ji} g(\beta_{1i}' z_t) \right) + \varepsilon_{t+h}. \qquad (7)$$

We report results for the following specifications: n_1=2, n_2=0,p=3 (recall that p is number of lags in z_t); n_1=2, n_2=1,p=3; n_1=2, n_2=2,p=3; AIC or BIC selection with n_1=(1,2,3), n_2=(1,2 with n_1=2),p=(1,3). For each case y_t can be either stationary, or I(1) or pre-tested, which yields a total of 15 ANN models. The models are estimated by (recursive) non-linear least squares, using an algorithm developed by Stock and Watson (1999).

Overall, there are 58 models in the forecast comparison exercise, 22 belong to the linear class, 21 are time-varying, and 15 are non-linear. They are summarized in Table 1. To mimic real time situations, for each variable, method and model the unit-root tests, estimation and model selection are repeated each month over the forecasting period, which is 1994:1-1997:8.

4. Forecast Evaluation

We now have to evaluate the relative forecasting performance of the M=58 models for the N=480 variables in the dataset. The starting point is the choice of a loss function.

For variable *n* and forecasting method *m*, we define the loss function as

$$Loss^{h}_{n,m} = \frac{1}{T-h}\sum_{t=1}^{T-h}\left|e_{t+h,n,m}\right|^{r}, \quad (8)$$

where e_{t+h} is the h-step ahead forecast error, and r can be equal to 1, 1.5, 2, 2.5 or 3. The values $r=1$ and $r=2$ correspond to the familiar choices of, respectively, the mean absolute and the mean square forecast error as the loss function.

In order to compare the loss over the whole set of variables, we adopt the following loss function for method *m*:

$$Loss^{h}_{m} = \frac{1}{N}\sum_{n=1}^{N}\frac{Loss^{h}_{n,m}}{Loss^{h}_{n,1}}, \quad (9)$$

namely, a weighted average of the loss for each variable, with weights given by the inverse of the loss of a benchmark forecast, which makes the magnitude of the losses

comparable across variables. As a benchmark, we adopt throughout an AR model with 4 lags and a constant, specified in levels.

In Table 2 we report the ranking of the models, for different values of r. The results are quite clear cut, and three main comments are in order. First, the best model for any value of r is an AR, with 4 lags when *h=1* or *3* (our benchmark), and with AIC lag selection for *h=6*. The AR(4) ranks second for *h=6*, and the AR(AIC) ranks second for *h=1,3*. In both cases, it is better not to impose the presence of a unit root and not to include a linear trend in the model. AR models with unit roots imposed or pre-tested for appear in the ranking at, respectively, the third and fourth place for some values of r and *h*.

Second, time-varying models perform better than non-linear models, and the best time-varying models are the TVARs. In particular, when $r = 2$, the TVAR with 3 lags, constant and no unit root imposed ranks 4th for *h=6*, 10th for *h=3* and 17th for *h=1*. Several other TVAR models are ranked 15th or lower, while the only LSTAR model in the top-15 has 3 lags, no unit root, and the transition variable is $z_t = y_t - y_{t-6}$.

Third, the performance of the neural network models is very poor, the best ranked model is only 35th. To make sure that this result is not driven by estimation problems due to the small sample size, we have repeated the estimation and forecasting exercises several times with different starting values and a very large number of iterations in the optimization routines, but the figures did not change. Moreover, Stock and Watson (1999) got similar results with longer series for the US.[1]

The ranking in Table 2 is based on the loss function in (9), which is an average over all the variables, so that the TV and non-linear models could still be valuable for some series. To evaluate whether this is the case, we adopt the loss function in (8) with $r = 2$, i.e. the mean square forecast error (msfe), and we find the best forecasting model for each

[1] Note that since we are comparing the average loss over about 500 variables, it is virtually impossible to provide standard errors for the measure in equation (9), and hence tests for whether the average loss between two models is statistically different from zero. Yet, the ranking in Table 2 definitely favors linear models.

variable. In Table 3a we report the fraction of series for which a given method is the best (results for each model are available upon request).

The picture is now rather different. The best methods for the largest proportion of series are ANN, which leads to the lowest msfe for 27% of the 480 series when *h=1* and for 32% when *h=6*, and LSTAR, with 28% of the lowest msfe for *h=3*. The AR method ranks third, with values of 23% for *h=1* and *6*, and of 20% for *h=3*. Even though Stock and Watson (1999) do not explicitly mention it, a similar pattern emerges also for the US, see their Tables 3 and 4.

The second panel of Table 3a shows that if we aggregate the models into linear, time-varying and non-linear methods, there is a substantial equivalence of the three approaches in terms of the fraction of best forecasting models, with only slightly lower values for the non-linear approach.

In Table 3b we provide additional results for the models that perform best for the highest fraction of series in each class. In particular, we compute the fraction of series for which these models are the best or among the top 5, 10, 15 and 20. The resulting figures are of comparable magnitude across models, with slightly lower values for the no-change forecast.

To explain the mismatching ranking of Tables 2 and 3 we have to take a more disaggregate approach. First, for each variable we compute the relative msfe (rmsfe) of each forecasting model with respect to the benchmark AR(4), so that an rmsfe higher than one indicates that the method under analysis is worse than the benchmark. In formulae, the rmsfe of model j for variable m is:

$$rmsfe^{h}{}_{j-AR4,m} = \left(\sum_{t=1}^{T-h} e^{2}_{j,t+h,m}\right) \Big/ \left(\sum_{t=1}^{T-h} e^{2}_{AR4,t+h,m}\right) \qquad (10)$$

Then, for each model, we calculate the empirical distribution of the rmsfe over the variables. In Table 4 we report the mean of the distribution and some percentiles for selected models (the best in Table 2 and those in Table 3b, results for all models are available upon request).

The ranking in Table 2 for $r = 2$ is based on the mean of this distribution, while that in Table 3 in practice is based on the lower percentiles. Hence, we expect the ARFC0a (and the benchmark) to have a lower average rmsfe and a more concentrated

distribution, while the ANN models, and more generally the models in Table 3b, should present higher dispersion and good performance in the lower tail of the distribution.

The figures in Table 4 confirm our expectations. In particular, values of the rmsfe in the lower 10% tail of the distribution are substantially smaller than one for ANN, but also for LSTAR models, while some values in the upper 10% tail are very large. This could suggest to use the median rather than the mean of the distribution to construct the ranking in Table 2. Yet, from the 6^{th} column of Table 4 the median is also in general higher for non-linear than for linear models. It is important to take into consideration the whole distribution.

It is also worth noting that the AR in levels with a constant and AIC lag length selection (ARFC0a) has a highly concentrated distribution over variables, most rmsfe are in the range 0.85 to 1.19 for *h=1*. The corresponding values for the ANN model ANF0b are 0.66 to 2.15, and 0.68 to 2.04 for the LSTAR model LS0063 (these are the best models in their class from Table 3b). Moreover, for these models the dispersion of the distribution increases much more rapidly with the forecast horizon, *h*, than for the AR model.

These characteristics imply that the AR model has a much more stable performance over variables and forecast horizons than time-varying and non-linear models, but the latter can yield substantial gains for some variables and forecast horizons. In Section 6 we will evaluate whether this is the case for some key macroeconomic variables, while in the next Section we analyze in more detail the issue of instability.

5. Measuring the extent of instability

Time-varying models work better than linear specifications for about one third of the series under analysis. Moreover, the success of the non-linear models can be also partly due to instability. In this section we try to measure the extent of instability in the Monetary Union by applying a battery of parameter constancy tests to all the 480 macroeconomic variables. We then repeat the forecasting exercise for the subset of unstable series, and verify whether the time-varying and non-linear models do perform better in this case.

5.1 Instability Tests

Following Stock and Watson (1996), who present a detailed analysis of instability for the US, we consider three different types of statistics.

First, tests for constant versus randomly time-varying coefficients. This set includes Nyblom's (1989, NY) locally most powerful test against the alternative of random walk coefficients (λ=0 versus λ >0 in equation (4)), and a Breusch and Pagan (1979, BP) Lagrange multiplier test against the alternative of iid random coefficients with constant mean and variance.

Second, tests based on functions of the cumulative sum of OLS residuals from equation (1), see Ploeberger and Kramer (1992). We consider the supremum of the cumulative sum (KP1), and its mean square (KP2).

Third, F-tests for constancy of the parameters against the alternative of a single break at an unknown date. The tests are computed recursively for a range of dates, say $[t_0,\ldots,t_1]$, where t_0 and t_1 are selected in order to discard the first and last 15% of the sample. Three functions of the resulting sequence of statistics are considered: the supremum (Quandt (1960, QLR)); the mean (Hansen (1992), Andrews and Ploeberger (1994), MLR); and the so called average exponential (Andrews and Ploeberger (1994), ALR).

Stationarity transformations, i.e. logarithms and differencing, are applied to all series when needed (a detailed list is available upon request), and all series are represented as an AR process in levels, with 3 lags and a constant. In Table 5a we report results for the stability tests, using different significance levels and asymptotic critical values from the papers listed above. More precisely, we report the percentage of series for which the null hypothesis of stability is rejected.

Using a 10% significance level, the figures are in the range 20-40%, with lower values from the KP1 and KP2 tests, and higher values from the recursive F-tests. There is no clear-cut pattern of rejection of stability among series and countries (detailed results for each variable are available upon request, see also the Data Appendix and Section 6), even though price series and monetary aggregates appear often to be unstable.

In Table 5b we investigate whether the detected amount of instability is robust to three extensions. First, instead of using a fixed lag length for all the series, we allow for BIC selection for each variable. Second, because of the short sample, the finite sample distribution of the tests could be different from its asymptotic counterpart. To address this issue, we have generated finite sample critical values by bootstrapping, following a procedure suggested by Stock and Watson (1996). Third, the performance of the Nyblom's statistic and of the F-tests could be affected by the presence of heteroskedasticity in the errors. Hence, we consider a robust version of these tests, where the relevant covariance matrices are estimated by the White's (1980) method.

From Table 5b, BIC selection does not affect the outcome of the tests. Instead, the use of finite sample critical values substantially decreases the fraction of unstable series according to Nyblom's statistic and the F-tests, values are now in the range 10-25%. The KP1, KP2 and BP tests are robust to the change of critical values, and still reject stability for about 20% of the series. The robust estimation of the covariance matrix further decreases the number of unstable series according to the F-tests, to values around 10%.

Overall, we can conclude that tests for parameter stability reject this hypothesis for about 20-30% of the series.

5.2 Forecast evaluation for unstable series

We now evaluate whether the time-varying and non-linear models under analysis forecast better than linear specifications for the unstable series. In particular, we select those series for which the Nyblom's test rejects at the 10% level, so that TVAR models should be particularly favored, see the Data Appendix for a list of these 134 variables.

Table 6 reports the ranking of the top-10 models, according to the loss function in equation (9). An AR in levels, with a constant, and either a fixed or AIC selected number of lags is still the best forecasting model on average. The main difference with respect to Table 2 is that now the TVAR3 ranks second when $h=1$ and $r = 2$. More generally, TV models appear more frequently in the top-10, actually they are the only models in the top-10 not in the linear class, but still most of the top-10 models are linear. The ranking of STAR or ANN models does not improve significantly. This implies that, on average, linear models forecast comparatively well also in the presence of changing parameters.

Yet, if we increase the level of disaggregation by focusing on the percentage of series for which a model forecasts best in msfe terms, the outcome is rather different. From Table 7a, the improved performance of time-varying models for unstable series is evident, in particular for *h=3* and *6*. When *h=3* the TV models forecast best for 51% of the unstable variables, versus 38% in Table 3a, and for 37% when *h=6*, versus 29% in Table 3a. The performance of the linear models deteriorates at all forecast horizions, in particular for *h=1,3*, while that of the non-linear models improves slightly for *h=1* and *6* but deteriorates for *h=3*.

Within the TV class, the performance of the TV-AR improves for all forecast horizons, that for the STAR models for *h=3,6*. This pattern is also reflected in Table 7b, the fraction of series for which the TV models are among the top-N, with N=5, 10 ,15, 20, increases for all values of N with respect to Table 3b.

We can further increase the level of disaggregation, by considering the performance of each model for each variable. In table 8 we report, for the best model in Table 6 and those in Table 7b, the mean of the empirical distribution of the msfe relative to the benchmark ARFC04, and some percentiles. If we focus on the mean, the ranking in Table 6 (for $r = 2$) is obviously confirmed. But if we look at the percentiles, it is evident that the time-varying and non-linear models in Table 7b can perform substantially better than the benchmark and the ARFC0a for a consistent fraction of series. Moreover, the whole empirical distribution for the TV and non-linear models is in general shifted to the left with respect to the case where all the variables are analyzed, see Table 4, which is consistent with the fact that these models should perform better for unstable variables.

In summary, time-varying models forecast better for a larger fraction of unstable series, even though on average linear models are still the best.

6. Forecasting industrial production, unemployment and inflation

In this section we focus on three key macroeconomic variables, namely, industrial production (IP), unemployment (UNEM) and inflation (INFL), for all the 11 countries originally in the EMU. More precisely, we focus on IP growth, the change in the unemployment rate, and the growth in consumer prices.

In Table 9 we report the outcome of the stability tests for these variables. If we label unstable a variable when at least one test rejects, then inflation is the most unstable with 10 rejections out of 11, followed by unemployment with 5 out of 10 (unemployment is not available for Portugal over the whole sample), and IP ranks third with 5 rejections out of 11. Overall, there appears to be enough instability for the time-varying and non-linear models to be potentially useful.

