EU Aggregates with Missing Country Values
Brief Methodological Note

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Abstract

This brief methodological note formulates the problem of the production of EU aggregates when some country values are missing. We discuss various forecasting approaches as well as machine learning-based solutions, suggest extensions and highlight some important concerns.

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Contents

1 Introduction

Eurostat (2021) analyses how European aggregates are produced. In particular, we distinguish two cases: (i) aggregation under full information, and (ii) aggregation under partial information available.

As the name suggests, aggregation under full information takes place when all member states have submitted their official statistics and the data is complete and meets the necessary quality criteria. Define N to be the set of all countries (member states) to form the aggregate with available data from t ={1, 2, ..., T}; e.g., in the case of EU27 we have N ={1, 2, ..., 27}. The value for the aggregate variable, Y, at time T is then calculated as:

$$Y_T = \sum_{i=1}^{N} w_i y_{iT}, \tag{1}$$

where y_{iT} denotes the submitted value of the disaggregate of country i at time T and w_i denotes the corresponding weight. Of course, aggregates under full information are usually delayed since data from all member states has to be collected, assessed and curated.

On the other hand, we might have to produce aggregate statistics when only partial information is available. Usually, this includes two cases: (i) national data is missing or it is incomplete, and (ii) national data exists but it is unreliable. Therefore, being able to produce aggregates under these conditions allows to solve the problem of estimation as well as to improve the timeliness of official statistics (or -at least-early estimates of those statistics). This makes the purpose of this project of utmost importance to official statistics agencies.

Denote the set of countries with complete data at time t by N_1 and the set of countries with incomplete data at time t by N_2; obviously $N = N_1+N_2$. As explained in Eurostat (2021), the standard practice when only partial information is available is to estimate the missing values and produce the aggregate as:

$$\widehat{Y}_T = \sum_{i=1}^{N_1} w_i y_{iT} + \sum_{j=1}^{N_2} w_j \widehat{y}_{jT}, \tag{2}$$

where y_{iT} denotes the submitted value of the disaggregate of country i at time T, w_i denotes the corresponding weight, $\widehat{y}_{jT}$ denotes the estimated value of the disaggregate of country i at time T which has incomplete data and w_j denotes the corresponding weight.

Eurostat (2014) provides details on three different imputation approaches: (i) deductive imputation, (ii) model-based imputation, and (iii) donor imputation. Deductive imputation is straightforward and can be easily applied based on logical or mathematical relationships between variables. Eurostat (2014) provides a specific example where businesses are asked in a survey to report their total turnover (TO), turnover from the main activity (TO_1), and turnover from sideline activities (TO_2). If the value of one of these variables is missing, and if it may be assumed that the two observed values are correct, then the missing value can be calculated using the rule: $TO_1 + TO_2 = TO$. Of course, this cannot be applied in the case of the aggregates production; for example, considering the EA-19 calculation, the GDP of Belgium does not equate to the GDP of Netherlands and so on.

Missing values can be estimated with model-based forecasting or imputation methods. Model-based forecasting is quite general and, if a considerable number of historical data is available, it can include from basic time series models to machine learning approaches. Forecasting can be a very useful tool especially for cases with a specific target variable; for example, forecasting the GDP growth of Italy. However, one should be cautious in using forecasting models in this context. Consider the case where the EA-19 GDP aggregate needs to be calculated. In case we have data for 18 member states then one could employ time series forecasting models (or model averages) to estimate the missing data for the corresponding member state. If we have missing data for 3 or 4 countries, then one would have to estimate each of these series separately and employ different models (or different parameters). But, having to estimate different models for different cases and merge estimates from models with different forecasting ability would reduce the parsimony of the overall approach and greatly increase the risk of misspecification.

Model-based imputation suggests to replace missing values with estimates based on a model. In this case we can have simple approaches like the mean imputation, where the missing values are replaced by the mean, or the ratio imputation, where missing values in one variable are estimated based on the ratio of this variable and a corresponding one and the data which exists in the corresponding variables (if it exists).

Another method is the donor imputation. This case, which includes nearest neighbours as an algorithm, attempts to fill in the missing values for a given unit by copying observed values of another unit, the donor. Typically, the donor is chosen in such a way that it resembles the imputed unit as much as possible on one or more background characteristics. The rationale behind this is that if the two units match (exactly or approximately) on a number of relevant auxiliary variables, it is likely that their scores on the target variable will also be similar. However, the main problem is how to identify the donors or auxiliary variables.

2 Methodology

2.1 Univariate Forecasting

The model-based imputation, which essentially is a forecasting exercise, described in Equation (2) consists of the following steps.

1. First, we carefully consider our preferred model, M.
2. For a given country j, with $j \in N_2$, we estimate the model using past historical data, i.e. for $t = \{1, 2, ..., T-1\}$.
3. Using the parameter estimates we forecast the missing value and obtain $\widehat{y}_{jT}$.
4. We repeat the same process for all countries in N_2 and obtain estimates for all missing values.

In the end of the above procedure, we can calculate the aggregate as defined in Equation (2).

The univariate time series models we consider here include: the naive forecasting, simple averages, ETS (exponential smoothing state space model), BATS (exponential smoothing state space model with Box-Cox transformation, ARMA errors, trend and seasonal components), NNETAR (single hidden layer Feed-forward neural network with lagged inputs), spline forecasting, the theta method, AR(1) forecasting, ARIMA(p,d,q) with order selected via the corrected AIC and a trend regression.

2.2 Partial Aggregate Regression

An alternative approach to forecasting the missing values is to exclude these countries and calculate an estimate of the aggrate by using the countries with available information only. In particular, consider that for time t ={1, 2, ..., $T-1$} all countries have full information. Therefore, we can calculate the total aggregate as:

$$Y_t = \sum_{i=1}^{N_1} w_i y_{it} + \sum_{j=1}^{N_2} w_j \widehat{y}_{jt}, \text{ for } t = \{1,\ 2,\ ...,\ T-1\} \tag{3}$$

One could also calculate the partial aggregate of the countries with no missing values which is available for the whole time period as:

$$Y_t^P = \sum_{i=1}^{N_1} w_i y_{it}, \text{ for } t = \{1,\ 2,\ ...,\ T\}. \tag{4}$$

Then, we can estimate the following regression:

$$Y_t = \alpha + \beta Y_t^P + \varepsilon_t, \text{ for } t = \{1,\ 2,\ ...,\ T-1\} \tag{5}$$

with $\varepsilon_t \sim WN\left(0, \sigma_\varepsilon^2\right)$ with $\sigma_\varepsilon^2 < \infty$ and obtain the OLS estimates $\widehat{\alpha}$ and $\widehat{\beta}$. The forecast of the total aggregate which only uses the information of the countries with no missing values can be calculated as:

$$\widehat{Y}_T = \widehat{\alpha} + \widehat{\beta} Y_T^P. \tag{6}$$

2.3 The Ratio Approach

A similar, but perhaps less sophisticated approach, is to employ the ratio of the total and partial aggregate. In particular, we consider again Y_t available at t ={1, 2, ..., $T-1$} and Y_t^P available at t ={1, 2, ..., T} as defined in Equation (3) and Equation (4) respectively. Instead of estimatin the corresponding regression, one can calculate their historical ratio:

$$R_t = \frac{Y_t}{Y_t^P}, \text{ for } t = \{1, 2, ..., T-1\}. \tag{7}$$

Then, we can use the time series of the historical ratio R_t for t ={1, 2, ..., $T-1$} to produce the forecast for the total aggregate. This could be done in many ways. Perhaps two simple approaches is to use the last observed value of the ratio, R_{T-1}, or the historical average, $\overline{R} = \frac{1}{T-1}\sum_{t=1}^{T-1} R_t$, and calculate:

$$\widehat{Y}_T = R_{T-1}Y_t^P, \tag{8}$$

$$\widehat{Y}_T = \overline{R}Y_t^P. \tag{9}$$

2.4 Machine Learning

A possible extension of the regression approach is to provide an expanded version where instead of the partial average one employs the time series of each country. In particular, consider that N_1 consists of K countries, i.e. N_1 ={n_1, n_2, ..., n_K}. Then, one could estimate:

$$Y_t = \alpha + \beta_1 Y_{n_1 t} + \beta_2 Y_{n_2 t} + ... + \beta_K Y_{n_K t} + \varepsilon_t, \text{ for } t = \{1, 2, ..., T-1\} \tag{10}$$

and obtain the forecast of the aggregate as:

$$\widehat{Y}_T = \widehat{\alpha} + \widehat{\beta}_1 Y_{n_1 T} + \widehat{\beta}_2 Y_{n_2 T} + ... + \widehat{\beta_K} Y_{n_K T}. \tag{11}$$

An obvious problem arises when the number of available time observations, $T-1$, is smaller than the number of countries, K. This could be investigated with linear and nonlinear supervised machine learning methodologies.