In Table 10 we then compare the ranking of the competing models using the average loss function in equation (9) for several values of ρ, only the top-2 models are reported for each variable to save space. In the case of IP growth, the best models are linear, but for inflation an ANN model ranks second for *h=1* and a TV model for *h=3*, while for unemployment time-varying models rank first (in particular, a TVAR for *h=1* and STAR models for *h=3,6*). Hence, for this variable even the average msfe can be reduced by forecasting with a model outside the linear class.

Table 11 presents the ranking of the methods based on the fraction of series for which they msfe dominate. In this case time-varying methods perform rather well also for IP growth, in particular models in the STAR class and when *h=1,3*. The ANN models rank first in about 50% of the cases for unemployment, and they achieve good results also for inflation. Overall, linear models work well only in about 25% of the cases.

7. Conclusions

In this paper we have provided an accurate analysis of the relative forecasting performance of linear, time-varying and non-linear models, using a very large dataset of 480 macroeconomic variables for the countries in the European Monetary Union. The main finding is that models outside the linear class are useful for a substantial fraction of the series

Three final comments are in order to interpret this result. First, as shown for example in Clements and Hendry (1998, 1999), the best forecasting model does not necessarily provide the closest approximation to the generating mechanism of the process. Yet, the fact that time-varying and non-linear models work well for a substantial fraction of the series, combined with the outcome of the instability tests and with the

many social, economic and institutional changes that affected European countries over the past 20 years, provide enough evidence against the untested use of linear models.

Second, unfortunately, the sample available is rather short, so that estimation and forecast evaluation have to be conducted on a limited number of observations. We have compensated for this effect by increasing substantially the number of series under analysis. Moreover, a longer sample would have likely improved the estimation of non-linear and time-varying models, so that the results could point even more in their favor.

Third, other non-linear or time-varying models could perform even better, and computation of the forecasts using simulation methods could further increase the forecast gains.

Thus, this paper would like to encourage applied researchers to go beyond linearity, and economists to investigate in more detail the economic rationale underlying the good performance of non-linear models.

References

Andrews, D.W.K. and Ploeberger, W. (1994), "Optimal tests when a nuisance parameter is present only under the alternative", *Econometrica*, 62, 1383-1414.

Artis, M. and Marcellino, M. (2001), "Fiscal forecasting: the track record of IMF, OECD *Econometrics Journal*, 4, s20-s36.

Box, G.E.P. and Jenkins, G.M. (1970), *Time series analysis, forecasting and control*, San Francisco: Holden Day.

Breusch, T.S. and Pagan, A.R. (1979), "A simple test for heteroschedasticity and random coefficient variation", *Econometrica*, 47, 1287-1294.

Clements, M.P. and Hendry, D.F. (1996), "Multi-step estimation for forecasting", *Oxford Bulletin of Economics and Statistics*, 58, 657-684.

Clements, M.P. and Hendry, D.F. (1998), *Forecasting Economic Time Series*, Cambridge: Cambridge University Press.

Clements, M.P. and Hendry, D.F. (1999), *Forecasting Non-Stationary Economic Time Series*, Cambridge (MA): MIT Press.

Diebold, F.X. and Kilian, L. (2000), "Unit Root Tests are Useful for Selecting Forecasting Models," *Journal of Business and Economic Statistic*s, 18, 265-273.

Elliott, G., Rothenberg, T.J. and Stock, J.H. (1996), "Efficient tests for an autoregressive *Econometrica*, 64, 813-36.

Granger, C.W.J. and Newbold, P. (1986), *Forecasting economic time series*, San Diego: Academic Press.

Granger, C.W.J. and Terasvirta, T. (1993), *Modelling nonlinear economic relationships*, Oxford: Oxford University Press.

Hansen, B. (1992), "Tests for parameter instability in regressions with I(1) processes, *Journal of Business and Economic Statistic*s, 10, 321-336.

Hornik, K., Stinchcombe, M. and White, H. (1989), "Multilayer feedforward networks are universal approximators", *Neural Networks*, 2, 359-66.

Marcellino, M., Stock, J.H. and Watson, M.W. (2000), "A dynamic factor analysis of the *mimeo.*

Marcellino, M., Stock, J.H. and Watson, M.W. (2001), "Macroeconomic forecasting in the Euro area: country specific versus Euro wide information", *European Economic Review* (forthcoming).

Makridakis, S. Anderson, A., Carbonne, R., Fildes, R., Hibon, M., Lewandowski, R., Newton, J., Parzen, E., Winkler, R. (1982), "The accuracy of extrapolation (time series) methods: Results of a forecasting competition", *Journal of Forecasting*, 1, 111-153.

Meese, R. and Geweke, J. (1984), A comparison of autoregressive univariate forecasting procedures for macroeconomic time series", *Journal of Business and Economic Statistics*, 2, 191-200.

Nyblom, J. (1989), "Testing for constancy of parameters over time", *Journal of the American Statistical Association*, 84, 223-230.

Ploeberger, W. and Kramer, W. (1992), "The CUSUM test with OLS residuals", *Econometrica*, 60, 271-286.

Quandt, R.E. (1960), "Tests of the hypothesis that a linear regression system obeys two *Journal of the American Statistical Association*, 55, 324-330.

Swanson, N.R. and White, H. (1997), "A model selection approach to real-time macroeconomic forecasting using linear models and artificial neural networks", Review of Economics and Statistics, 79, 540-550.

Terasvirta, T. (1998), "Modelling economic relationships with smooth transition Ullah, A. and Giles, D.E.A. (eds.), *Handbook of Applied Economic Statistics*, New York: Marcel Dekker, 507-552.

Tiao, G.C. and Xu, D. (1993), "Robustness of maximum likelihood estimates for multi-step predictions: the exponential smoothing case", *Biometrika*, 80, 623-641.

Stock, J.H. (1996), "VAR, error correction and pretest forecasts at long horizons", *Oxford Bulletin of Economics and Statistics*, 58, 685-701.

Stock, J.H. and Watson, M.W. (1996), "Evidence on structural instability in macroeconomic time series relations", *Journal of Business and Economic Statistic*s, 14, 11-30.

Stock, J.H. and Watson, M.W. (1999), "A comparison of linear and nonlinear univariate models for forecasting macroeconomic time series", in Engle, R. and White, R. (eds), *Cointegration, causality, and forecasting: A festschrift in honor of Clive W.J. Granger*, Oxford: Oxford University Press, 1-44.

White, H. (1980), "A heteroskedasticity consistent covariance matrix estimator and a direct test for heteroskedasticity", *Econometrica*, 48, 817-830.

Table 1 – Forecasting models

Linear methods

ARF(X,Y,Z)	*Autoregressive models* (18 models) X = C (const.) or T (trend) Y = 0 (stationary), 1 (I(1)), P (pre-test) Z = 4 (4 lags), a (AIC), b (BIC)
EX(X)	*Exponential smoothing* (3 models) X = 1 (single), 2 (double), P (pre-test)
NOCHANGE	*No change forecast* (1 model)

Time-varying methods

ARTVF(X,Y,Z)	*Time-varying AR models* (9 models) X = C (const.) Y = 0 (stationary), 1 (I(1)), P (pre-test) Z = 3 (3 lags), a (AIC), b (BIC)
LS(X,Y,Z)	*Logistic smooth transition* (6 models) X = 0 (stationary), 1 (I(1)), P (pre-test) Y = transition variable, 10 ($z_t = y_t$), 06 ($z_t = y_t - y_{t-6}$) Z = 3 (p, lag length)
LSF(X,W)	*Logistic smooth transition* (6 models) X = 0 (stationary), 1 (I(1)), P (pre-test) W = a (AIC on transition variable and p), b (BIC)

Non-linear methods

AN(X,Y,Z,W)	*Artificial neural network models* (9 models) X = 0 (stationary), 1 (I(1)), P (pre-test) Y = 2 (n_1) Z = 0, 1, 2 (n_2) W = 3 (p, lag length)
ANF(X,S)	*Artificial neural network models* (6 models) X = 0 (stationary), 1 (I(1)), P (pre-test) S = a (AIC on n_1, n_2, p), b (BIC)

Table 2 - Ranking of competing models with different loss functions

Rank	Horizon	ρ=1	ρ=1.5	ρ=2	ρ=2.5	ρ=3
1	h=1	ARFC04	ARFC04	ARFC04	ARFC04	ARFC04
	h=3	ARFC04	ARFC04	ARFC04	ARFC04	ARFC04
	h=6	ARFC0a	ARFC0a	ARFC0a	ARFC0a	ARFC0a
2	h=1	ARFC0a	ARFC0a	ARFC0a	ARFC0a	ARFC0a
	h=3	ARFC0a	ARFC0a	ARFC0a	ARFC0a	ARFC0a
	h=6	ARFC04	ARFC04	ARFC04	ARFC04	ARFC04
3	h=1	ARFT1a	ARFT1a	ARFT1a	ARFC1a	ARFC1a
	h=3	ARFC0b	ARFC0b	ARFC0b	ARFC0b	ARFC0b
	h=6	ARFC0b	ARFC0b	ARFC0b	ARFC0b	ARFC0b
4	h=1	ARFC0b	ARFC0b	ARFC1a	ARFTPa	ARFTPa
	h=3	ARFC1a	ARFC1a	ARFC1a	ARFC1a	ARFC1a
	h=6	ARFC1a	ARFC1a	ARTVFC03	ARTVFC03	ARTVFC03
5	h=1	ARFT1b	ARFC1a	ARFTPa	ARFT1a	ARFCPa
	h=3	ARFTPa	ARFTPa	ARFTPa	ARFTPa	ARFTPa
	h=6	ARFCPa	ARFCPa	ARFC1a	ARFT1a	ARTVFC0b
6	h=1	ARFC1a	ARFTPa	ARFC0b	ARFC0b	ARFC0b
	h=3	ARFCPa	ARFCPa	ARFCPa	ARFCPa	ARFCPa
	h=6	ARFTPa	ARFTPa	ARFT1a	ARFC1a	ARFT1a
7	h=1	ARFT14	ARFT14	ARFCPa	ARFCPa	ARFT1a
	h=3	ARFC1b	ARFC1b	ARTVFC1b	ARTVFC03	ARTVFC03
	h=6	ARFT1a	ARFT1a	ARFCPa	ARFCPa	ARTVFC0a
8	h=1	ARFTPa	ARFT1b	ARFT14	ARTVFC1b	ARTVFC1b
	h=3	ARFTPb	ARTVFC1b	ARTVFCPb	ARTVFC1b	ARTVFC1b
	h=6	ARFC1b	ARTVFC03	ARFTPa	ARFTPa	ARFC1a
9	h=1	ARTVFC03	ARFCPa	ARTVFC1b	ARTVFC1a	ARTVFC1a
	h=3	ARFT1a	ARFT1a	ARFC1b	ARTVFCPb	ARTVFCPb
	h=6	ARTVFC1a	ARFT14	ARFT14	ARTVFC0b	ARFCPa
10	h=1	ARFCPa	ARTVFC1b	ARTVFC1a	ARFT14	ARTVFCP3
	h=3	ARTVFC1b	ARFTPb	ARTVFC03	ARTVFC1a	ARTVFCPa
	h=6	ARFCPb	ARFC1b	ARFT1b	ARFT1b	ARFT1b

Notes:
See Table1 for definition of models

The loss function is $Loss^{h}{}_{m} = \frac{1}{N}\sum_{n=1}^{N}\frac{Loss^{h}{}_{n,m}}{Loss^{h}{}_{n,1}}, \quad Loss^{h}{}_{n,m} = \frac{1}{T-h}\sum_{t=1}^{T-h}\left|e_{t+h,n,m}\right|^{r}$, where the benchmark model is ARFC04 and e_{t+h} is the h-step ahead forecast error

Table 3a – Fraction of series for which a forecasting method has lowest msfe

Method	AR	ES	NoChange	ARTV	LSTAR	ANN
h=1	0.23	0.11	0.02	0.13	0.25	0.27
h=3	0.20	0.09	0.02	0.10	0.28	0.27
h=6	0.23	0.11	0.03	0.06	0.23	0.32

Method	Linear	Time-varying	Non-linear
h=1	0.36	0.38	0.27
h=3	0.31	0.38	0.27
h=6	0.37	0.29	0.32

Notes:
Linear method includes AR,ES, No Change.
Time-varying method includes ARTV, LSTAR.
Non-linear method includes ANN.
Figures do not sum up to one because of rounding errors.

Table 3b – Fraction of series for which a forecasting model is in the top-N

	N=1	N=5	N=10	N=15	N=20
ARFT0b	0.03	0.12	0.22	0.32	0.39
	0.03	0.14	0.21	0.31	0.37
	0.04	0.14	0.19	0.26	0.32
EX1	0.05	0.16	0.25	0.30	0.36
	0.05	0.15	0.24	0.30	0.35
	0.05	0.16	0.25	0.29	0.36
NOCHANGE	0.02	0.08	0.12	0.16	0.21
	0.02	0.09	0.15	0.19	0.24
	0.03	0.13	0.19	0.23	0.27
ARTVFC03	0.04	0.14	0.24	0.35	0.44
	0.03	0.16	0.28	0.37	0.41
	0.02	0.07	0.21	0.31	0.38
LS0063	0.04	0.12	0.18	0.26	0.34
	0.04	0.13	0.22	0.30	0.37
	0.04	0.11	0.21	0.30	0.37
ANF0b	0.05	0.13	0.20	0.26	0.30
	0.04	0.14	0.22	0.28	0.33
	0.05	0.14	0.22	0.27	0.32

Notes: See Table 1 for definition of models
The figures report the fraction of series for which a model is among the N models with the lowest msfe.
The reported models are the best performers in each class for N=1.
For each model, the three rows report result for, respectively, h=1,3,6.