In this research we are considering the following machine learning approaches:

1. Penalised Regressions
   - Ridge and adaptive ridge,
   - Lasso and adaptive lasso,
   - Elastic net and adaptive elastic net; both with 1/2 mixing coefficient,
2. Classification Algorithms
   - Gradient boosting (GB) and extreme gradient boosting (XGBoost),
   - Random forests,
   - K-Nearest Neighbours.

More details on the above methodologies is discussed in Appendix A.

3 Empirical Exercise

3.1 Preliminaries

3.1.1 Variables

The main purpose of this study is to investigate the models which are able to provide accurate EU27 estimates when some figures from member countries are missing. The models from our main methodologies, as discussed in the previous section, are empirically evaluated in a number of important variables across all different frequencies: annual, quarterly and monthly.

In particular, we consider the variables of Employment (lfsi_emp_a), Producer Prices (sts_inpp_a), Industrial Production (sts_inpr_a) and Retail Trade (sts_trtu_a) in the annual frequency. We consider the variables of GNI (naidq_10_gdp), Employment (namq_10_a10_e), GDP (namq_10_gdp) and Labour in Construction (sts_colb_q) in the quarterly frequency. And, finally, we consider the variables Unemployment (ei_lmhu_m), Producer Prices (sts_inpp_m), Industrial Production (sts_inpr_m) and Retail Trade (sts_trtu_m) in the monthly frequency. For consistency, we try to use the last 5 years of data as our evaluation (out-of-sample) data. For all variables, we perform all the analysis and levels as well as using the stationary version of the variable, but we perform all evaluation in (log) growth. Table 1 provides the details about sample size and evaluation sample for each variable.

3.1.2 Missing Values

For consistency, we consider 15 cases with combinations of countries with missing values. This number of cases is fixed across all variables. In particular, the cases below provide the countries (combinations) where the latest figure is missing and, hence, the EU27 is estimated.

Case 1: MT.

Case 2: MT, LU.

Case 3: MT, LU, HR.

Case 4: MT, SK, CZ, EL.

Case 5: MT, EL, IE, DK.

Case 6: MT, AT.

Case 7: EL, AT, NL, ES.

Case 8: AT, NL, ES.

Case 9: ES.

Case 10: FR.

Case 11: IT.

Case 12: DE.

Case 13: ES, IT.

Case 14: ES, IT, FR.

Case 15: IT, FR, DE.

As it can be seen, the above combinations of countries with missing values include cases of minor countries (e.g., Cases 1 to 5), cases of medium-sized countries (Cases 6 to 9), as well as cases with major countries (e.g., Cases 10 to 15).

3.1.3 Models

As discussed in Section 2, the models considered in this study to handle the cases of missing values and, thus, provide an estimate of the EU27 aggregate include:

1. LV_NAIVE: the naive model applied directly in the levels.
2. LV_Avg2: the average of the past 2 periods applied directly in the levels.
3. LV_Avg4: the average of the past 4 periods applied directly in the levels.
4. LV_BATS: BATS model applied directly in the levels.
5. LV_ETS: ETS model applied directly in the levels.
6. LV_NNETAR: The neural network with 1-hidden layer and AR(P) model applied directly in the levels.
7. LV_SPLINE: A nonlinear spline applied directly in the levels.
8. LV_THETA: The theta model applied directly in the levels.
9. LV_AR1: An AR(1) model applied in the first difference of the levels.
10. LV_ARIMA: An ARIMA(p,d,q) model applied directly in the levels.
11. LV_TREND: A deterministic trend model applied directly in the levels.
12. LV_REG: An OLS regression model applied directly in the levels.

13. LV_RATIO_LAST: The ratio approach using the last observed value applied directly in the levels.
14. LV_RATIO_HAVG: The ratio approach using the historical average applied directly in the levels.
15. D_NAIVE: the naive model applied in the stationary version of the series.
16. D_Avg2: the average of the past 2 periods applied in the stationary version of the series.
17. D_Avg4: the average of the past 4 periods applied in the stationary version of the series.
18. D_BATS: BATS model applied in the stationary version of the series.
19. D_ETS: ETS model applied in the stationary version of the series.
20. D_NNETAR: The neural network with 1-hidden layer and AR(P) model applied in the stationary version of the series.
21. D_SPLINE: A nonlinear spline applied in the stationary version of the series.
22. D_THETA: The theta model applied in the stationary version of the series.
23. D_AR1: An AR(1) model applied in the stationary version of the series.
24. D_ARIMA: An ARIMA(p,d,q) model applied in the stationary version of the series.
25. D_TREND: A deterministic trend model applied in the stationary version of the series.
26. D_REG: An OLS regression model applied in the stationary version of the series.
27. D_RATIO_LAST: The ratio approach using the last observed value applied in the stationary version of the series.

28. D_RATIO_HAVG: The ratio approach using the historical average applied in the stationary version of the series.
29. D_RF: The Random Forest applied in the stationary version of the series.
30. D_XGBoost: The XGBoost applied in the stationary version of the series.
31. D_GB: The Gradient Boosting applied in the stationary version of the series.
32. D_KNN: The K-Nearest Neighbours approach applied in the stationary version of the series; K is selected via cross-validation.
33. D_Lasso: The Lasso Regression applied in the stationary version of the series.
34. D_AdaLasso: The adaptive Lasso Regression (using the Ridge estimates in the first step) applied in the stationary version of the series.
35. D_Ridge: The Ridge Regression applied in the stationary version of the series.
36. D_AdaRidge: The adaptive Ridge Regression (using the Ridge estimates in the first step) applied in the stationary version of the series.
37. D_ElastNet: The Elastic Net Regression with 0.5 mixing coefficient applied in the stationary version of the series.
38. D_AdaElastNet: The adaptive Elastic Net Regression with 0.5 mixing coefficient (using the Ridge estimates in the first step) applied in the stationary version of the series.

Appendix A provides details on each of the previously described models.

3.2 Cross-Validation Algorithm

This methodological report discusses the results for annual, quarterly and monthly variables for the EU27. The cross-validation exercise is executed as follows.

1. For given N_1 and N_2, we estimate the total EU27 aggregate using the univariate models, the partial aggregate regression, the ratio approach and the machine learning-based approaches.

2. We do this for a number of K out-of-sample periods t_T ={T-K+1, ..., T-2, T-1, T}.

3. By the end of the exercise, we collect the estimates and compare them to the actual values.

At this stage, one can construct various performance evaluation measures such as the MAE, MSE, etc. In this report, we construct the symmetric intervals as $-/+1\%$ of the estimate; i.e. for model M and year T with an estimate $\widehat{Y}_T^M$ we construct:

$$FI_T^M = (-1\%\widehat{Y}_T^M,\ +1\%\widehat{Y}_T^M). \tag{12}$$

Obviously, if the variable is expressed as a percentage change (with respect to the previous period), the symmetric intervals are constructed as:

$$FI_T^M = (\widehat{Y}_T^M - 0.1\%,\ \widehat{Y}_T^M + 0.1\%). \tag{13}$$

By the end of the cross-validation exercise one can construct the coverage rates of the above intervals, i.e. the number of times the intervals include the actual value as:

$$CR_{t_T}^M = \frac{1}{t_T}\sum_{i=1}^{t_T} I(Y_i \epsilon FI_i^M) \tag{14}$$

where $I(\cdot)$ is the indicator function taking one if $Y_i \epsilon FI_i^M$ and zero otherwise. A number of combinations of countries with missing values (small, medium, large, small and medium, small and large, medium and large, small and medium and large) is included.

3.3 Results

This section briefly describes the empirical results obtained in the cross-validation exercise. Tables 2 to 13 present the main results which include the ±1% coverage rates. Figures 1 to 6 provide an overview of the averages across variables as well as across models. Similarly, Tables 14 to 25 and Figures 7 to 12 (Appendix B) provide the extended results for the ±3% coverage rates and Tables 26 to 37 and Figures 13 to 18 (Appendix C) provide the extended results for the ±5% coverage rates.

3.3.1 Annual

It is important to notice that the annual cases consist of only 5 periods as out-of-sample (which is relatively small); therefore, these results should be examined with caution. Starting with the results for Employment (lfsi_emp_a) we see in Table 2 that, as expected, the calculated intervals for the EU27 aggregate are successful for combination of small-sized countries (e.g., MT, MT and LU, MT and AT and even FR in some cases). However, as we move to combination of large-sized countries, such as DE, IT, etc., the performance of all models deteriorate. On average across all cases, LV_REG, LV_RATIO_LAST and LV_RATIO_HAVG have the best performance.

Moving to the results for the Producer Prices (sts_inpp_a), we see in Table 3 that D_RATIO_HAVG and LV_Avg4 are the two best performing models. However, one must notice that all models deteriorate for this variable even with the "easiest" cases such as MT or MT and LU. The results for the Industrial Production (sts_inpr_a) presented in Table 4 show that the LV_NNETAR is the most successful model, but -as with the previous case- all models perform relatively poorly.

Finally, the results for the Retail Trade (sts_trtu_a) in Table 5 show a slight improve in the performance of most models where the best one is LV_RATIO_HAVG. Again, it is important to highlight the very small out-of-sample size in the annual cases which could make the above results and qualitative conclusions to be unstable. Overall, looking at Figure 1 we see that the best results, on average across all models, are obtained for the Employment (lfsi_emp_a) series

3.3.2 Quarterly

Next, we move to the cases with the quarterly variables where the out-of-sample size has increased to 20. Starting with the GNI (naidq_10_gdp) we see in Table 6 that most models provide adequate results; with the best model being LV_Avg4 followed by LV_Avg2 and LV_REG. We again see that most models perform better in the cases with combinations of small-size countries and their performance deteriorates as we move to missing values cases which include DE, IT, etc.

Moving to the quarterly employment variable (namq_10_a10_e) in Table 7 we see a relatively good performance from most models; even in the strange case of IT, FR and DE having missing values, we have that, on average across models, 53% of the times the ±1% confidence intervals include the true value. The best models are LV_RATIO_HAVG and LV_REG.

For the GDP (namq_10_gdp) variable in Table 8 we see that again there is an adequate performance of a large number of models. The model with the largest coverage rate is LV_RATIO_HAVG.

Finally, for the Labour in Construction variable (sts_colb_q) in Table 9 we observe a slight deterioration of the performance of most models compared to the previous cases. The best models are LV_Avg2 and LV_TREND followed by LV_NAIVE, LV_Avg4, LV_BATS, LV_THETA and D_AR1. Overall, looking at Figure 2 we see that the best results, on average across all models, are obtained for the all series apart from the Labour in Construction series (sts_colb_q).

3.3.3 Monthly

Moving to the last selection of monthly variables, Table **??** shows that for the Unemployment (ei_lmhu_m) the best model is LV_TREND. The expected result where the performance of models deteriorate as move from the "easiest" cases (MT, MT and LU, etc.) to the more "challenging" cases (DE, IT, etc.) of countries with missing values is again repeated here.

Table 11 presents the results for the Producer Prices (sts_inpp_m) variable. We see that the best model, on average, across all missing value cases are D_Lasso and

D_ElastNet where 63% of the times the ±1% confidence intervals include the true value.

For the case of the Industrial Production (sts_inpr_m), Table 12 shows that, on average across missing value cases, the LV_TREND has the best results which is also the case for the Retail Trade (sts_trtu_m) variable reported in Table 13.

Overall, looking at Figure 3 we see that the best results, on average across all models, are obtained for the Producer Prices (sts_inpp_m) variable.

4 Key Findings

As discussed in the previous section, this report provides a large number of detailed results for the required ±1% interval estimates, see Tables 2 to 13, as well as averaged results across models and missing value cases, see Figures 1 to **??**. Furthermore, we also provide a number of additional results for the more relaxed cases of ±3% and ±5% intervals in Appendix B and C respectively. This section provides some insights and key findings across all the results to assist the applied researcher in her methodological work.

Which missing value cases/countries have the best results? As it is expected, when the missing value comes from a country which has a relatively small impact on the aggregate, the results are better. Figures 1 to 3 show that across all annual, quarterly and monthly series, there is distinct deterioration in the average performance across models as we move from small-sized cases (Case 1, Case 2, etc.) to cases which include big-sized countries (e.g., Case 9 to Case 15).

What works best across Cases 9 to 15? Cases 9 to 15 are the most challenging cases as the missing values are as follows. Case 9: ES, Case 10: FR, Case 11: IT, Case 12: DE, Case 13: {ES, IT}, Case 14: {ES, IT, FR}, and Case 15: {IT, FR, DE}. Still, the results show that there exist models, say for the case of the quarterly GDP (namq_10_gdp), which provide ±1% coverage rates of the size of 45%, indicating that nearly half of the times the true value is included in the interval even when DE is missing or all IT, FR and DE are missing; see Table 8.

Should we apply the univariate forecasting models directly in the levels or in a stationary transformation of the original series? The answer to this question one could compare the results of the models which start with the "LV_" prefix against the corresponding models which start with the "D_" prefix. Using the averaged results across missing value cases, we see that for the annual variables the "LV_" are 57% of the times better than the corresponding "D_" models. This number increases to 80% for the quarterly variables and 84% for the monthly variables indicating that univariate forecasting models should be applied straight in the levels of the series.

Are the univariate forecasting "LV_" models better than machine learning? As in the above question, we attempt to provide an answer by comparing the average results across missing value cases of the best "LV_" univariate model to the best machine learning model. The empirical evidence suggests that the best "LV_" model is better than the best machine learning model in all annual and quarterly variables and in 3 out 4 monthly variables.

So, which model "LV_" is the best? The answer to this question is slightly more complex as there seems to be some heterogeneity across different variables and missing value cases. For the annual variables, LV_REG, LV_RATIO_LAST, LV_Avg4 and LV_NNETAR are in the top models. For the quarterly variables, LV_Avg4, LV_RATIO_HAVG and LV_TREND are in the top models. Finally, for the monthly variables LV_TREND seems to be the best model.

Is there a pattern between models and missing value cases? One could also average the results across variables (annual, quarterly and monthly) and examine the behaviour of best models for different missing value cases.

- Annual Variables. For the annual variables, which we highlight that there is a very small out-of-sample size, we see that for Cases 1 to 3 (i.e. when MT, LU, HR and their combinations have missing values), LV_NNETAR is the best. For Cases 4 and 5, LV_Avg4 provides the best results. For Cases 6 and 7 the results are more heterogeneous including models such as LV_NAIVE, LV_BATS, LV_THETA and LV_RATIO_LAST among others. For Cases 8 to 15, which are the more complex cases where countries such as ES, IT, FR and DE have missing values, the results indicate that LV_RATIO_HAVG is the best model. However, it must be noted that in Cases 8 to 15, LV_RATIO_HAVG provides intervals which include the true values only in 23% to 43% of out-of-sample periods.

- Quarterly Variables. Repeating the same analysis as above, for the quarterly variables we again find that for Cases 1 to 3 a large number of models perform favourably including LV_BATS, LV_ETS, LV_THETA and LV_ARIMA. For Case 4 LV_Avg2 and LV_Avg4 are the best models. For Cases 5 and 6, we have that LV_TREND is the best model. For Cases 7 and 8, we have that LV_RATIO_HAVG is the best model. For Cases 9 and 10, LV_Avg2 and LV_Avg4 are the best models. For Cases 11 and 12, LV_TREND is the best model. For Cases 13 and 14, LV_Avg2 is the best model whereas for Case 15 LV_Avg4 is the best model. It must be noted that in Cases 8 to 15, the best model intervals include the true values in about 41% to 68% of out-of-sample periods.

- Monthly Variables. Finally, for the monthly variables we see that most univariate models are good for Case 1. D_Avg4 is one of the best models for Cases 2 and 3. LV_TREND is the best model in Cases 4 to 11 and 13 with confidence intervals which include the true value in about 43% to 77% of out-of-sample periods. For Case 12, LV_Avg2 and LV_ETS are the best models. For Case 14 and 15 LV_REG is the best model with confidence intervals which include the true value in 25% of out-of-sample periods.

It is important to highlight that the above concluding remarks are drawn from the set of our chosen variables evaluated in the past 5 years. It is wise for the research to include all models as it is highly likely that in different target variables, missing value cases of other settings the results to change in favour of other models (e.g., machine learning methods seem to work better in monthly variables where there is more data available for the models to "learn" and provide more favourable results for the monthly Producer Prices variable, sts_inpp_m).