Table 4 – Mean and percentiles of relative msfe for selected forecasting models

Forecast	Mean	0.02	0.10	0.25	0.50	0.75	0.90	0.98
ARFC04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ARFC0a	1.01	0.85	0.94	0.99	1.00	1.03	1.08	1.19
	1.01	0.77	0.92	0.98	1.00	1.04	1.08	1.21
	1.00	0.66	0.84	0.94	1.00	1.03	1.14	1.38
ARFT0b	1.08	0.67	0.87	0.95	1.02	1.11	1.30	1.93
	1.22	0.45	0.74	0.88	1.04	1.26	1.79	3.44
	1.84	0.19	0.49	0.75	1.08	1.84	2.99	9.79
EX1	1.50	0.65	0.85	0.94	1.05	1.26	2.02	5.00
	1.81	0.43	0.76	0.91	1.06	1.40	3.08	9.75
	3.55	0.16	0.44	0.76	1.07	1.78	5.24	20.32
NOCHANGE	1.67	0.64	0.88	1.02	1.24	1.56	2.24	5.00
	1.90	0.42	0.77	0.95	1.22	1.63	3.04	9.75
	3.65	0.15	0.44	0.81	1.27	2.18	4.56	18.28
ARTVFC03	1.03	0.72	0.90	0.96	1.01	1.07	1.17	1.52
	1.07	0.59	0.81	0.92	1.01	1.12	1.34	2.14
	1.24	0.37	0.62	0.86	1.04	1.29	1.96	3.94
LS0063	1.14	0.68	0.88	0.97	1.05	1.16	1.36	2.04
	1.15	0.55	0.81	0.95	1.05	1.21	1.60	2.52
	1.36	0.27	0.60	0.84	1.03	1.35	2.23	4.93
ANF0b	1.31	0.66	0.88	0.98	1.08	1.24	1.53	2.15
	1.42	0.41	0.78	0.95	1.14	1.47	2.09	4.76
	2.75	0.16	0.48	0.87	1.30	2.15	4.13	12.17

Notes:
The models are the best in Table 2 and those in Table 3b
The benchmark model is ARFC04
For each forecast the three rows correspond to, respectively, h=1, 3, 6
See Table 1 for the definition of the models

Table 5a –Stability Tests

Percentage of series significant at

	NY	KP1	KP2	BP	QLR	MLR	ALR
10% level	27.9	22.5	20.6	31.5	40.8	34.6	41.7
5% level	21.0	16.0	16.9	26.7	35.2	28.5	35.2
1% level	8.3	5.2	9.6	17.3	24.6	17.5	23.3

Notes:
The model is an AR3, except for the second line where the lag length is selected by BIC
NY is Nyblom's (1989) test
KP1 and KP2 are the Ploeberger and Kramer's (1992) supremum and mean square tests
BP is Breusch and Pagan's (1979) Lagrange multiplier test
QLR is Quandt's (1960) supremum F-test
MLR is Andrews and Ploeberger's (1994) mean F-test
ALR is Andrews and Ploeberger's (1994) average exponential F-test

Table 5b –Stability Tests, sensitivity analysis

Percentage of series significant at the 10%

Lag L	Cval	H-R	NY	KP1	KP2	BP	QLR	MLR	ALR
Fixed	Asy.	No	27.9	22.5	20.6	31.5	40.8	34.6	41.7
BIC	Asy.	No	25.4	21.9	20.4	33.5	41.7	33.8	39.6
Fixed	MC	No	10.6	24.8	21.3	20.0	25.6	16.5	23.8
Fixed	MC	Yes	8.8	--	--	--	10.8	10.6	11.3

Notes:
Lag L indicates whether the lag length is fixed at 3 or BIC determined
Cval indicates whether the critical values are asymptotic or for finite sample (MC)
H-R indicates robust estimation of the relevant covariance matrices
See the Notes to Table 5a for a description of the tests

Table 6 - Unstable series , ranking of competing models with different loss functions

Rank		ρ=1	ρ=1.5	ρ=2	ρ=2.5	ρ=3
1	h=1	ARFT1b	ARFC04	ARFC04	ARFC04	ARFC04
	h=3	ARFT1a	ARFC0a	ARFC0a	ARFC0a	ARFC04
	h=6	ARFC0a	ARFC0a	ARFC0a	ARFC0a	ARFC0a
2	h=1	ARFT1a	ARTVFC03	ARTVFC03	ARFC0a	ARFC0a
	h=3	ARFC0a	ARFT1a	ARFC04	ARFC04	ARFC0a
	h=6	ARFC04	ARFC04	ARFC04	ARFC04	ARFC04
3	h=1	ARFC04	ARFT1a	ARFT1a	ARFC0b	ARFC0b
	h=3	ARFT1b	ARFC04	ARFC0b	ARFC0b	ARFC0b
	h=6	ARFC0b	ARFC0b	ARFC0b	ARFC0b	ARFC0b
4	h=1	ARTVFC03	ARFT1b	ARFC0a	ARFT14	ARFT14
	h=3	ARFT14	ARFC0b	ARFT1a	ARFT1a	ARFT1a
	h=6	ARFT1a	ARFT1a	ARFT1a	ARFT1a	ARFT1a
5	h=1	ARFT14	ARFT14	ARFT14	ARFT1a	ARFT1a
	h=3	EXP	ARFT1b	ARFT14	ARTVFC03	ARTVFC03
	h=6	ARFT14	ARFT14	ARFT14	ARFT14	ARFT14
6	h=1	ARFC0b	ARFC0a	ARFT1b	ARTVFC03	ARFT1b
	h=3	ARFC0b	ARFT14	ARFT1b	ARFT14	ARFT14
	h=6	ARFT1b	ARFT1b	ARFT1b	ARFT1b	ARFT1b
7	h=1	ARFC0a	ARFC0b	ARFC0b	ARFT1b	ARTVFC03
	h=3	ARFC04	ARTVFC03	ARTVFC03	ARFT1b	ARFT1b
	h=6	ARTVFC03	ARTVFC03	ARTVFC03	ARTVFC03	ARTVFC03
8	h=1	EXP	EXP	EXP	ARTVFC1b	ARTVFC1b
	h=3	ARTVFC03	EXP	EXP	ARTVFC0b	ARTVFC0b
	h=6	EXP	ARTVFC0b	ARTVFC0b	ARTVFC0b	ARTVFC0b
9	h=1	EX2	EX2	ARTVFC1b	ARTVFC1a	ARTVFCPb
	h=3	EX2	ARTVFC0b	ARTVFC0b	ARTVFC0a	ARTVFC0a
	h=6	EX2	ARTVFC0a	ARTVFC0a	ARTVFC0a	ARTVFC0a
10	h=1	ARTVFC0a	ARTVFC1b	ARTVFC1a	ARTVFCPb	ARTVFC1a
	h=3	ARTVFC0b	ARTVFC0a	ARTVFC0a	EXP	EXP
	h=6	ARFC1a	EXP	EXP	EXP	EXP

Notes:
See Table1 for definition of models

The loss function is $Loss^{h}{}_{m} = \frac{1}{N}\sum_{n=1}^{N}\frac{Loss^{h}{}_{n,m}}{Loss^{h}{}_{n,1}}, \quad Loss^{h}{}_{n,m} = \frac{1}{T-h}\sum_{t=1}^{T-h}\left|e_{t+h,n,m}\right|^{r}$, where the benchmark model is ARFC04 and e_{t+h} is the h-step ahead forecast error

Table 7a – Fraction of unstable series for which a forecasting method has lowest msfe

Method	AR	ES	NoChange	ARTV	LSTAR	ANN
h=1	0.17	0.04	0.04	0.17	0.21	0.31
h=3	0.15	0.1	0.01	0.16	0.35	0.20
h=6	0.22	0.08	0.05	0.08	0.29	0.28

Method	Linear	Time-varying	Non-linear
h=1	0.25	0.38	0.31
h=3	0.17	0.51	0.20
h=6	0.35	0.37	0.28

Notes:
Linear method includes AR,ES, No Change.
Time-varying method includes ARTV, LSTAR.
Non-linear method includes ANN.
Figures do not sum up to one because of rounding errors.

Table 7b – Fraction of unstable series for which a forecasting model is in the top-N

	N=1	N=5	N=10	N=15	N=20
ARFT1b	0.02	0.12	0.30	0.39	0.54
	0.04	0.14	0.28	0.35	0.48
	0.04	0.17	0.25	0.34	0.43
EX1	0.01	0.13	0.20	0.25	0.34
	0.06	0.13	0.22	0.25	0.30
	0.04	0.14	0.21	0.24	0.31
NOCHANGE	0.04	0.13	0.18	0.24	0.29
	0.01	0.11	0.16	0.20	0.26
	0.05	0.13	0.21	0.24	0.28
ARTVFC03	0.09	0.23	0.34	0.49	0.57
	0.06	0.19	0.33	0.46	0.51
	0.03	0.07	0.23	0.34	0.40
LS0103	0.03	0.13	0.25	0.34	0.40
	0.07	0.25	0.33	0.39	0.46
	0.07	0.21	0.31	0.36	0.41
ANF0b	0.09	0.21	0.29	0.37	0.39
	0.04	0.18	0.27	0.34	0.40
	0.05	0.18	0.29	0.36	0.41

Notes: See Table 1 for definition of models
The figures report the fraction of series for which a model is among the N models with the lowest msfe.
The reported models are the best performers in each class for N=1.

Table 8 – Unstable series, mean and percentiles of relative msfe for selected forecasting models

Forecast	Mean	0.02	0.10	0.25	0.50	0.75	0.90	0.98
ARFC04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ARFC0a	1.01	0.87	0.97	0.99	1.00	1.03	1.07	1.20
	0.99	0.74	0.89	0.97	1.00	1.04	1.08	1.20
	0.98	0.62	0.81	0.91	0.98	1.03	1.15	1.37
ARFT1b	1.01	0.69	0.84	0.95	1.01	1.06	1.18	1.45
	1.03	0.34	0.62	0.87	1.03	1.17	1.34	2.06
	1.29	0.14	0.35	0.68	1.01	1.29	2.74	5.19
EX1	1.59	0.70	0.86	0.95	1.09	1.48	2.14	4.57
	1.91	0.39	0.74	0.92	1.15	1.86	3.84	7.42
	2.83	0.15	0.40	0.79	1.36	2.63	6.23	18.26
NOCHANGE	1.67	0.64	0.85	1.00	1.14	1.63	2.36	4.57
	1.94	0.36	0.73	0.94	1.18	1.96	3.84	7.42
	2.86	0.13	0.39	0.79	1.38	2.64	6.23	18.26
ARTVFC03	1.01	0.68	0.85	0.92	0.99	1.05	1.17	1.53
	1.03	0.56	0.75	0.87	0.97	1.10	1.29	2.57
	1.33	0.28	0.50	0.83	1.03	1.47	2.05	3.94
LS0103	1.15	0.68	0.88	0.96	1.06	1.18	1.45	1.89
	1.19	0.46	0.73	0.87	1.05	1.35	1.73	2.89
	1.67	0.12	0.40	0.70	1.09	1.68	3.46	8.21
ANF0b	1.13	0.67	0.82	0.94	1.05	1.21	1.41	2.15
	1.40	0.33	0.73	0.90	1.13	1.41	2.07	4.54
	2.57	0.08	0.33	0.66	1.15	2.63	6.28	14.97

Notes:
The benchmark model is ARFC04
The models are the best from Table 6 and those from Table 7b
For each forecast the three rows correspond to, respectively, h=1, 3, 6
See Table 1 for the definition of the models