5 Conclusions

This methodological report investigates the estimation of the EU aggregate in cases where some of the values of the disaggregates (EU member countries) are missing. To that end, we compare the estimates from various univariate models applied in the levels as well as in the stationary version of the series. We further include linear and nonlinear machine learning models in our selection. Our empirical exercise evaluates the results in four annual, four quarterly and four monthly macroeconomic variables over the past 5 years. The results are promising indicating that the EU27 estimate can be accurately estimated in cases where missing values come from small and perhaps a combination of small and medium to big size member countries.[1]

[1] In this report the term "size" mainly refers to the qualitative as well as the quantitative impact a county has on the aggregate; e.g., DE is a big-size country compared to MT.

6 References

- Eurostat (2014). Handbook on Methodology of Modern Business Statistics.
- Eurostat (2021). European Business Statistics Manual, 2021 Edition.

7 Tables

Working	Measurement	Variable Code	Evaluation	Measurement	Code	Frequency	Sample Size Obs	From	To	Evaluation Obs	From	To
Employment	Level	lfsi_emp_a	Employment	Log Growth	lfsi_emp_a	Annual	15	2009	2023	5	2019	2023
Producer Prices	Level	sts_inpp_a	Producer Prices	Log Growth	sts_inpp_a	Annual	19	2005	2023	5	2019	2023
Industrial Production	Level	sts_inpr_a	Industrial Production	Log Growth	sts_inpr_a	Annual	24	2000	2023	5	2019	2023
Retail Trade	Level	sts_trtu_a	Retail Trade	Log Growth	sts_trtu_a	Annual	14	2000	2023	5	2019	2023
GNI	Level	naidq_10_gdp	GNI	Log Growth	naidq_10_gdp	Quarterly	80	2000Q1	2019Q4	20	2015Q1	2019Q4
Employment	Level	namq_10_a10_e	Employment	Log Growth	namq_10_a10_e	Quarterly	97	2000Q1	2024Q1	20	2019Q2	2024Q1
GDP	Level	namq_10_gdp	GDP	Log Growth	namq_10_gdp	Quarterly	97	2000Q1	2024Q1	20	2019Q2	2024Q1
Labour in Construction	Level	sts_colb_q	Labour in Construction	Log Growth	sts_colb_q	Quarterly	64	2008Q1	2023Q4	20	2019Q1	2023Q4
Unemployment	Level	ei_lmhu_m	Unemloyment	Log Growth	ei_lmhu_m	Monthly	292	2000M02	2024M05	60	2019M06	2024M05
Producer Prices	Level	sts_inpp_m	Producer Prices	Log Growth	sts_inpp_m	Monthly	233	2005M01	2024M05	60	2019M06	2024M05
Industrial Production	Level	sts_inpr_m	Industrial Production	Log Growth	sts_inpr_m	Monthly	293	2000M01	2024M05	60	2019M06	2024M05
Retail Trade	Level	sts_trtu_m	Retail Trade	Log Growth	ei_isrr_m	Monthly	292	2000M01	2024M04	60	2019M05	2024M04

Table 1: Variable details, sample sizes and evaluation periods.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	1.00	0.60	0.60	1.00	0.60	0.60	0.60	0.80	0.40	0.20	0.40	0.20	0.20
LV_Avg2	1.00	1.00	1.00	0.80	0.40	1.00	0.40	0.40	0.40	0.60	0.40	0.40	0.40	0.40	0.20
LV_Avg4	1.00	1.00	1.00	0.80	0.80	1.00	0.20	0.20	0.20	0.80	0.40	0.20	0.20	0.20	0.20
LV_BATS	1.00	1.00	1.00	0.60	0.60	1.00	0.40	0.20	0.40	0.40	0.00	0.40	0.20	0.40	0.00
LV_ETS	1.00	1.00	1.00	0.60	0.60	1.00	0.60	0.60	0.60	0.80	0.40	0.20	0.40	0.20	0.20
LV_NNETAR	1.00	1.00	1.00	0.60	0.40	1.00	0.00	0.00	0.00	0.60	0.20	0.00	0.00	0.00	0.00
LV_SPLINE	1.00	1.00	1.00	0.40	0.40	0.80	0.40	0.40	0.20	0.60	0.40	0.20	0.40	0.20	0.20
LV_THETA	1.00	1.00	1.00	0.60	0.60	1.00	0.60	0.60	0.60	0.80	0.40	0.20	0.40	0.00	0.20
LV_AR1	1.00	1.00	1.00	0.60	0.40	1.00	0.20	0.40	0.40	0.60	0.60	0.20	0.60	0.00	0.20
LV_ARIMA	1.00	1.00	1.00	0.60	0.40	1.00	0.20	0.40	0.40	0.60	0.40	0.40	0.60	0.00	0.20
LV_TREND	1.00	1.00	1.00	0.80	0.60	1.00	0.40	0.40	0.60	0.80	0.40	0.40	0.20	0.20	0.20
LV_REG	1.00	1.00	1.00	1.00	1.00	1.00	0.60	1.00	0.60	1.00	0.40	1.00	0.20	0.20	0.40
LV_RATIO_LAST	1.00	1.00	1.00	1.00	0.80	1.00	0.60	0.60	0.60	0.60	0.80	0.80	0.40	0.40	0.40
LV_RATIO_HAVG	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.60	0.80	0.80	0.80	1.00	0.40	0.60	0.40
D_NAIVE	1.00	1.00	1.00	0.40	0.40	1.00	0.20	0.40	0.40	0.40	0.20	0.00	0.20	0.20	0.20
D_Avg2	1.00	1.00	1.00	0.40	0.40	1.00	0.40	0.40	0.40	0.60	0.20	0.00	0.20	0.20	0.00
D_Avg4	1.00	1.00	1.00	0.60	0.60	1.00	0.40	0.60	0.60	0.80	0.40	0.00	0.40	0.00	0.20
D_BATS	1.00	1.00	1.00	0.40	0.20	1.00	0.00	0.40	0.40	0.60	0.20	0.20	0.20	0.00	0.00
D_ETS	1.00	1.00	1.00	0.20	0.20	1.00	0.20	0.20	0.40	0.60	0.40	0.20	0.40	0.00	0.20
D_NNETAR	1.00	1.00	1.00	0.40	0.40	1.00	0.20	0.40	0.40	0.60	0.20	0.00	0.20	0.20	0.20
D_SPLINE	1.00	1.00	1.00	0.20	0.20	0.60	0.20	0.20	0.20	0.60	0.20	0.00	0.20	0.00	0.00
D_THETA	1.00	1.00	1.00	0.20	0.20	1.00	0.20	0.20	0.40	0.60	0.40	0.00	0.20	0.00	0.20
D_AR1	1.00	1.00	1.00	0.60	0.40	1.00	0.20	0.40	0.40	0.60	0.60	0.20	0.40	0.00	0.20
D_ARMA	1.00	1.00	1.00	0.60	0.40	1.00	0.20	0.40	0.40	0.60	0.40	0.40	0.20	0.00	0.20
D_TREND	1.00	1.00	1.00	0.60	0.60	1.00	0.40	0.60	0.60	0.60	0.40	0.20	0.40	0.20	0.20
D_REG	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_RATIO_LAST	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
D_RATIO_HAVG	0.40	0.20	0.40	0.20	0.00	0.60	0.00	0.20	0.40	0.00	0.00	0.00	0.00	0.00	0.00
D_RF	0.20	0.20	0.20	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
D_XGBoost	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_GB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_KNN	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_Lasso	0.20	0.20	0.20	0.40	0.20	0.20	0.00	0.00	0.00	0.20	0.40	0.00	0.00	0.20	0.00
D_AdaLasso	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.00	0.20	0.40	0.00	0.00	0.00	0.00
D_Ridge	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
D_AdaRidge	0.40	0.40	0.40	0.20	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
D_ElastNet	0.00	0.00	0.00	0.40	0.20	0.20	0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.20
D_AdaElastNet	0.20	0.20	0.20	0.40	0.20	0.20	0.00	0.00	0.00	0.20	0.40	0.00	0.20	0.20	0.00

Table 2: $\pm 1\%$ coverage rates for Employment (lfsi_emp_a), annual.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.40	0.40	0.40	0.40	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LV_Avg2	0.40	0.40	0.20	0.60	0.40	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LV_Avg4	0.40	0.40	0.40	0.80	0.80	0.20	0.20	0.20	0.20	0.40	0.20	0.20	0.20	0.20	0.20
LV_BATS	0.40	0.40	0.20	0.40	0.60	0.40	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00
LV_ETS	0.40	0.40	0.40	0.40	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LV_NNETAR	0.40	0.60	0.60	0.60	0.60	0.20	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00
LV_SPLINE	0.40	0.40	0.40	0.20	0.00	0.40	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00
LV_THETA	0.40	0.40	0.40	0.40	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LV_AR1	0.40	0.40	0.40	0.40	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LV_ARIMA	0.40	0.40	0.40	0.40	0.20	0.20	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
LV_TREND	0.40	0.40	0.40	0.80	0.80	0.20	0.00	0.00	0.20	0.40	0.20	0.20	0.00	0.00	0.20
LV_REG	0.20	0.00	0.20	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00
LV_RATIO_LAST	0.00	0.00	0.40	0.00	0.00	0.20	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LV_RATIO_HAVG	0.20	0.00	0.00	0.40	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.00	0.20	0.20	0.00
D_NAIVE	0.40	0.40	0.60	0.20	0.00	0.40	0.00	0.20	0.20	0.00	0.00	0.00	0.20	0.00	0.00
D_Avg2	0.40	0.40	0.60	0.20	0.00	0.20	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_Avg4	0.40	0.40	0.40	0.40	0.00	0.40	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
D_BATS	0.40	0.40	0.40	0.40	0.00	0.20	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
D_ETS	0.40	0.40	0.40	0.40	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_NNETAR	0.40	0.60	0.60	0.40	0.20	0.40	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
D_SPLINE	0.40	0.40	0.60	0.20	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00
D_THETA	0.40	0.40	0.40	0.40	0.00	0.20	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
D_AR1	0.40	0.40	0.40	0.40	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_ARMA	0.40	0.40	0.40	0.40	0.00	0.20	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
D_TREND	0.40	0.40	0.40	0.40	0.00	0.40	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
D_REG	0.40	0.20	0.20	0.20	0.00	0.20	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
D_RATIO_LAST	0.40	0.20	0.20	0.40	0.20	0.20	0.20	0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.20
D_RATIO_HAVG	0.40	0.20	0.20	0.40	0.20	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
D_RF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00
D_XGBoost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_GB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_KNN	0.00	0.00	0.00	0.00	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_Lasso	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.20	0.00	0.00	0.00	0.20	0.20	0.00
D_AdaLasso	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_Ridge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_AdaRidge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_ElastNet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_AdaElastNet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 3: ±1% coverage rates for Producer Prices (sts_inpp_a), annual.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.60	0.60	0.60	0.00	0.00	0.20	0.00	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.20
LV_Avg2	0.60	0.60	0.60	0.20	0.00	0.00	0.00	0.00	0.40	0.00	0.20	0.00	0.00	0.00	0.00
LV_Avg4	0.60	0.60	0.60	0.20	0.20	0.20	0.00	0.00	0.00	0.20	0.20	0.00	0.00	0.00	0.00
LV_BATS	0.60	0.60	0.60	0.20	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.40	0.20	0.20	0.00
LV_ETS	0.60	0.60	0.60	0.00	0.00	0.20	0.00	0.00	0.20	0.40	0.20	0.20	0.00	0.00	0.00
LV_NNETAR	0.60	0.60	0.60	0.20	0.00	0.20	0.60	0.60	0.20	0.40	0.00	0.00	0.40	0.20	0.20
LV_SPLINE	0.60	0.60	0.60	0.20	0.00	0.20	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LV_THETA	0.60	0.60	0.60	0.00	0.00	0.20	0.00	0.00	0.20	0.20	0.20	0.20	0.00	0.00	0.00
LV_AR1	0.60	0.60	0.60	0.20	0.00	0.20	0.20	0.00	0.20	0.20	0.20	0.20	0.00	0.00	0.00
LV_ARIMA	0.60	0.60	0.60	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.20	0.20	0.20
LV_TREND	0.60	0.60	0.60	0.20	0.20	0.20	0.00	0.00	0.20	0.40	0.20	0.20	0.00	0.00	0.40
LV_REG	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.00
LV_RATIO_LAST	0.20	0.00	0.20	0.00	0.20	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LV_RATIO_HAVG	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.20	0.20	0.00	0.00	0.00	0.20	0.00
D_NAIVE	0.60	0.60	0.60	0.20	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.00	0.00	0.00	0.00
D_Avg2	0.60	0.60	0.60	0.00	0.20	0.00	0.00	0.00	0.40	0.40	0.00	0.00	0.00	0.00	0.00
D_Avg4	0.60	0.60	0.60	0.00	0.00	0.20	0.00	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.00
D_BATS	0.60	0.60	0.60	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.20
D_ETS	0.60	0.60	0.60	0.20	0.20	0.20	0.00	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.20
D_NNETAR	0.60	0.60	0.60	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.20
D_SPLINE	0.60	0.60	0.40	0.00	0.00	0.20	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.20	0.20
D_THETA	0.60	0.60	0.60	0.20	0.20	0.20	0.00	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.20
D_AR1	0.60	0.60	0.60	0.00	0.00	0.20	0.00	0.00	0.20	0.20	0.20	0.20	0.00	0.00	0.00
D_ARMA	0.60	0.60	0.60	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.20
D_TREND	0.60	0.60	0.60	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.00	0.00	0.20	0.20	0.20
D_REG	0.00	0.00	0.00	0.20	0.20	0.00	0.20	0.00	0.20	0.20	0.00	0.20	0.20	0.00	0.00
D_RATIO_LAST	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_RATIO_HAVG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_RF	0.00	0.00	0.20	0.00	0.20	0.20	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.20	0.00
D_XGBoost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_GB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00
D_KNN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_Lasso	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.20	0.00	0.00	0.20	0.00
D_AdaLasso	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.20	0.00	0.00	0.00	0.00
D_Ridge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_AdaRidge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_ElastNet	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.20	0.00	0.00
D_AdaElastNet	0.20	0.20	0.20	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.00	0.20	0.00