Table 9 –Stability Tests for Unemployment, IP and Inflation

Series	NY		KP1		KP2		BP		QLR		MLR		ALR	
Ger-UNEM	0.86		1.08		0.25		5.98		11.76		5.38		3.33	
Ger-IP	0.78		1.14		0.19		4.85		12.11		4.63		3.87	
Ger-INFL	1.03		1.13		0.3		8.48	**	13.6		7.92	**	4.89	*
Ita-UNEM	0.47		0.87		0.17		10.29	**	8.71		3.78		2.41	
Ita-IP	0.57		0.58		0.07		2.15		8.37		3.3		2.13	
Ita-INFL	0.78		0.73		0.21		7.54	*	11.23		5.3		3.08	
Spa-UNEM	0.83		0.79		0.16		1.34		19.65	**	6.89	*	6.81	**
Spa-IP	1.34	**	0.99		0.14		5.76		16.21	**	8.21	**	5.53	**
Spa-INFL	1.74	***	1.51	**	1.07	***	9.52	**	39.79	***	15.01	***	15.76	***
Fra-UNEM	0.34		0.66		0.08		3.44		6.89		2.06		1.5	
Fra-IP	0.52		0.64		0.09		7.43	*	6.69		2.95		1.82	
Fra-INFL	1.3	**	1.04		0.44	*	3.18		30.39	***	15.45	***	11.48	***
Aus-UNEM	0.4		0.69		0.06		9.16	**	9		2.4		1.91	
Aus-IP	0.8		0.64		0.07		0.78		8.85		4.59		2.79	
Aus-INFL	0.39		0.94		0.26		0.78		9.34		2.71		2.33	
Lux-UNEM	0.92		1.23	*	0.38	*	7.59	*	9.96		5.33		3.22	
Lux-IP	0.58		0.98		0.24		5.1		9.52		3.23		2.38	
Lux-INFL	0.77		1.08		0.19		5.32		19.47	**	4.89		5.7	**
Net-UNEM	1.99	***	0.75		0.13		9.26	**	23.88	***	11.03	***	7.4	***
Net-IP	0.49		0.48		0.02		5.54		7.16		3.49		2.17	
Net-INFL	1.28	**	1.26	*	0.34	*	4.17		20.85	***	10.5	***	7.33	***
Fin-UNEM	1.92	***	0.85		0.14		8.65	**	135.35	***	54.7	***	63.69	***
Fin-IP	1.27	**	1.31	*	0.31		3.45		17.09	**	8.71	**	5.66	**
Fin-INFL	1.41	**	1.5	**	0.78	***	3.06		20.2	***	12.47	***	7.6	***
Por-IP	0.46		1.29	*	0.23		1.59		8.79		2.66		2.15	
Por-INFL	1.23	**	1.15		0.57	**	27.29	***	38.04	***	11.05	***	14.85	***
Bel-UNEM	0.66		0.98		0.18		4.65		8.93		4.47		2.76	
Bel-IP	0.32		0.72		0.08		11.21	**	5.44		1.48		0.89	
Bel-INFL	1.66	***	1.48	**	0.5	**	12.35	***	35.86	***	14.38	***	13.41	***
Ire-UNEM	0.63		0.83		0.23		1.58		11.06		4.55		3.02	
Ire-IP	0.69		0.98		0.28		1.9		7.77		4.13		2.34	
Ire-INFL	1.4	**	0.93		0.2		0.98		16.13	**	8.49	**	6.14	**

Notes:
The model is an AR3 for the change in unemployment, and growth in IP and CPI
NY is Nyblom's (1989) test
KP1 and KP2 are the Ploeberger and Kramer's (1992) supremum and mean square tests
BP is Breusch and Pagan's (1979) Lagrange multiplier test
QLR is Quandt's (1960) supremum F-test
MLR is Andrews and Ploeberger's (1994) mean F-test
ALR is Andrews and Ploeberger's (1994) average exponential F-test
*, **, and *** indicate significance at, respectively, 10%, 5% and 1% level

Table 10 - Ranking of competing models with different loss functions, selected series

IP growth

Rank		ρ=1	ρ=1.5	ρ=2	ρ=2.5	ρ=3
1	h=1	ARFTP4	ARFTP4	ARFTP4	ARFTP4	ARFCP4
	h=3	ARFTP4	ARFCP4	ARFTP4	ARFCP4	ARFCP4
	h=6	ARFCPa	ARFCP4	ARFTP4	ARFTP4	ARTVFC13
2	h=1	ARFC14	ARFC14	ARFC14	ARFC14	ARFC14
	h=3	ARFC14	ARFC14	ARFC14	ARFC14	ARFC14
	h=6	ARFTPa	ARFC14	ARFC14	ARFC14	ARTVFCP3

Unemployment (change)

Rank		ρ=1	ρ=1.5	ρ=2	ρ=2.5	ρ=3
1	h=1	NOCHANGE	ARTVFCP3	ARTVFCP3	ARTVFC13	ARTVFC13
	h=3	LSP063	LS1063	LS1063	LSP063	LSP063
	h=6	ANP213	ANP213	LSF1a	ANF1b	ANFPb
2	h=1	ARFTPb	ARTVFC13	ARTVFC13	ARTVFCP3	ARTVFCP3
	h=3	LS1063	LSP063	LSP063	LS1063	LS1063
	h=6	AN1213	AN1213	LSFPa	ANFPb	ANF1b

CPI inflation

Rank		ρ=1	ρ=1.5	ρ=2	ρ=2.5	ρ=3
1	h=1	ARFC04	ARFC04	ARFC04	ARFC04	ARFC04
	h=3	LS0103	ARFC04	ARFC04	ARFC04	ARFC04
	h=6	AN0223	ARFC04	ARFC04	ARFC0a	ARFC0a
2	h=1	ANF0b	ANF0b	ANF0b	ANF0b	ANF0b
	h=3	ARFC04	LS0103	LS0103	LS0103	LS0103
	h=6	ARFC04	AN0223	ARFC0a	ARFC04	ARFC04

Notes:
See Table1 for definition of models

The loss function is $Loss^{h}{}_{m} = \frac{1}{N}\sum_{n=1}^{N}\frac{Loss^{h}{}_{n,m}}{Loss^{h}{}_{n,1}}$, $Loss^{h}{}_{n,m} = \frac{1}{T-h}\sum_{t=1}^{T-h}\left|e_{t+h,n,m}\right|^{r}$, where the benchmark model is ARFC04 and e_{t+h} is the h-step ahead forecast error

Unemployment for Portugal is not available

Table 11 - Fraction of series for which a forecasting method has lowest msfe

IP growth

Method	AR	ES	NoChange	ARTV	LSTAR	ANN
h=1	2/11	-	-	1/11	7/11	1/11
h=3	1/11	1/11	-	2/11	6/11	1/11
h=6	4/11	-	-	1/11	-	6/11

Method	Linear	Time-varying	Non-linear
h=1	2/11	8/11	1/11
h=3	2/11	8/11	1/11
h=6	4/11	1/11	6/11

Unemployment (change)

Method	AR	ES	NoChange	ARTV	LSTAR	ANN
h=1	3/10	1/10	-	2/10	-	4/10
h=3	2/10	-	-	-	3/10	5/10
h=6	1/10	1/10	-	-	3/10	5/10

Method	Linear	Time-varying	Non-linear
h=1	4/10	2/10	4/10
h=3	2/10	3/10	5/10
h=6	2/10	3/10	5/10

CPI inflation

Method	AR	ES	NoChange	ARTV	LSTAR	ANN
h=1	3/11	1/11	-	1/11	-	6/11
h=3	2/11	-	-	2/11	5/11	2/11
h=6	1/11	-	1/11	1/11	3/11	5/11

Method	Linear	Time-varying	Non-linear
h=1	4/11	1/11	6/11
h=3	2/11	7/11	2/11
h=6	2/11	4/11	5/11

Notes:
Unemployment for Portugal is not available
Linear method includes AR,ES, No Change.
Time-varying method includes ARTV, LSTAR.
Non-linear method includes ANN.

Appendix: The dataset

The first column reports the OECD identifier of the series. The second column reports ***, **, * when the Nyblom (1989) test for parameter stability rejects at the, respectively, 1%, 5%, and 10% level. The third column reports a brief description of the series.

Austria

OECD Code		OECD Definition
7020349K	*	Consumer goods, sa /Industrial production /PRODUCTION 1990=100 Austria /AUTNSO-OECD STATI
7020439K		Intermediate goods, sa /Industrial production /PRODUCTION 1990=100 Austria /AUTNSO-OECD ST
7020449K		Investment goods, sa /Industrial production /PRODUCTION 1990=100 Austria /AUTNSO-OECD STAT
7020519K		Total, sa /Industrial production /PRODUCTION 1990=100 Austria /AUTNSO-OECD STATISTICS, PAR
70206780		Crude steel /Commodity output /PRODUCTION tonnes '000 Austria /INTISI-OECD STATISTICS, PAR
7032419K		Total: value, sa /Retail sales /DOMESTIC TRADE 1990=100 Austria /AUTNSO-OECD STATISTICS, P
7032439K		Durable goods: value, sa /Retail sales /DOMESTIC TRADE 1990=100 Austria /AUTNSO-OECD STAT
7032449K		RETAIL SALES (volume), sa 1990 = 100 Austria /AUTNSO-OECD STATISTICS, PARIS"
7032519K		Total: value, sa /Wholesale sales /DOMESTIC TRADE 1990=100 Austria /AUTNSO-OECD STATISTIC
70325383		New passenger car registrations, sa /Domestic trade - other /DOMESTIC TRADE '000 Austria /
70426780		Foreign workers /Employment /LABOUR '000 Austria /AUTLAB-OECD STATISTICS, PARIS"
70428283		Registered unemployed, sa /Unemployment /LABOUR '000 Austria /AUTLAB-OECD STATISTICS, PA
704284A3		Rate, sa /Unemployment /LABOUR % Austria /AUTLAB-OECD STATISTICS, PARIS"
70429983	***	Unfilled vacancies, sa /Labour - other /LABOUR (continued) '000 Austria /AUTLAB-OECD STATI
7043119H		Hourly rates /Wages /WAGES 1990=100 Austria /AUTNSO-OECD STATISTICS, PARIS"
7043219K		Monthly earnings, sa /Wages /WAGES 1990=100 Austria /AUTNSO-OECD STATISTICS, PARIS"
7043779H		PRODUCER PRICES (manufacturing) 1990 = 100 Austria /AUTNSO-OECD STATISTICS, PARIS"
7044029H	**	Agricultural goods /Wholesale prices /PRICES 1990=100 Austria /AUTNSO-OECD STATISTICS, PAR
7044119H		Food /Wholesale prices /PRICES 1990=100 Austria /AUTNSO-OECD STATISTICS, PARIS"
7044219H	*	Petroleum products /Wholesale prices /PRICES 1990=100 Austria /AUTNSO-OECD STATISTICS, PA
7044259H	***	Transport equipment /Wholesale prices /PRICES 1990=100 Austria /AUTNSO-OECD STATISTICS, P/
7044459H		Food /Consumer prices /PRICES 1990=100 Austria /AUTNSO-OECD STATISTICS, PARIS"
7044479H		Fuel and electricity /Consumer prices /PRICES 1990=100 Austria /AUTNSO-OECD STATISTICS, PA
7044559H		All items less food /Consumer prices /PRICES 1990=100 Austria /AUTNSO-OECD STATISTICS, PAR
7044579H		All items less food less rent /Consumer prices /PRICES 1990=100 Austria /AUTNSO-OECD STATI
7044589H		Rent /Consumer prices /PRICES 1990=100 Austria /AUTNSO-OECD STATISTICS, PARIS"
7044619H		All items /Consumer prices /PRICES 1990=100 Austria /AUTNSO-OECD STATISTICS, PARIS"
7044639H		All items excl. seasonal items /Consumer prices /PRICES 1990=100 Austria /AUTNSO-OECD STAT
7054821D		AUT MONETARY AGGREGATE M1 SA /MN SCHILLING Austria OECD STATISTICS, PARIS"
7054829D		MONETARY AGGREGATES, sa 1990 = 100 Austria /AUTCBA-OECD STATISTICS, PARIS"
7054831D	**	AUT MONETARY AGGREGATE (M3) SA /MN SCHILLING Austria OECD STATISTICS, PARIS"
7054839D	**	MONETARY AGGREGATES, sa 1990 = 100 Austria /AUTCBA-OECD STATISTICS, PARIS"
7054911A	*	AUT SAVINGS DEPOSITS /MN SCHILLING Austria OECD STATISTICS, PARIS"
7054911X		AUT FOREIGN EXCHANGE DEPOSITS /MN SCHILLING Austria OECD STATISTICS, PARIS"
7055111A	**	AUT QUASI-MONEY /MN SCHILLING Austria OECD STATISTICS, PARIS"
7055251A	**	Domestic credit /Domestic finance /DOMESTIC FINANCE S bln Austria /AUTCBA-OECD STATISTICS
705561AH		Official discount /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Austria /AUTCBA-OE
7055809H		VSE WBI Index /Share prices /INTEREST RATES - SHARE PRICES 1990=100 Austria /AUTSTE-OE(
705581AH		Yield of public sector bonds /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Austria
7056009H		EFFECTIVE EXCHANGE RATES 1990 = 100 Austria /OECD-OECD STATISTICS, PARIS"
705601AH		EXCHANGE RATES National currency units per US dollar Austria /OECD-OECD STATISTICS, PARIS
705611AS	**	Official reserves excluding gold /Foreign finance /FOREIGN FINANCE SDR mln Austria /INTIMF
7056151A		Net foreign position /Foreign finance /FOREIGN FINANCE S bln Austria /AUTCBA-OECD STATISTI
70663200		Current account balance /Balance of payments /BALANCE OF PAYMENTS S mln Austria /AUTCBA-(
70663250		AUT BOP CURRENT BALANCE /MN US DOLLARS Austria OECD STATISTICS, PARIS"
70663400		Net current transfers /Balance of payments /BALANCE OF PAYMENTS S mln Austria /AUTCBA-OEC
70663500		Financial account balance /Balance of payments /BALANCE OF PAYMENTS S mln Austria /AUTCBA
70663600		Net services /Balance of payments /BALANCE OF PAYMENTS S mln Austria /AUTCBA-OECD STATI
70663700		Net errors and omissions /Balance of payments /BALANCE OF PAYMENTS S mln Austria /AUTCBA-(
70663900	**	Change in official reserves /Balance of payments /BALANCE OF PAYMENTS S mln Austria /AUTCB
70664000		Net investment income /Balance of payments /BALANCE OF PAYMENTS S mln Austria /AUTCBA-OE
70765103		Net trade (f.o.b.-c.i.f.), sa /Foreign trade /FOREIGN TRADE S bln Austria /AUTNSO-OECD STA
70765253		FOREIGN TRADE - Ftr Trade Balance (fob-fob), sa Billions US dollars; monthly averages Aust
70765303		Imports c.i.f., sa /Foreign trade /FOREIGN TRADE S bln Austria /AUTNSO-OECD STATISTICS, PA
70765553		FOREIGN TRADE - Ftr Imports (fob/cif) Total, sa Billions US dollars; monthly averages Aust
70765603		Exports f.o.b., sa /Foreign trade /FOREIGN TRADE S bln Austria /AUTNSO-OECD STATISTICS, PA
70765753		FOREIGN TRADE - Ftr Exports Fob Total, sa Billions US dollars; monthly averages Austria /A