Table 4: ±1% coverage rates for Industrial Production (sts_inpr_a), annual.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	0.75	0.00	0.50	0.80	0.00	0.40	0.25	0.20	0.20	0.00	0.00	0.00	0.00
LV_Avg2	1.00	1.00	1.00	0.25	0.25	0.80	0.25	0.40	0.25	0.20	0.40	0.00	0.00	0.00	0.00
LV_Avg4	1.00	0.75	0.75	0.25	0.25	0.80	0.25	0.40	0.25	0.20	0.20	0.00	0.00	0.00	0.00
LV_BATS	1.00	0.75	0.50	0.25	0.25	0.80	0.50	0.20	0.00	0.00	0.20	0.25	0.25	0.00	0.00
LV_ETS	1.00	1.00	0.75	0.00	0.50	0.80	0.00	0.40	0.50	0.20	0.20	0.00	0.00	0.00	0.00
LV_NNETAR	1.00	1.00	0.75	0.25	0.25	0.80	0.25	0.60	0.25	0.40	0.40	0.00	0.00	0.00	0.00
LV_SPLINE	1.00	1.00	0.50	0.25	0.25	0.80	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00
LV_THETA	1.00	1.00	0.75	0.00	0.50	0.80	0.00	0.40	0.50	0.20	0.20	0.00	0.00	0.00	0.00
LV_AR1	1.00	1.00	0.75	0.25	0.50	0.80	0.00	0.40	0.50	0.20	0.20	0.00	0.00	0.00	0.00
LV_ARIMA	1.00	0.75	0.50	0.00	0.50	0.80	0.25	0.20	0.25	0.20	0.20	0.00	0.00	0.00	0.00
LV_TREND	1.00	0.75	0.75	0.25	0.00	0.80	0.25	0.40	0.00	0.20	0.20	0.00	0.00	0.25	0.00
LV_REG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LV_RATIO_LAST	0.20	0.25	0.25	0.25	0.50	0.00	0.25	0.20	0.25	0.20	0.40	0.25	0.50	0.75	0.25
LV_RATIO_HAVG	0.60	0.00	0.25	0.50	0.75	0.20	0.50	0.40	0.50	0.40	0.40	0.25	1.00	0.50	0.50
D_NAIVE	1.00	1.00	0.50	0.50	0.25	0.60	0.00	0.20	0.00	0.20	0.00	0.25	0.00	0.00	0.00
D_Avg2	1.00	1.00	0.75	0.25	0.50	0.80	0.00	0.20	0.00	0.20	0.20	0.50	0.00	0.00	0.00
D_Avg4	1.00	1.00	0.75	0.25	0.50	0.80	0.00	0.40	0.25	0.00	0.20	0.00	0.00	0.00	0.00
D_BATS	1.00	1.00	0.75	0.00	0.50	0.80	0.00	0.40	0.25	0.20	0.20	0.00	0.00	0.00	0.00
D_ETS	1.00	1.00	0.75	0.00	0.50	0.80	0.00	0.40	0.25	0.20	0.20	0.25	0.00	0.00	0.00
D_NNETAR	1.00	1.00	0.50	0.25	0.50	0.80	0.00	0.40	0.50	0.20	0.00	0.00	0.00	0.00	0.00
D_SPLINE	1.00	1.00	0.25	0.00	0.25	0.60	0.25	0.40	0.25	0.00	0.20	0.00	0.00	0.00	0.00
D_THETA	1.00	1.00	0.75	0.25	0.50	0.80	0.00	0.40	0.25	0.00	0.20	0.25	0.00	0.00	0.00
D_AR1	1.00	1.00	0.75	0.00	0.50	0.80	0.00	0.40	0.50	0.20	0.20	0.25	0.00	0.00	0.00
D_ARMA	1.00	1.00	0.50	0.00	0.50	0.80	0.25	0.40	0.25	0.20	0.20	0.00	0.00	0.00	0.00
D_TREND	1.00	1.00	0.75	0.25	0.50	0.80	0.00	0.00	0.25	0.00	0.20	0.25	0.00	0.00	0.00
D_REG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_RATIO_LAST	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_RATIO_HAVG	0.00	0.00	0.00	0.00	0.25	0.00	0.25	0.20	0.50	0.40	0.20	0.00	0.00	0.00	0.25
D_RF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_XGBoost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_GB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_KNN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_Lasso	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_AdaLasso	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_Ridge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_AdaRidge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_ElastNet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_AdaElastNet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 5: ±1% coverage rates for Retail Trade (sts_trtu_a), annual.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	0.70	0.75	0.70	0.55	0.90	0.40	0.45	1.00	0.60	0.65	0.20	0.50	0.55	0.15
LV_Avg2	1.00	0.85	0.85	0.85	0.55	0.95	0.70	0.70	1.00	0.65	0.90	0.30	0.80	0.70	0.30
LV_Avg4	1.00	0.85	0.85	0.90	0.75	0.95	0.70	0.75	1.00	0.80	0.85	0.35	0.75	0.75	0.35
LV_BATS	1.00	0.85	0.85	0.65	0.50	0.85	0.55	0.65	0.90	0.60	0.55	0.20	0.35	0.50	0.20
LV_ETS	1.00	0.85	0.85	0.70	0.50	0.90	0.55	0.65	0.90	0.60	0.55	0.20	0.50	0.50	0.15
LV_NNETAR	1.00	0.60	0.75	0.70	0.55	0.85	0.40	0.45	0.95	0.60	0.65	0.20	0.50	0.55	0.15
LV_SPLINE	1.00	0.70	0.70	0.55	0.50	0.80	0.40	0.55	0.95	0.60	0.55	0.15	0.50	0.45	0.10
LV_THETA	1.00	0.85	0.85	0.70	0.50	0.90	0.40	0.60	1.00	0.60	0.65	0.20	0.50	0.55	0.15
LV_AR1	1.00	0.85	0.80	0.60	0.45	0.75	0.50	0.65	0.95	0.50	0.50	0.20	0.30	0.40	0.20
LV_ARIMA	1.00	0.85	0.85	0.55	0.45	0.85	0.65	0.75	0.95	0.60	0.60	0.20	0.45	0.50	0.10
LV_TREND	1.00	0.85	0.85	0.85	0.70	1.00	0.35	0.45	0.95	0.75	0.85	0.45	0.50	0.30	0.30
LV_REG	1.00	0.85	0.85	0.85	0.70	0.95	0.60	0.60	0.90	0.75	0.80	0.50	0.65	0.50	0.20
LV_RATIO_LAST	1.00	0.70	0.75	0.60	0.50	0.95	0.50	0.55	0.90	0.40	0.40	0.35	0.30	0.35	0.10
LV_RATIO_HAVG	1.00	0.85	0.85	0.85	0.70	1.00	0.75	0.75	0.90	0.70	0.70	0.65	0.45	0.20	0.20
D_NAIVE	1.00	0.50	0.55	0.55	0.25	0.70	0.20	0.25	0.90	0.45	0.25	0.10	0.20	0.35	0.10
D_Avg2	1.00	0.70	0.70	0.65	0.30	0.85	0.25	0.40	0.85	0.55	0.60	0.10	0.50	0.35	0.00
D_Avg4	1.00	0.70	0.70	0.60	0.40	0.85	0.35	0.45	0.95	0.60	0.50	0.20	0.45	0.55	0.10
D_BATS	1.00	0.85	0.85	0.70	0.45	0.90	0.45	0.65	0.95	0.60	0.60	0.20	0.45	0.50	0.15
D_ETS	1.00	0.70	0.75	0.70	0.50	0.90	0.40	0.40	0.95	0.60	0.60	0.20	0.45	0.45	0.10
D_NNETAR	1.00	0.85	0.85	0.65	0.35	0.90	0.65	0.60	0.70	0.55	0.70	0.20	0.40	0.35	0.05
D_SPLINE	1.00	0.70	0.75	0.65	0.25	0.85	0.35	0.45	0.85	0.55	0.50	0.20	0.35	0.25	0.15
D_THETA	1.00	0.70	0.75	0.65	0.50	0.85	0.40	0.40	0.95	0.60	0.55	0.20	0.45	0.50	0.15
D_AR1	1.00	0.85	0.85	0.60	0.45	0.85	0.50	0.55	0.95	0.65	0.50	0.20	0.35	0.45	0.20
D_ARMA	1.00	0.85	0.85	0.60	0.50	0.85	0.60	0.70	0.95	0.60	0.55	0.20	0.45	0.45	0.15
D_TREND	1.00	0.70	0.75	0.70	0.55	0.85	0.45	0.40	1.00	0.60	0.60	0.20	0.50	0.55	0.15
D_REG	0.05	0.20	0.20	0.10	0.10	0.05	0.10	0.05	0.10	0.10	0.10	0.05	0.05	0.05	0.10
D_RATIO_LAST	0.10	0.05	0.05	0.15	0.05	0.05	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05
D_RATIO_HAVG	0.10	0.10	0.05	0.05	0.05	0.10	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.00
D_RF	0.25	0.25	0.25	0.25	0.25	0.30	0.30	0.30	0.20	0.10	0.35	0.20	0.35	0.15	0.10
D_XGBoost	0.05	0.10	0.25	0.20	0.00	0.15	0.15	0.25	0.10	0.25	0.20	0.15	0.15	0.35	0.05
D_GB	0.40	0.35	0.40	0.40	0.25	0.35	0.25	0.30	0.40	0.20	0.35	0.05	0.30	0.50	0.15
D_KNN	0.10	0.10	0.10	0.20	0.10	0.10	0.10	0.10	0.20	0.10	0.25	0.15	0.25	0.15	0.05
D_Lasso	0.95	0.65	0.65	0.65	0.50	0.85	0.40	0.50	0.90	0.50	0.55	0.05	0.50	0.35	0.10
D_AdaLasso	0.95	0.65	0.65	0.70	0.45	0.80	0.25	0.60	0.90	0.40	0.35	0.10	0.55	0.40	0.05
D_Ridge	0.95	0.60	0.65	0.75	0.20	0.90	0.45	0.45	0.85	0.55	0.65	0.05	0.55	0.50	0.10
D_AdaRidge	0.90	0.65	0.60	0.65	0.40	0.70	0.40	0.55	0.85	0.55	0.70	0.20	0.65	0.45	0.10
D_ElastNet	0.95	0.60	0.60	0.65	0.50	0.85	0.40	0.50	0.90	0.50	0.50	0.05	0.55	0.40	0.10
D_AdaElastNet	0.95	0.65	0.65	0.70	0.45	0.80	0.25	0.60	0.90	0.45	0.35	0.10	0.55	0.40	0.05

Table 6: $\pm 1\%$ coverage rates for GNI (naidq_10_gdp), quarterly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.95	0.95	0.95	0.85	0.75	0.85	0.45	0.55	0.65	0.80	0.75	0.80	0.55	0.40	0.65
LV_Avg2	0.95	0.95	0.95	0.90	0.75	0.95	0.55	0.55	0.60	0.80	0.70	0.85	0.60	0.55	0.50
LV_Avg4	0.95	0.95	0.95	0.90	0.80	0.95	0.60	0.60	0.70	0.80	0.70	0.85	0.55	0.50	0.70
LV_BATS	0.95	0.95	0.95	0.85	0.75	0.90	0.45	0.40	0.50	0.85	0.70	0.85	0.50	0.40	0.60
LV_ETS	0.95	0.95	0.95	0.85	0.75	0.90	0.40	0.45	0.50	0.80	0.70	0.80	0.50	0.40	0.55
LV_NNETAR	0.95	0.95	0.95	0.85	0.75	0.90	0.45	0.55	0.70	0.70	0.75	0.75	0.60	0.40	0.60
LV_SPLINE	0.95	0.95	0.95	0.80	0.65	0.80	0.50	0.45	0.55	0.75	0.65	0.70	0.45	0.45	0.45
LV_THETA	0.95	0.95	0.95	0.85	0.75	0.90	0.45	0.55	0.65	0.80	0.75	0.80	0.55	0.40	0.65
LV_AR1	0.95	0.95	0.95	0.85	0.70	0.90	0.40	0.45	0.45	0.75	0.65	0.80	0.45	0.40	0.55
LV_ARIMA	0.95	0.95	0.95	0.85	0.75	0.90	0.50	0.40	0.50	0.75	0.70	0.85	0.50	0.40	0.55
LV_TREND	0.95	0.95	0.95	0.90	0.85	0.95	0.65	0.70	0.65	0.80	0.80	0.90	0.60	0.50	0.55
LV_REG	0.95	0.95	0.95	0.95	0.90	0.95	0.70	0.75	0.75	0.95	0.80	0.75	0.65	0.65	0.60
LV_RATIO_LAST	0.90	0.90	0.85	0.85	0.80	0.90	0.45	0.45	0.45	0.90	0.75	0.65	0.55	0.50	0.45
LV_RATIO_HAVG	0.95	0.95	0.95	0.95	0.90	0.95	0.70	0.75	0.75	0.90	0.90	0.70	0.75	0.60	0.65
D_NAIVE	0.95	0.95	0.95	0.80	0.70	0.80	0.35	0.25	0.35	0.75	0.40	0.75	0.45	0.35	0.35
D_Avg2	0.95	0.95	0.95	0.80	0.70	0.85	0.45	0.40	0.50	0.70	0.50	0.75	0.35	0.35	0.40
D_Avg4	0.95	0.95	0.95	0.85	0.75	0.85	0.50	0.60	0.65	0.85	0.65	0.80	0.60	0.50	0.45
D_BATS	0.95	0.95	0.95	0.85	0.70	0.90	0.50	0.45	0.50	0.75	0.70	0.80	0.50	0.40	0.55
D_ETS	0.95	0.95	0.95	0.85	0.70	0.85	0.45	0.45	0.50	0.75	0.70	0.80	0.50	0.40	0.55
D_NNETAR	0.95	0.95	0.95	0.85	0.80	0.85	0.50	0.50	0.50	0.80	0.70	0.80	0.50	0.50	0.45
D_SPLINE	0.95	0.95	0.95	0.85	0.70	0.80	0.35	0.35	0.35	0.75	0.55	0.75	0.45	0.40	0.50
D_THETA	0.95	0.95	0.95	0.85	0.70	0.85	0.45	0.45	0.50	0.75	0.70	0.80	0.50	0.40	0.55
D_AR1	0.95	0.95	0.95	0.85	0.70	0.90	0.40	0.45	0.45	0.75	0.65	0.80	0.45	0.40	0.55
D_ARMA	0.95	0.95	0.95	0.85	0.80	0.90	0.45	0.45	0.45	0.75	0.75	0.80	0.50	0.40	0.55
D_TREND	0.95	0.95	0.95	0.85	0.75	0.85	0.45	0.50	0.65	0.80	0.75	0.80	0.50	0.40	0.60
D_REG	0.50	0.50	0.50	0.50	0.50	0.45	0.40	0.40	0.45	0.50	0.55	0.55	0.45	0.45	0.50
D_RATIO_LAST	0.30	0.30	0.25	0.45	0.40	0.25	0.25	0.25	0.30	0.30	0.35	0.35	0.25	0.25	0.35
D_RATIO_HAVG	0.50	0.50	0.35	0.15	0.45	0.30	0.30	0.35	0.35	0.45	0.55	0.15	0.45	0.40	0.50
D_RF	0.40	0.40	0.40	0.45	0.40	0.40	0.40	0.40	0.35	0.40	0.40	0.40	0.30	0.35	0.40
D_XGBoost	0.40	0.40	0.40	0.40	0.25	0.25	0.35	0.45	0.45	0.35	0.35	0.40	0.35	0.50	0.40
D_GB	0.50	0.45	0.50	0.45	0.30	0.55	0.45	0.60	0.45	0.45	0.45	0.50	0.35	0.30	0.40
D_KNN	0.50	0.35	0.35	0.50	0.50	0.40	0.45	0.40	0.45	0.40	0.55	0.45	0.40	0.50	0.45
D_Lasso	0.80	0.80	0.75	0.80	0.85	0.85	0.65	0.60	0.45	0.90	0.50	0.75	0.45	0.40	0.60
D_AdaLasso	0.80	0.80	0.75	0.75	0.85	0.85	0.50	0.60	0.45	0.90	0.65	0.70	0.45	0.40	0.60
D_Ridge	0.75	0.75	0.75	0.90	0.80	0.75	0.60	0.55	0.55	0.75	0.65	0.70	0.50	0.40	0.60
D_AdaRidge	0.85	0.85	0.80	0.90	0.75	0.75	0.55	0.55	0.55	0.80	0.70	0.65	0.40	0.40	0.65
D_ElastNet	0.80	0.80	0.75	0.80	0.85	0.85	0.65	0.60	0.45	0.90	0.50	0.70	0.50	0.40	0.60
D_AdaElastNet	0.80	0.80	0.75	0.75	0.85	0.85	0.60	0.60	0.45	0.90	0.65	0.70	0.50	0.40	0.60