Belgium

OECD Code		OECD Definition
2220339K		Construction, sa /Industrial production /PRODUCTION 1990=100 Belgium /BELNSO-OECD STATISTI
2220359K		Consumer durable goods, sa /Industrial production /PRODUCTION 1990=100 Belgium /BELNSO-OEC
2220369K		Consumer non-durable goods, sa /Industrial production /PRODUCTION 1990=100 Belgium /BELNSO
2220439K		Intermediate goods, sa /Industrial production /PRODUCTION 1990=100 Belgium /BELNSO-OECD ST
2220449K		Investment goods, sa /Industrial production /PRODUCTION 1990=100 Belgium /BELNSO-OECD STAT
2220459K		Manufacturing, sa /Industrial production /PRODUCTION 1990=100 Belgium /BELNSO-OECD STATIST
2220519K		Total, sa /Industrial production /PRODUCTION 1990=100 Belgium /BELNSO-OECD STATISTICS, PAR
2220539K		Total including construction, sa /Industrial production /PRODUCTION 1990=100 Belgium /BELN
22206780		Crude steel /Commodity output /PRODUCTION tonnes '000 Belgium /INTISI-OECD STATISTICS, PAR
2232048X		BEL CON BUILDING STARTED RESID /CUB METERS Belgium OECD STATISTICS, PARIS"
22321180		Total /Permits issued /CONSTRUCTION cu. m. '000 Belgium /BELNSO-OECD STATISTICS, PARIS"
22321283		Residential, sa /Permits issued /CONSTRUCTION cu. m. '000 Belgium /BELNSO-OECD STATISTICS,
22321480		Total /Buildings started /CONSTRUCTION cu. m. '000 Belgium /BELNSO-OECD STATISTICS, PARIS"
22321780		CONSTRUCTION Thousands; monthly averages Belgium /BELNSO-OECD STATISTICS, PARIS"
2232419K		Total: value, sa /Retail sales /DOMESTIC TRADE 1990=100 Belgium /BELNSO-OECD STATISTICS, P
2232449Y		Total: volume, sa /Retail sales /DOMESTIC TRADE 1990=100 Belgium /BELNSO-OECD STATISTICS,
22325383		New passenger car registrations, sa /Domestic trade - other /DOMESTIC TRADE '000 Belgium /
224280A3		Rate, sa /Unemployment /LABOUR % Belgium /BELLAB-OECD STATISTICS, PARIS"
22428183		Total, sa /Unemployment /LABOUR '000 Belgium /BELNSO-OECD STATISTICS, PARIS"
224284A0	*	BEL UNEMPLOY. % CIV. LAB. FORCE /PERCNT Belgium OECD STATISTICS, PARIS"
224284AX		BEL UNEMPL % INSURED LAB FORCE /PERCNT Belgium OECD STATISTICS, PARIS"
224286A3		STANDARDISED UNEMPLOYMENT RATES, sa Per cent Belgium /INTEUR-OECD STATISTICS, PARIS"
2243459H	***	Chemicals /Producer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATISTICS, PARIS"
2243479H	**	Consumer goods /Producer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATISTICS, PARIS"
2243529H		Food,, beverages and tobacco /Producer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATIS
2243649H		Intermediate goods /Producer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATISTICS, PARI
2243659H	**	Investment goods /Producer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATISTICS, PARIS"
2243749H		Petroleum products /Producer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATISTICS, PARI
2243759H		Textiles and clothing /Producer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATISTICS, P
2243779H		Manufactured goods /Producer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATISTICS, PARI
2243869H		Total /Producer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATISTICS, PARIS"
2244449H		BEL CPI ENERGY /I/90 Belgium OECD STATISTICS, PARIS"
2244459H	***	Food /Consumer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATISTICS, PARIS"
2244479H		Fuel and electricity /Consumer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATISTICS, PA
2244499H		All goods less food /Consumer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATISTICS, PAR
2244559H	*	BEL CPI NON FOOD /I/90 Belgium OECD STATISTICS, PARIS"
2244589H	**	Rent /Consumer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATISTICS, PARIS"
2244599H	***	Services less rent /Consumer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATISTICS, PARI
2244619H	***	All items /Consumer prices /PRICES 1990=100 Belgium /BELNSO-OECD STATISTICS, PARIS"
2254829D		MONETARY AGGREGATES, sa 1990 = 100 Belgium /BELCBA-OECD STATISTICS, PARIS"
2254839D	**	MONETARY AGGREGATES, sa 1990 = 100 Belgium /BELCBA-OECD STATISTICS, PARIS"
225567AH		Treasury certificates /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Belgium /BELCB
225578AH		Yield of government bonds /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Belgium /B
2256009H		EFFECTIVE EXCHANGE RATES 1990 = 100 Belgium /OECD-OECD STATISTICS, PARIS"
225601AH		EXCHANGE RATES National currency units per US dollar Belgium /OECD-OECD STATISTICS, PARIS"
225611AS		Official reserves excluding gold /Foreign finance /FOREIGN FINANCE SDR mln Belgium /INTIMF
22765103	**	Net trade (f.o.b.-c.i.f.), sa /Foreign trade /FOREIGN TRADE FB bln Belgium /BELNSO-OECD ST
22765303		Imports c.i.f., sa /Foreign trade /FOREIGN TRADE FB bln Belgium /BELNSO-OECD STATISTICS, P
22765603	***	Exports f.o.b., sa /Foreign trade /FOREIGN TRADE FB bln Belgium /BELNSO-OECD STATISTICS, P

Finland

OECD Code		OECD Definition
6420349J		Consumer goods, sa /Industrial production /PRODUCTION 1990=100 Finland /FINNSO-OECD STATIS
6420439J		Intermediate goods, sa /Industrial production /PRODUCTION 1990=100 Finland /FINNSO-OECD ST
6420449J	*	Investment goods, sa /Industrial production /PRODUCTION 1990=100 Finland /FINNSO-OECD STAT
6420459J	***	Manufacturing, sa /Industrial production /PRODUCTION 1990=100 Finland /FINNSO-OECD STATIST
6420519J	**	Total, sa /Industrial production /PRODUCTION 1990=100 Finland /FINNSO-OECD STATISTICS, PAR
64206780		Crude steel /Commodity output /PRODUCTION tonnes '000 Finland /INTISI-OECD STATISTICS, PAR
64207182		Wood fellings, sa /Commodity output /PRODUCTION cu. m. mln Finland /FINNSO-OECD STATISTICS
64321180		Total /Permits issued /CONSTRUCTION cu. m. mln Finland /FINNSO-OECD STATISTICS, PARIS"

64321280		Residential /Permits issued /CONSTRUCTION cu. m. mln Finland /FINNSO-OECD STATISTICS, PARI
6432239H	**	Total /Cost of construction /CONSTRUCTION 1990=100 Finland /FINNSO-OECD STATISTICS, PARIS"
6432449J	**	Volume, sa /Retail sales /DOMESTIC TRADE 1990=100 Finland /FINNSO-OECD STATISTICS, PARIS"
6432519J		Value, sa /Wholesale sales /DOMESTIC TRADE 1990=100 Finland /FINNSO-OECD STATISTICS, PARIS
64325383	*	New passenger car registrations, sa /Domestic trade - other /DOMESTIC TRADE '000 Finland /
6432589J		Volume, sa /Wholesale sales /DOMESTIC TRADE 1990=100 Finland /FINNSO-OECD STATISTICS, PARI
64426580	**	FIN EMPLOYMENT TOTAL /PERSONS Finland OECD STATISTICS, PARIS"
6442659H	**	TOTAL EMPLOYMENT 1990 = 100 Finland /FINNSO-OECD STATISTICS, PARIS"
64426883	**	FIN EMPLOYMENT INDUSTRY SA /PERSONS Finland OECD STATISTICS, PARIS"
64427480	*	Part-time (economic reasons) /Employment /LABOUR '000 Finland /FINNSO-OECD STATISTICS, PAR
644280A2	***	Rate, sa /Unemployment /LABOUR % Finland /FINNSO-OECD STATISTICS, PARIS"
64428182	***	Total, sa /Unemployment /LABOUR '000 Finland /FINNSO-OECD STATISTICS, PARIS"
64429180		Total hours worked: industry /Labour - other /LABOUR hrs mln Finland /FINNSO-OECD STATISTI
64429983		Unfilled vacancies, sa /Labour - other /LABOUR '000 Finland /FINNSO-OECD STATISTICS, PARIS
6443479H	**	Consumer goods /Producer prices /PRICES 1990=100 Finland /FINNSO-OECD STATISTICS, PARIS"
6443649H		Intermediate goods /Producer prices /PRICES 1990=100 Finland /FINNSO-OECD STATISTICS, PARI
6443659H		Investment goods /Producer prices /PRICES 1990=100 Finland /FINNSO-OECD STATISTICS, PARIS"
6443749H	**	Petroleum products /Producer prices /PRICES 1990=100 Finland /FINNSO-OECD STATISTICS, PARI
6443869H		PRODUCER PRICES (manufacturing) 1990 = 100 Finland /FINNSO-OECD STATISTICS, PARIS"
6444419H	**	Beverages and tobacco /Consumer prices /PRICES 1990=100 Finland /FINNSO-OECD STATISTICS, P
6444459H	**	Food /Consumer prices /PRICES 1990=100 Finland /FINNSO-OECD STATISTICS, PARIS"
6444479H	**	Fuel and electricity /Consumer prices /PRICES 1990=100 Finland /FINNSO-OECD STATISTICS, PA
6444509H	**	All items less food less housing /Consumer prices /PRICES 1990=100 Finland /FINNSO-OECD ST
6444529H	***	Housing /Consumer prices /PRICES 1990=100 Finland /FINNSO-OECD STATISTICS, PARIS"
6444559H	**	All items less food /Consumer prices /PRICES 1990=100 Finland /FINNSO-OECD STATISTICS, PAR
6444619H	**	All items /Consumer prices /PRICES 1990=100 Finland /FINNSO-OECD STATISTICS, PARIS"
6444709H	**	FIN CPI NON FOOD NON ENERGY /I/90 Finland OECD STATISTICS, PARIS"
6454821D		Monetary aggregate (M1), sa /Domestic finance /DOMESTIC FINANCE Fmk bln Finland /FINCBA-OE
6454829D		MONETARY AGGREGATES, sa 1990 = 100 Finland /FINCBA-OECD STATISTICS, PARIS"
6454831D	***	Monetary aggregate (M3), sa /Domestic finance /DOMESTIC FINANCE Fmk bln Finland /FINCBA-OE
6454839D	***	MONETARY AGGREGATES, sa 1990 = 100 Finland /FINCBA-OECD STATISTICS, PARIS"
6454841B	***	Monetary aggregate (M2), sa /Domestic finance /DOMESTIC FINANCE Fmk bln Finland /FINCBA-OE
6455231A		Credit to economy /Domestic finance /DOMESTIC FINANCE Fmk bln Finland /FINCBA-OECD STATIST
645561AH		Base rate /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Finland /FINCBA-OECD STATI
6455631H		Liquidity credit rate /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Finland /FINCB
6455849H		HEX All Share Index /Share prices /INTEREST RATES - SHARE PRICES 1990=100 Finland /FINCBA-
6456009H		EFFECTIVE EXCHANGE RATES 1990 = 100 Finland /OECD-OECD STATISTICS, PARIS"
645601AH		EXCHANGE RATES National currency units per US dollar Finland /OECD-OECD STATISTICS, PARIS"
645611AS	*	Official reserves excluding gold /Foreign finance /FOREIGN FINANCE SDR mln Finland /INTIMF
64663100	***	Trade balance /Balance of payments /BALANCE OF PAYMENTS Fmk bln Finland /FINCBA-OECD STATI
64663200	*	Current account balance /Balance of payments /BALANCE OF PAYMENTS Fmk bln Finland /FINCBA-
64663400		Net current transfers /Balance of payments /BALANCE OF PAYMENTS Fmk bln Finland /FINCBA-OE
64663500		Financial account balance /Balance of payments /BALANCE OF PAYMENTS Fmk bln Finland /FINCB
64663700		Net errors and omissions /Balance of payments /BALANCE OF PAYMENTS Fmk bln Finland /FINCBA
64664000		Net investment income /Balance of payments /BALANCE OF PAYMENTS Fmk bln Finland /FINCBA-OE
64765303		Imports c.i.f., sa /Foreign trade /FOREIGN TRADE Fmk bln Finland /FINNSO-OECD STATISTICS,
64765603		Exports f.o.b., sa /Foreign trade /FOREIGN TRADE Fmk bln Finland /FINNSO-OECD STATISTICS,

France

OECD Code		OECD Definition
1420339J		Construction, sa /Industrial production /PRODUCTION 1990=100 France /FRANSO-OECD STATISTIC
1420349J		Consumer goods, sa /Industrial production /PRODUCTION 1990=100 France /FRANSO-OECD STATIST
1420399J		Energy, sa /Industrial production /PRODUCTION 1990=100 France /FRANSO-OECD STATISTICS, PAR
1420439J		Intermediate goods, sa /Industrial production /PRODUCTION 1990=100 France /FRANSO-OECD STA
1420449J		Investment goods, sa /Industrial production /PRODUCTION 1990=100 France /FRANSO-OECD STATI
1420459J		Manufacturing, sa /Industrial production /PRODUCTION 1990=100 France /FRANSO-OECD STATISTI
1420519J		Total, sa /Industrial production /PRODUCTION 1990=100 France /FRANSO-OECD STATISTICS, PARI
14206183		Passenger cars, sa /Commodity output /PRODUCTION '000 France /FRAIND-OECD STATISTICS, PARI
14206780		Crude steel /Commodity output /PRODUCTION tonnes '000 France /INTISI-OECD STATISTICS, PARI
14321780		CONSTRUCTION Thousands; monthly averages France /FRATRA-OECD STATISTICS, PARIS"
1432419J	***	Value, sa /Retail sales /DOMESTIC TRADE 1990=100 France /FRACHA-OECD STATISTICS, PARIS"
1432449J		Volume, sa /Retail sales /DOMESTIC TRADE 1990=100 France /FRACHA-OECD STATISTICS, PARIS"
14325382		New passenger car registrations, sa /Domestic trade - other /DOMESTIC TRADE '000 France /F
1432549J		Manufact. products - 1980 prices, sa /Retail sales /DOMESTIC TRADE 1990=100 France /FRANSO
14428282		Registered unemployed, sa /Unemployment /LABOUR '000 France /FRALAB-OECD STATISTICS, PARIS
144286A3		STANDARDISED UNEMPLOYMENT RATES, sa Per cent France /INTEUR-OECD STATISTICS, PARIS"

1442879J		New jobseekers, sa /Unemployment /LABOUR 1990=100 France /FRALAB-OECD STATISTICS, PARIS"
1443249H	***	Labour cost: engineering industries /Wages /WAGES 1990=100 France /FRANSO-OECD STATISTICS,
1443259H	***	Labour cost: textile industries /Wages /WAGES 1990=100 France /FRANSO-OECD STATISTICS, PAR
1443419J		Agricultural goods, sa /Producer prices /PRICES 1990=100 France /FRANSO-OECD STATISTICS, P
1443459H		Chemicals /Producer prices /PRICES 1990=100 France /FRANSO-OECD STATISTICS, PARIS"
1443649H		Intermediate goods /Producer prices /PRICES 1990=100 France /FRANSO-OECD STATISTICS, PARIS
1443699H		Metal products /Producer prices /PRICES 1990=100 France /FRANSO-OECD STATISTICS, PARIS"
1443809H		FRA WPI INTERM PRICE OF RAW MATER /I/90 France OECD STATISTICS, PARIS"
1444449H		FRA CPI ENERGY /I/90 France OECD STATISTICS, PARIS"
1444459H	***	Food /Consumer prices /PRICES 1990=100 France /FRANSO-OECD STATISTICS, PARIS"
1444479H		Fuel and electricity /Consumer prices /PRICES 1990=100 France /FRANSO-OECD STATISTICS, PAR
1444499H	***	All goods less food /Consumer prices /PRICES 1990=100 France /FRANSO-OECD STATISTICS, PARI
1444559H	**	All items less food /Consumer prices /PRICES 1990=100 France /FRANSO-OECD STATISTICS, PARI
1444589H	***	Rent /Consumer prices /PRICES 1990=100 France /FRANSO-OECD STATISTICS, PARIS"
1444599H	***	Services less rent /Consumer prices /PRICES 1990=100 France /FRANSO-OECD STATISTICS, PARIS
1444619H	**	All items /Consumer prices /PRICES 1990=100 France /FRANSO-OECD STATISTICS, PARIS"
1444659H	**	Paris: all items /Consumer prices /PRICES 1990=100 France /FRANSO-OECD STATISTICS, PARIS"
1454822B	**	Monetary aggregate (M1), sa /Domestic finance /DOMESTIC FINANCE FF bln France /FRACBA-OECD
1454829B	**	MONETARY AGGREGATES, sa 1990 = 100 France /FRACBA-OECD STATISTICS, PARIS"
1454832B	**	Monetary aggregate (M3), sa /Domestic finance /DOMESTIC FINANCE FF bln France /FRACBA-OECD
1454839B	**	MONETARY AGGREGATES, sa 1990 = 100 France /FRACBA-OECD STATISTICS, PARIS"
1454892B		Investment aggregate (P1), sa /Domestic finance /DOMESTIC FINANCE FF bln France /FRACBA-OE
1455631H		Call money /Interest rates /INTEREST RATES - SHARE PRICES % p.a. France /FRACBA-OECD STATI
145565AH		3-month PIBOR /Interest rates /INTEREST RATES - SHARE PRICES % p.a. France /FRACBA-OECD ST
145581AH		Bonds: public and semi-public /Interest rates /INTEREST RATES - SHARE PRICES % p.a. France
1455849H		Paris Stock Exchange: SBF 250 /Share prices /INTEREST RATES - SHARE PRICES 1990=100 France
1456009H		EFFECTIVE EXCHANGE RATES 1990 = 100 France /OECD-OECD STATISTICS, PARIS"
145601AH		EXCHANGE RATES National currency units per US dollar France /OECD-OECD STATISTICS, PARIS"
145611AS	**	Official reserves excluding gold /Foreign finance /FOREIGN FINANCE SDR mln France /INTIMF-
14765102		Net trade (f.o.b.-f.o.b.), sa /Foreign trade /FOREIGN TRADE FF bln France /FRACUS-OECD STA
14765252		FOREIGN TRADE - Ftr Trade Balance (fob-fob), sa Billions US dollars; monthly averages Fran
14765302		Imports f.o.b., sa /Foreign trade /FOREIGN TRADE FF bln France /FRACUS-OECD STATISTICS, PA
14765552		FOREIGN TRADE - Ftr Imports (fob/cif) Total, sa Billions US dollars; monthly averages Fran
14765602		Exports f.o.b., sa /Foreign trade /FOREIGN TRADE FF bln France /FRACUS-OECD STATISTICS, PA
14765752		FOREIGN TRADE - Ftr Exports Fob Total, sa Billions US dollars; monthly averages France /FR

Germany

OECD Code		OECD Definition
1220519J		INDUSTRIAL PRODUCTION, sa 1990 = 100 Germany /DEUCBA-OECD STATISTICS, PARIS"
12206180		Passenger cars /Commodity output /PRODUCTION '000 Germany /DEUNSO-OECD STATISTICS, PARIS"
12206780		Crude steel /Commodity output /PRODUCTION tonnes '000 Germany /INTISI-OECD STATISTICS, PAR
12321100		Total /Permits issued /CONSTRUCTION DM bln Germany /DEUNSO-OECD STATISTICS, PARIS"
12321200		Residential /Permits issued /CONSTRUCTION DM bln Germany /DEUNSO-OECD STATISTICS, PARIS"
1232449K	**	RETAIL SALES (volume), sa 1990 = 100 Germany /OECD-OECD STATISTICS, PARIS"
12325383		New passenger car registrations, sa /Domestic trade - other /DOMESTIC TRADE '000 Germany /
1242669K		DEU CIVILIAN EMPLOYMENT SA /I/90 Germany OECD STATISTICS, PARIS"
12427183		Manufacturing, sa /Employment /LABOUR '000 Germany /DEUNSO-OECD STATISTICS, PARIS"
12427480		Part-time (economic reasons) /Employment /LABOUR '000 Germany /DEUNSO-OECD STATISTICS, PAR
12428280		Registered unemployed /Unemployment /LABOUR '000 Germany /DEULAB-OECD STATISTICS, PARIS"
124286A3		STANDARDISED UNEMPLOYMENT RATES, sa -- ADJUSTED Down by 2% in xxx (AC) Per cent Germany
12429180		Monthly hours of work /Labour - other /LABOUR hrs mln Germany /DEULAB-OECD STATISTICS, PAR
12430082		Unfilled vacancies, sa /Labour - other /LABOUR '000 Germany /DEUCBA-OECD STATISTICS, PARIS
1243569H		PRODUCER PRICES (manufacturing) 1990 = 100 Germany /DEUNSO-OECD STATISTICS, PARIS"
1244619H		CONSUMER PRICES 1990 = 100 Germany /DEUNSO-OECD STATISTICS, PARIS"
1254821B		Monetary aggregate (M1), sa /Domestic finance /DOMESTIC FINANCE DM bln Germany /DEUCBA-OEC
1254829B		MONETARY AGGREGATES, sa 1990 = 100 Germany /DEUCBA-OECD STATISTICS, PARIS"
1254829D		DEU MONETARY AGGT M1 RFA+RDA EST SA /I/90 Germany OECD STATISTICS, PARIS"
1254831B		Monetary aggregate (M3), sa /Domestic finance /DOMESTIC FINANCE DM bln Germany /DEUCBA-OEC
1254839B		MONETARY AGGREGATES, sa 1990 = 100 Germany /DEUCBA-OECD STATISTICS, PARIS"
1254839D		DEU M1 + QUASI MONEY RFA+RDA(EST)SA /I/90 Germany OECD STATISTICS, PARIS"
1254841B		Monetary aggregate (M2), sa /Domestic finance /DOMESTIC FINANCE DM bln Germany /DEUCBA-OEC
1254911A		Personal savings deposits /Domestic finance /DOMESTIC FINANCE DM bln Germany /DEUCBA-OECD
1254931B		Monetary aggregate (M3+), sa /Domestic finance /DOMESTIC FINANCE DM bln Germany /DEUCBA-OE
1255231D		Credit to economy, sa /Domestic finance /DOMESTIC FINANCE DM bln Germany /DEUCBA-OECD STAT
125561AH		Official discount /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Germany /DEUCBA-OE
1255631H	*	Call money /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Germany /DEUCBA-OECD STAT
125565AH		3-month FIBOR /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Germany /DEUCBA-OECD S

125581AH		Public sector bond yield /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Germany /DE
1255849H		CDAX Share Price Index /Share prices /INTEREST RATES - SHARE PRICES 1990=100 Germany /DEUN
1256009H		EFFECTIVE EXCHANGE RATES 1990 = 100 Germany /OECD-OECD STATISTICS, PARIS"
125611AS		Official reserves excluding gold /Foreign finance /FOREIGN FINANCE SDR mln Germany /INTIMF
1256151A		Net foreign position /Foreign finance /FOREIGN FINANCE DM bln Germany /DEUCBA-OECD STATIST
12663200		Current account balance /Balance of payments /BALANCE OF PAYMENTS DM bln Germany /DEUCBA-O
12663250		FDR/DEU BOP CURRENT BALANCE /MN US DOLLARS Germany OECD STATISTICS, PARIS"
12663500		Financial account balance /Balance of payments /BALANCE OF PAYMENTS DM bln Germany /DEUCBA
12663700		Net errors and omissions /Balance of payments /BALANCE OF PAYMENTS DM bln Germany /DEUCBA-
12663900		Change in official reserves /Balance of payments /BALANCE OF PAYMENTS DM bln Germany /DEUC
12765102		Net trade (f.o.b.-c.i.f.), sa /Foreign trade /FOREIGN TRADE DM bln Germany /DEUNSO-OECD ST
12765252		FOREIGN TRADE - Ftr Trade Balance (fob-fob), sa Billions US dollars; monthly averages Germ
12765302		Imports c.i.f., sa /Foreign trade /FOREIGN TRADE DM bln Germany /DEUNSO-OECD STATISTICS, P
12765552		FOREIGN TRADE - Ftr Imports (fob/cif) Total, sa Billions US dollars; monthly averages Germ
12765602		Exports f.o.b., sa /Foreign trade /FOREIGN TRADE DM bln Germany /DEUNSO-OECD STATISTICS, P
12765752		FOREIGN TRADE - Ftr Exports Fob Total, sa Billions US dollars; monthly averages Germany /D

Ireland

OECD Code		OECD Definition
2820349J		Consumer goods, sa /Industrial production /PRODUCTION 1990=100 Ireland /IRLNSO-OECD STATIS
2820439J		Intermediate goods, sa /Industrial production /PRODUCTION 1990=100 Ireland /IRLNSO-OECD ST
2820449J		Investment goods, sa /Industrial production /PRODUCTION 1990=100 Ireland /IRLNSO-OECD STAT
2820459J		Manufacturing, sa /Industrial production /PRODUCTION 1990=100 Ireland /IRLNSO-OECD STATIST
2820519J		Total, sa /Industrial production /PRODUCTION 1990=100 Ireland /IRLNSO-OECD STATISTICS, PAR
2832249H	**	Residential /Cost of construction /CONSTRUCTION 1990=100 Ireland /IRLENV-OECD STATISTICS,
2832419J		Value, sa /Retail sales /DOMESTIC TRADE 1990=100 Ireland /IRLNSO-OECD STATISTICS, PARIS"
2832449J	**	Volume, sa /Retail sales /DOMESTIC TRADE 1990=100 Ireland /IRLNSO-OECD STATISTICS, PARIS"
28325383	**	New passenger car registrations, sa /Domestic trade - other /DOMESTIC TRADE '000 Ireland /
28427480		Part-time (economic reasons) /Employment /LABOUR '000 Ireland /IRLNSO-OECD STATISTICS, PAR
28428282		Registered unemployed, sa /Unemployment /LABOUR '000 Ireland /IRLNSO-OECD STATISTICS, PARI
284286A3		STANDARDISED UNEMPLOYMENT RATES, sa Per cent Ireland /INTEUR-OECD STATISTICS, PARIS"
2844049H		Investment goods /Wholesale prices /PRICES 1990=100 Ireland /IRLNSO-OECD STATISTICS, PARIS
2844119H		Food /Wholesale prices /PRICES 1990=100 Ireland /IRLNSO-OECD STATISTICS, PARIS"
2844189H		Manufactured goods /Wholesale prices /PRICES 1990=100 Ireland /IRLNSO-OECD STATISTICS, PAR
2844269H	**	Total /Wholesale prices /PRICES 1990=100 Ireland /IRLNSO-OECD STATISTICS, PARIS"
2854829D	***	MONETARY AGGREGATES, sa 1990 = 100 Ireland /IRLCBA-OECD STATISTICS, PARIS"
2855631H		Call money /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Ireland /IRLCBA-OECD STAT
2855809H		ISEQ Index - Overall /Share prices /INTEREST RATES - SHARE PRICES 1990=100 Ireland /IRLCBA
2856009H		EFFECTIVE EXCHANGE RATES 1990 = 100 Ireland /OECD-OECD STATISTICS, PARIS"
285601AH		EXCHANGE RATES National currency units per US dollar Ireland /OECD-OECD STATISTICS, PARIS"
285611AS		Official reserves excluding gold /Foreign finance /FOREIGN FINANCE SDR mln Ireland /INTIMF
28765102		Net trade (f.o.b.-c.i.f.), sa /Foreign trade /FOREIGN TRADE pdIr mln Ireland /IRLNSO-OECD
28765252		FOREIGN TRADE - Ftr Trade Balance (fob-fob), sa Billions US dollars; monthly averages Irel
28765302	*	Imports c.i.f., sa /Foreign trade /FOREIGN TRADE pdIr mln Ireland /IRLNSO-OECD STATISTICS,
28765552		FOREIGN TRADE - Ftr Imports (fob/cif) Total, sa Billions US dollars; monthly averages Irel
28765602		Exports f.o.b., sa /Foreign trade /FOREIGN TRADE pdIr mln Ireland /IRLNSO-OECD STATISTICS,
28765752		FOREIGN TRADE - Ftr Exports Fob Total, sa Billions US dollars; monthly averages Ireland /I

Italy

OECD Code		OECD Definition
1620349J		Consumer goods, sa /Industrial production /PRODUCTION 1990=100 Italy /ITANSO-OECD STATISTI
1620439J		Industrial materials, sa /Industrial production /PRODUCTION 1990=100 Italy /ITANSO-OECD ST
1620449J		Investment goods, sa /Industrial production /PRODUCTION 1990=100 Italy /ITANSO-OECD STATIS
1620459J		Manufacturing, sa /Industrial production /PRODUCTION 1990=100 Italy /ITASCO-OECD STATISTIC
1620519J		Total, sa /Industrial production /PRODUCTION 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS
16206180		Passenger cars /Commodity output /PRODUCTION '000 Italy /ITANSO-OECD STATISTICS, PARIS"
16206480		Commercial vehicles /Commodity output /PRODUCTION '000 Italy /ITANSO-OECD STATISTICS, PARI
16206780		Crude steel /Commodity output /PRODUCTION tonnes '000 Italy /INTISI-OECD STATISTICS, PARIS
1631299H	*	Consumer goods /Sales /MANUFACTURING 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS"
1631309H		Intermediate goods /Sales /MANUFACTURING 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS"
1631319H		Investment goods /Sales /MANUFACTURING 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS"
1631329H		Total /Sales /MANUFACTURING 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS"

1632019H	*	Total /New orders /MANUFACTURING 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS"
1632249H	***	Residential /Cost of construction /CONSTRUCTION 1990=100 Italy /ITANSO-OECD STATISTICS, PA
1632419K	*	Major outlets: value, sa /Retail sales /DOMESTIC TRADE 1990=100 Italy /ITANSO-OECD STATIST
1632449K		RETAIL SALES (volume), sa 1990 = 100 Italy /ITANSO-OECD STATISTICS, PARIS"
16325383		New passenger car registrations, sa /Domestic trade - other /DOMESTIC TRADE '000 Italy /IT
164286A3		STANDARDISED UNEMPLOYMENT RATES, sa Per cent Italy /INTEUR-OECD STATISTICS, PARIS"
16429880	*	Labour disputes: time lost /Labour - other /LABOUR hrs '000 Italy /ITANSO-OECD STATISTICS,
1643119H	**	Hourly rates /Wages /WAGES 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS"
1643429H	*	Machinery and equipment /Producer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTICS, P
1643459H	***	Chemical products /Producer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS"
1643529H		Food,, beverages and tobacco /Producer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTI
1643709H	***	Non-metallic mineral products /Producer prices /PRICES 1990=100 Italy /ITANSO-OECD STATIST
1643719H		Metal and metal products /Producer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTICS,
1643749H		Petroleum products /Producer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS"
1643759H		Textiles and clothing /Producer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTICS, PAR
1643869H		Total /Producer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS"
1644419H		Beverages and tobacco /Consumer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTICS, PAR
1644459H	*	Food /Consumer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS"
1644489H		Fuel and electricity /Consumer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTICS, PARI
1644499H	**	All goods less food /Consumer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS
1644559H		All items less food /Consumer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS
1644589H		Rent /Consumer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS"
1644599H		Services less rent /Consumer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS"
1644619H		All items /Consumer prices /PRICES 1990=100 Italy /ITANSO-OECD STATISTICS, PARIS"
1644679H		CONSUMER PRICES 1990 = 100 Italy /ITANSO-OECD STATISTICS, PARIS"
1654822D	***	Monetary aggregate (M1), sa /Domestic finance /DOMESTIC FINANCE Lit '000 bln Italy /ITACBA
1654832A	**	ITA TOTAL LIQUIDITY /BN ITA LIRA Italy OECD STATISTICS, PARIS"
1654833D	**	Monetary aggregate (M2), sa /Domestic finance /DOMESTIC FINANCE Lit '000 bln Italy /ITACBA
1654839D	**	MONETARY AGGREGATES, sa 1990 = 100 Italy /ITACBA-OECD STATISTICS, PARIS"
165498AH	**	3-month interbank deposits /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Italy /IT
1655121A		Gross bond issues: public sector /Domestic finance /DOMESTIC FINANCE Lit '000 bln Italy /I
1655131A		Gross bond issues: banking sector /Domestic finance /DOMESTIC FINANCE Lit '000 bln Italy /
1655251A	*	Domestic credit /Domestic finance /DOMESTIC FINANCE Lit '000 bln Italy /ITACBA-OECD STATIS
1655292A		Finance to the non state sector /Domestic finance /DOMESTIC FINANCE Lit '000 bln Italy /IT
1655751H		Bond yield /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Italy /ITACBA-OECD STATIS
165578AH		Long-term treasury bonds /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Italy /ITAC
1655849H		ISE MIB Storico /Share prices /INTEREST RATES - SHARE PRICES 1990=100 Italy /ITACBA-OECD S
1656009H		EFFECTIVE EXCHANGE RATES 1990 = 100 Italy /OECD-OECD STATISTICS, PARIS"
165601AH		EXCHANGE RATES National currency units per US dollar Italy /OECD-OECD STATISTICS, PARIS"
165611AS		Official reserves excluding gold /Foreign finance /FOREIGN FINANCE SDR mln Italy /INTIMF-O
1656152A		Net foreign position /Foreign finance /FOREIGN FINANCE Lit '000 bln Italy /ITACBA-OECD STA
16663100		Trade balance /Balance of payments /BALANCE OF PAYMENTS Lit '000 bln Italy /ITACBA-OECD ST
16663200		Current account balance /Balance of payments /BALANCE OF PAYMENTS Lit '000 bln Italy /ITAC
16663250		ITA BOP CURRENT BALANCE US $ /MN US $ Italy OECD STATISTICS, PARIS"
16663400		Net current transfers /Balance of payments /BALANCE OF PAYMENTS Lit '000 bln Italy /ITACBA
16663500		Financial account balance /Balance of payments /BALANCE OF PAYMENTS Lit '000 bln Italy /IT
16663600		Net services /Balance of payments /BALANCE OF PAYMENTS Lit '000 bln Italy /ITACBA-OECD STA
16663700		Net errors and omissions /Balance of payments /BALANCE OF PAYMENTS Lit '000 bln Italy /ITA
16663900		Change in official reserves /Balance of payments /BALANCE OF PAYMENTS Lit '000 bln Italy /
16664000		Net income /Balance of payments /BALANCE OF PAYMENTS Lit '000 bln Italy /ITACBA-OECD STATI
16765103		Net trade (f.o.b.-c.i.f.), sa /Foreign trade /FOREIGN TRADE Lit bln Italy /ITASCO-OECD STA
16765253		FOREIGN TRADE - Ftr Trade Balance (fob-fob), sa Billions US dollars; monthly averages Ital
16765303	*	Imports c.i.f., sa /Foreign trade /FOREIGN TRADE Lit bln Italy /ITASCO-OECD STATISTICS, PA
16765553	**	FOREIGN TRADE - Ftr Imports (fob/cif) Total, sa Billions US dollars; monthly averages Ital
16765603		Exports f.o.b., sa /Foreign trade /FOREIGN TRADE Lit bln Italy /ITASCO-OECD STATISTICS, PA
16765753	*	FOREIGN TRADE - Ftr Exports Fob Total, sa Billions US dollars; monthly averages Italy /ITA

Luxembourg

OECD Code	OECD Definition
2420339K	Construction, sa /Industrial production /PRODUCTION 1990=100 Luxembourg /LUXNSO-OECD STATI
2420459K	Manufacturing, sa /Industrial production /PRODUCTION 1990=100 Luxembourg /LUXNSO-OECD STAT
2420519K	Total, sa /Industrial production /PRODUCTION 1990=100 Luxembourg /LUXNSO-OECD STATISTICS,
24206780	Crude steel /Commodity output /PRODUCTION tonnes '000 Luxembourg /INTISI-OECD STATISTICS,
24321383	Permits issued, sa /Construction /CONSTRUCTION number Luxembourg /LUXNSO-OECD STATISTICS,
24325383	New passenger car registrations, sa /Domestic trade /DOMESTIC TRADE number Luxembourg /LUX
2442699H	Industry: employees /Employment /LABOUR 1990=100 Luxembourg /LUXNSO-OECD STATISTICS, PARIS

24427080		Iron and steel: wage earners /Employment /LABOUR '000 Luxembourg /LUXNSO-OECD STATISTICS,
24428283		Registered unemployed, sa /Unemployment /LABOUR number Luxembourg /LUXNSO-OECD STATISTICS,
244286A3		STANDARDISED UNEMPLOYMENT RATES, sa Per cent Luxembourg /INTEUR-OECD STATISTICS, PARI
2442929H		Monthly hours of work /Labour - other /LABOUR 1990=100 Luxembourg /LUXNSO-OECD STATISTICS,
24429983		Unfilled vacancies, sa /Labour - other /LABOUR number Luxembourg /OECD-OECD STATISTICS, PA
2443159H		Monthly earnings /Wages /WAGES 1990=100 Luxembourg /LUXNSO-OECD STATISTICS, PARIS"
2443589H		Industrial goods /Producer prices /PRICES 1990=100 Luxembourg /LUXNSO-OECD STATISTICS, PAR
2444459H		Food /Consumer prices /PRICES 1990=100 Luxembourg /LUXNSO-OECD STATISTICS, PARIS"
2444479H		Fuel and electricity /Consumer prices /PRICES 1990=100 Luxembourg /LUXNSO-OECD STATISTICS,
2444559H		All items less food /Consumer prices /PRICES 1990=100 Luxembourg /LUXNSO-OECD STATISTICS,
2444619H		All items /Consumer prices /PRICES 1990=100 Luxembourg /LUXNSO-OECD STATISTICS, PARIS"

Netherlands

OECD Code		OECD Definition
1820459J		Manufacturing, sa /Industrial production /PRODUCTION 1990=100 Netherlands /NLDNSO-OECD STA
1820519J		Total, sa /Industrial production /PRODUCTION 1990=100 Netherlands /NLDNSO-OECD STATISTICS,
18206680	**	Crude petroleum /Commodity output /PRODUCTION tonnes '000 Netherlands /NLDNSO-OECD STATIST
18206780		Crude steel /Commodity output /PRODUCTION tonnes '000 Netherlands /INTISI-OECD STATISTICS,
18206880		Natural gas /Commodity output /PRODUCTION cu. m. mln Netherlands /NLDNSO-OECD STATISTICS,
18321100		Total /Permits issued /CONSTRUCTION f. mln Netherlands /NLDNSO-OECD STATISTICS, PARIS"
18321203		Residential, sa /Permits issued /CONSTRUCTION f. mln Netherlands /NLDNSO-OECD STATISTICS,
1832419K		Total: value, sa /Retail sales /DOMESTIC TRADE 1990=100 Netherlands /NLDNSO-OECD STATISTIC
1832449K		RETAIL SALES (volume), sa 1990 = 100 Netherlands /NLDNSO-OECD STATISTICS, PARIS"
18325383		New passenger car registrations, sa /Domestic trade - other /DOMESTIC TRADE '000 Netherlan
184286A3	***	STANDARDISED UNEMPLOYMENT RATES, sa Per cent Netherlands /INTEUR-OECD STATISTICS, PARIS"
1843149H		Hourly rates: manufacturing /Wages /WAGES 1990=100 Netherlands /NLDNSO-OECD STATISTICS, PA
1843469H	**	Output: consumer goods /Producer prices /PRICES 1990=100 Netherlands /NLDNSO-OECD STATISTI
1843489H		Output: crude petroleum /Producer prices /PRICES 1990=100 Netherlands /NLDNSO-OECD STATIST
1843569H	**	PRODUCER PRICES (manufacturing) 1990 = 100 Netherlands /NLDNSO-OECD STATISTICS, PARIS"
1843649H	*	Output: intermediate goods /Producer prices /PRICES 1990=100 Netherlands /NLDNSO-OECD STAT
1843659H		Output: investment goods /Producer prices /PRICES 1990=100 Netherlands /NLDNSO-OECD STATIS
1843879H	**	Input: total /Producer prices /PRICES 1990=100 Netherlands /NLDNSO-OECD STATISTICS, PARIS"
1843889H	*	Output: total /Producer prices /PRICES 1990=100 Netherlands /NLDNSO-OECD STATISTICS, PARIS
1844459H	**	Food /Consumer prices /PRICES 1990=100 Netherlands /NLDNSO-OECD STATISTICS, PARIS"
1844479H		Fuel and electricity /Consumer prices /PRICES 1990=100 Netherlands /NLDNSO-OECD STATISTICS
1844499H		All goods less food /Consumer prices /PRICES 1990=100 Netherlands /NLDNSO-OECD STATISTICS,
1844559H		All items less food /Consumer prices /PRICES 1990=100 Netherlands /NLDNSO-OECD STATISTICS,
1844589H		Rent /Consumer prices /PRICES 1990=100 Netherlands /NLDNSO-OECD STATISTICS, PARIS"
1844599H	**	Services less rent /Consumer prices /PRICES 1990=100 Netherlands /NLDNSO-OECD STATISTICS,
1844619H	**	All items /Consumer prices /PRICES 1990=100 Netherlands /NLDNSO-OECD STATISTICS, PARIS"
1844709H		NLD CPI NON FOOD-NON ENERGY /I/90 Netherlands OECD STATISTICS, PARIS"
1854829D		MONETARY AGGREGATES, sa 1990 = 100 Netherlands /NLDCBA-OECD STATISTICS, PARIS"
1854832D		NLD MONETARY AGGREGATE M3 SA /MN GUILDER Netherlands OECD STATISTICS, PARIS"
1854839D		MONETARY AGGREGATES, sa 1990 = 100 Netherlands /NLDCBA-OECD STATISTICS, PARIS"
1855631H		Call money (Amsterdam) /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Netherlands /
1856009H		EFFECTIVE EXCHANGE RATES 1990 = 100 Netherlands /OECD-OECD STATISTICS, PARIS"
185601AH		EXCHANGE RATES National currency units per US dollar Netherlands /OECD-OECD STATISTICS, PA
185611AS		Official reserves excluding gold /Foreign finance /FOREIGN FINANCE SDR mln Netherlands /IN
1856151A	***	Net foreign position /Foreign finance /FOREIGN FINANCE f. mln Netherlands /NLDCBA-OECD STA
18765103		Net trade (f.o.b.-c.i.f.), sa /Foreign trade /FOREIGN TRADE f. mln Netherlands /NLDNSO-OEC
18765253		FOREIGN TRADE - Ftr Trade Balance (fob-fob), sa Billions US dollars; monthly averages Neth
18765303		Imports c.i.f., sa /Foreign trade /FOREIGN TRADE f. mln Netherlands /NLDNSO-OECD STATISTIC
18765603		Exports f.o.b., sa /Foreign trade /FOREIGN TRADE f. mln Netherlands /NLDNSO-OECD STATISTIC

Portugal

OECD Code		OECD Definition
3620459K		Manufacturing, sa /Industrial production /PRODUCTION 1990=100 Portugal /PRTNSO-OECD STATIS
3620519K		Total, sa /Industrial production /PRODUCTION 1990=100 Portugal /PRTNSO-OECD STATISTICS, PA
36206780		Crude steel /Commodity output /PRODUCTION tonnes '000 Portugal /INTISI-OECD STATISTICS, PA
36428280		Registered unemployed /Unemployment /LABOUR '000 Portugal /PRTEPT-OECD STATISTICS, PARIS"
36429980	**	Unfilled vacancies /Labour - other /LABOUR '000 Portugal /PRTEPT-OECD STATISTICS, PARIS"
3644459H	**	Food /Consumer prices /PRICES 1990=100 Portugal /PRTNSO-OECD STATISTICS, PARIS"

3644549H	***	Lisbon: all items less rent /Consumer prices /PRICES 1990=100 Portugal /PRTNSO-OECD STATIS
3644559H	***	All items less food and rent /Consumer prices /PRICES 1990=100 Portugal /PRTNSO-OECD STATI
3644609H	**	All items less rent /Consumer prices /PRICES 1990=100 Portugal /PRTNSO-OECD STATISTICS, PA
3654829D		MONETARY AGGREGATES, sa 1990 = 100 Portugal /PRTCBA-OECD STATISTICS, PARIS"
3654831D		PRT MONETARY AGGREGATE M2- SA /MN ESCUDO Portugal OECD STATISTICS, PARIS"
3654839D		MONETARY AGGREGATES, sa 1990 = 100 Portugal /PRTCBA-OECD STATISTICS, PARIS"
3654861A	*	Total liquidity (L-) /Domestic finance /DOMESTIC FINANCE Esc bln Portugal /PRTCBA-OECD STA
3655231A		Bank credit to economy /Domestic finance /DOMESTIC FINANCE Esc bln Portugal /PRTCBA-OECD S
3656009H	*	EFFECTIVE EXCHANGE RATES 1990 = 100 Portugal /OECD-OECD STATISTICS, PARIS"
365601AH		EXCHANGE RATES National currency units per US dollar Portugal /OECD-OECD STATISTICS, PARIS
365611AS	*	Official reserves excluding gold /Foreign finance /FOREIGN FINANCE SDR mln Portugal /INTIM
3656151A		Net foreign position /Foreign finance /FOREIGN FINANCE Esc bln Portugal /PRTCBA-OECD STATI
36765103		Net trade (f.o.b.-c.i.f.), sa /Foreign trade /FOREIGN TRADE Esc bln Portugal /PRTNSO-OECD
36765303		Imports c.i.f., sa /Foreign trade /FOREIGN TRADE Esc bln Portugal /PRTNSO-OECD STATISTICS,
36765603	***	Exports f.o.b., sa /Foreign trade /FOREIGN TRADE Esc bln Portugal /PRTNSO-OECD STATISTICS,

Spain

OECD Code		OECD Definition
3220349H		Consumer goods /Industrial production /PRODUCTION 1990=100 Spain /ESPNSO-OECD STATISTICS,
3220439H		Intermediate goods /Industrial production /PRODUCTION 1990=100 Spain /ESPNSO-OECD STATISTI
3220449H		Investment goods /Industrial production /PRODUCTION 1990=100 Spain /ESPNSO-OECD STATISTICS
3220459K	***	Manufacturing, sa /Industrial production /PRODUCTION 1990=100 Spain /ESPNSO-OECD STATISTIC
3220519J	**	Total, sa /Industrial production /PRODUCTION 1990=100 Spain /ESPECO-OECD STATISTICS, PARIS
32206180		Passenger cars /Commodity output /PRODUCTION '000 Spain /ESPCAR-OECD STATISTICS, PARIS"
32206580		Cement /Commodity output /PRODUCTION tonnes '000 Spain /ESPIND-OECD STATISTICS, PARIS"
32206780		Crude steel /Commodity output /PRODUCTION tonnes '000 Spain /INTISI-OECD STATISTICS, PARIS
32321580		Dwellings completed /Construction - General /CONSTRUCTION '000 Spain /ESPTRA-OECD STATISTI
32321780	**	CONSTRUCTION Thousands; monthly averages Spain /ESPNSO-OECD STATISTICS, PARIS"
3232239H	*	Building construction /Cost of construction /CONSTRUCTION 1990=100 Spain /ESPTRA-OECD STAT
3232319H		Naval construction /Commodity output /PRODUCTION 1990=100 Spain /ESPNSO-OECD STATISTICS, P
32325383		New passenger car registrations, sa /Domestic trade - other /DOMESTIC TRADE '000 Spain /ES
32428282	**	Registered unemployed, sa /Unemployment /LABOUR '000 Spain /ESPNSO-OECD STATISTICS, PARIS"
324286A3		STANDARDISED UNEMPLOYMENT RATES, sa Per cent Spain /INTEUR-OECD STATISTICS, PARIS"
32429780		Labour disputes: time lost /Labour - other /LABOUR '000 Spain /ESPLAB-OECD STATISTICS, PAR
32429983	*	Unfilled vacancies, sa /Labour - other /LABOUR '000 Spain /ESPEMP-OECD STATISTICS, PARIS"
3243419H	*	Agricultural products /Producer prices /PRICES 1990=100 Spain /ESPNSO-OECD STATISTICS, PAR
3243479H		Consumer goods /Producer prices /PRICES 1990=100 Spain /ESPNSO-OECD STATISTICS, PARIS"
3243519H		Energy /Producer prices /PRICES 1990=100 Spain /ESPNSO-OECD STATISTICS, PARIS"
3243569H	*	PRODUCER PRICES (manufacturing) 1990 = 100 Spain /ESPNSO-OECD STATISTICS, PARIS"
3243649H		Intermediate goods /Producer prices /PRICES 1990=100 Spain /ESPNSO-OECD STATISTICS, PARIS"
3243659H		Investment goods /Producer prices /PRICES 1990=100 Spain /ESPNSO-OECD STATISTICS, PARIS"
3244449H		Fuel and electricity /Consumer prices /PRICES 1990=100 Spain /ESPNSO-OECD STATISTICS, PARI
3244459H	***	Food /Consumer prices /PRICES 1990=100 Spain /ESPNSO-OECD STATISTICS, PARIS"
3244559H	***	All items less food /Consumer prices /PRICES 1990=100 Spain /ESPNSO-OECD STATISTICS, PARIS
3244589H	*	Rent /Consumer prices /PRICES 1990=100 Spain /ESPNSO-OECD STATISTICS, PARIS"
3244599H	***	Services less rent /Consumer prices /PRICES 1990=100 Spain /ESPNSO-OECD STATISTICS, PARIS"
3244619H	***	All items /Consumer prices /PRICES 1990=100 Spain /ESPNSO-OECD STATISTICS, PARIS"
3254829D		MONETARY AGGREGATES, sa 1990 = 100 Spain /ESPCBA-OECD STATISTICS, PARIS"
3254832A	**	Monetary aggregate (M3) /Domestic finance - General /DOMESTIC FINANCE Ptas bln Spain /ESPC
3254833D	***	ESP MONETARY AGGREGATE M3 SA /BN PESETA Spain OECD STATISTICS, PARIS"
3254839D	***	MONETARY AGGREGATES, sa 1990 = 100 Spain /ESPCBA-OECD STATISTICS, PARIS"
3254861A	***	Total liquidity (ALP2) /Domestic finance - General /DOMESTIC FINANCE Ptas bln Spain /ESPCB
3255302A		Commercial banks /Credit to private sector /DOMESTIC FINANCE Ptas bln Spain /ESPCBA-OECD S
3255312A		Other credit institutions /Credit to private sector /DOMESTIC FINANCE Ptas bln Spain /ESPC
3255631H	***	Call money /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Spain /ESPCBA-OECD STATIS
325564AH		3-month interbank loans /Interest rates /INTEREST RATES - SHARE PRICES % p.a. Spain /ESPCB
3256009H		EFFECTIVE EXCHANGE RATES 1990 = 100 Spain /OECD-OECD STATISTICS, PARIS"
325601AH		EXCHANGE RATES National currency units per US dollar Spain /OECD-OECD STATISTICS, PARIS"
325611AS		Official reserves excluding gold /Foreign finance /FOREIGN FINANCE SDR mln Spain /INTIMF-O
3256151A		Net foreign position /Foreign finance /FOREIGN FINANCE Ptas bln Spain /ESPCBA-OECD STATIST
32765102		Net trade (f.o.b.-c.i.f.), sa /Foreign trade /FOREIGN TRADE Ptas bln Spain /ESPCUS-OECD ST
32765252		FOREIGN TRADE - Ftr Trade Balance (fob-fob), sa Billions US dollars; monthly averages Spai
32765302		Imports c.i.f., sa /Foreign trade /FOREIGN TRADE Ptas bln Spain /ESPCUS-OECD STATISTICS, P
32765552	*	FOREIGN TRADE - Ftr Imports (fob/cif) Total, sa Billions US dollars; monthly averages Spai
32765602		Exports f.o.b., sa /Foreign trade /FOREIGN TRADE Ptas bln Spain /ESPCUS-OECD STATISTICS, P
32765752		FOREIGN TRADE - Ftr Exports Fob Total, sa Billions US dollars; monthly averages Spain /ESP