Table 7: ±1% coverage rates for Employment (namq_10_a10_e), quarterly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.60	0.60	0.60	0.60	0.50	0.60	0.40	0.40	0.45	0.45	0.45	0.15	0.45	0.30	0.30
LV_Avg2	0.60	0.60	0.60	0.60	0.55	0.60	0.50	0.50	0.50	0.50	0.45	0.25	0.50	0.35	0.30
LV_Avg4	0.60	0.60	0.60	0.60	0.55	0.60	0.45	0.45	0.50	0.50	0.45	0.45	0.35	0.35	0.30
LV_BATS	0.60	0.60	0.60	0.60	0.55	0.60	0.40	0.40	0.45	0.50	0.55	0.25	0.50	0.45	0.25
LV_ETS	0.60	0.60	0.60	0.60	0.55	0.60	0.35	0.35	0.45	0.50	0.50	0.25	0.45	0.35	0.30
LV_NNETAR	0.60	0.60	0.60	0.60	0.55	0.65	0.40	0.40	0.45	0.40	0.50	0.15	0.40	0.35	0.30
LV_SPLINE	0.60	0.60	0.60	0.60	0.45	0.60	0.25	0.25	0.35	0.45	0.50	0.15	0.35	0.40	0.20
LV_THETA	0.60	0.60	0.60	0.60	0.50	0.60	0.40	0.40	0.45	0.45	0.50	0.30	0.45	0.30	0.30
LV_AR1	0.60	0.60	0.60	0.60	0.55	0.60	0.35	0.35	0.45	0.55	0.50	0.25	0.40	0.40	0.30
LV_ARIMA	0.60	0.60	0.60	0.60	0.55	0.60	0.35	0.35	0.45	0.55	0.50	0.25	0.50	0.45	0.30
LV_TREND	0.60	0.60	0.60	0.60	0.55	0.60	0.50	0.50	0.45	0.45	0.45	0.50	0.45	0.35	0.30
LV_REG	0.80	0.80	0.80	0.80	0.65	0.80	0.70	0.75	0.80	0.60	0.70	0.45	0.55	0.40	0.45
LV_RATIO_LAST	0.80	0.80	0.80	0.65	0.65	0.75	0.70	0.70	0.80	0.60	0.60	0.25	0.40	0.30	0.30
LV_RATIO_HAVG	0.80	0.80	0.80	0.80	0.65	0.80	0.85	0.85	0.80	0.60	0.70	0.50	0.55	0.35	0.40
D_NAIVE	0.60	0.60	0.60	0.60	0.45	0.55	0.35	0.35	0.35	0.45	0.40	0.05	0.45	0.30	0.15
D_Avg2	0.60	0.60	0.60	0.60	0.45	0.60	0.40	0.40	0.40	0.40	0.40	0.20	0.35	0.35	0.15
D_Avg4	0.60	0.60	0.60	0.60	0.45	0.55	0.40	0.40	0.40	0.45	0.40	0.20	0.30	0.30	0.25
D_BATS	0.60	0.60	0.60	0.60	0.55	0.60	0.35	0.35	0.45	0.55	0.50	0.15	0.45	0.35	0.30
D_ETS	0.60	0.60	0.60	0.60	0.50	0.60	0.35	0.35	0.45	0.50	0.50	0.15	0.45	0.35	0.30
D_NNETAR	0.60	0.60	0.60	0.60	0.55	0.60	0.50	0.50	0.40	0.35	0.40	0.10	0.40	0.35	0.35
D_SPLINE	0.60	0.60	0.60	0.60	0.45	0.60	0.30	0.30	0.45	0.40	0.40	0.10	0.40	0.40	0.15
D_THETA	0.60	0.60	0.60	0.60	0.50	0.60	0.35	0.35	0.45	0.45	0.50	0.10	0.45	0.35	0.30
D_AR1	0.60	0.60	0.60	0.60	0.55	0.60	0.35	0.35	0.45	0.55	0.50	0.25	0.40	0.35	0.35
D_ARMA	0.60	0.60	0.60	0.60	0.55	0.55	0.35	0.35	0.45	0.50	0.45	0.25	0.45	0.40	0.30
D_TREND	0.60	0.60	0.60	0.60	0.50	0.60	0.40	0.40	0.45	0.40	0.45	0.10	0.45	0.30	0.30
D_REG	0.25	0.25	0.40	0.35	0.30	0.20	0.10	0.10	0.20	0.20	0.20	0.20	0.20	0.20	0.20
D_RATIO_LAST	0.25	0.25	0.25	0.30	0.35	0.25	0.25	0.15	0.25	0.20	0.20	0.20	0.25	0.25	0.20
D_RATIO_HAVG	0.35	0.25	0.40	0.35	0.30	0.15	0.15	0.10	0.20	0.25	0.25	0.20	0.15	0.25	0.20
D_RF	0.35	0.35	0.35	0.35	0.45	0.30	0.35	0.40	0.40	0.40	0.30	0.25	0.35	0.40	0.15
D_XGBoost	0.35	0.30	0.35	0.35	0.30	0.35	0.40	0.35	0.40	0.15	0.30	0.25	0.30	0.20	0.15
D_GB	0.40	0.40	0.40	0.35	0.30	0.45	0.45	0.45	0.40	0.45	0.55	0.20	0.50	0.50	0.20
D_KNN	0.35	0.35	0.50	0.30	0.30	0.30	0.30	0.30	0.25	0.25	0.30	0.30	0.25	0.30	0.30
D_Lasso	0.60	0.60	0.65	0.55	0.55	0.65	0.65	0.60	0.70	0.65	0.50	0.35	0.40	0.30	0.15
D_AdaLasso	0.60	0.60	0.60	0.50	0.55	0.55	0.60	0.55	0.75	0.60	0.55	0.25	0.40	0.45	0.25
D_Ridge	0.65	0.65	0.65	0.60	0.60	0.70	0.55	0.55	0.70	0.35	0.40	0.25	0.50	0.30	0.30
D_AdaRidge	0.60	0.60	0.60	0.60	0.60	0.65	0.60	0.60	0.70	0.45	0.45	0.25	0.55	0.40	0.30
D_ElastNet	0.65	0.65	0.70	0.55	0.55	0.70	0.65	0.65	0.70	0.65	0.55	0.30	0.40	0.25	0.25
D_AdaElastNet	0.60	0.60	0.60	0.45	0.55	0.55	0.60	0.55	0.75	0.55	0.50	0.30	0.40	0.45	0.20

Table 8: $\pm 1\%$ coverage rates for GDP (namq_10_gdp), quarterly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.60	0.65	0.65	0.60	0.35	0.60	0.40	0.35	0.45	0.25	0.40	0.15	0.30	0.20	0.40
LV_Avg2	0.60	0.60	0.60	0.65	0.30	0.50	0.55	0.50	0.50	0.35	0.40	0.25	0.25	0.25	0.25
LV_Avg4	0.60	0.60	0.60	0.60	0.35	0.50	0.45	0.50	0.50	0.35	0.35	0.30	0.20	0.15	0.30
LV_BATS	0.60	0.65	0.65	0.60	0.30	0.60	0.45	0.45	0.50	0.15	0.40	0.25	0.25	0.20	0.20
LV_ETS	0.60	0.65	0.65	0.60	0.25	0.60	0.45	0.45	0.50	0.15	0.40	0.20	0.25	0.25	0.20
LV_NNETAR	0.60	0.60	0.60	0.60	0.25	0.60	0.20	0.30	0.45	0.10	0.45	0.15	0.35	0.20	0.15
LV_SPLINE	0.60	0.65	0.65	0.60	0.20	0.60	0.30	0.45	0.55	0.00	0.30	0.05	0.20	0.15	0.15
LV_THETA	0.60	0.65	0.65	0.60	0.30	0.60	0.45	0.40	0.50	0.25	0.40	0.15	0.30	0.20	0.25
LV_AR1	0.60	0.65	0.65	0.60	0.30	0.60	0.35	0.40	0.50	0.20	0.40	0.00	0.30	0.20	0.15
LV_ARIMA	0.60	0.65	0.65	0.60	0.20	0.60	0.45	0.25	0.45	0.25	0.30	0.10	0.30	0.30	0.10
LV_TREND	0.60	0.60	0.60	0.60	0.35	0.50	0.50	0.50	0.50	0.40	0.45	0.35	0.20	0.20	0.30
LV_REG	0.10	0.10	0.10	0.30	0.20	0.05	0.30	0.05	0.20	0.05	0.10	0.05	0.25	0.20	0.10
LV_RATIO_LAST	0.05	0.05	0.05	0.25	0.05	0.05	0.10	0.05	0.15	0.10	0.05	0.05	0.10	0.15	0.05
LV_RATIO_HAVG	0.10	0.05	0.10	0.05	0.15	0.10	0.10	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.05
D_NAIVE	0.60	0.55	0.50	0.55	0.30	0.50	0.10	0.20	0.20	0.05	0.30	0.00	0.20	0.05	0.15
D_Avg2	0.60	0.65	0.65	0.70	0.35	0.60	0.25	0.20	0.40	0.20	0.25	0.05	0.10	0.05	0.30
D_Avg4	0.60	0.65	0.65	0.60	0.35	0.55	0.20	0.30	0.45	0.20	0.15	0.05	0.25	0.10	0.15
D_BATS	0.60	0.65	0.65	0.60	0.20	0.60	0.30	0.35	0.40	0.15	0.35	0.20	0.25	0.05	0.15
D_ETS	0.60	0.65	0.65	0.60	0.25	0.60	0.15	0.15	0.35	0.20	0.35	0.15	0.25	0.25	0.35
D_NNETAR	0.60	0.60	0.60	0.60	0.25	0.60	0.40	0.20	0.40	0.25	0.30	0.20	0.20	0.15	0.35
D_SPLINE	0.60	0.65	0.65	0.60	0.40	0.55	0.10	0.10	0.40	0.00	0.30	0.10	0.10	0.10	0.05
D_THETA	0.60	0.65	0.65	0.60	0.35	0.60	0.25	0.20	0.45	0.20	0.35	0.15	0.25	0.20	0.30
D_AR1	0.60	0.65	0.65	0.60	0.35	0.60	0.35	0.40	0.50	0.20	0.40	0.25	0.30	0.20	0.25
D_ARMA	0.60	0.65	0.65	0.60	0.25	0.60	0.30	0.25	0.45	0.25	0.30	0.15	0.25	0.30	0.10
D_TREND	0.60	0.65	0.65	0.60	0.35	0.60	0.30	0.30	0.45	0.20	0.35	0.15	0.30	0.20	0.35
D_REG	0.20	0.15	0.10	0.10	0.05	0.15	0.10	0.25	0.25	0.15	0.20	0.20	0.20	0.20	0.20
D_RATIO_LAST	0.05	0.10	0.05	0.30	0.20	0.05	0.10	0.10	0.15	0.05	0.00	0.05	0.20	0.20	0.00
D_RATIO_HAVG	0.10	0.00	0.10	0.10	0.15	0.10	0.15	0.20	0.25	0.00	0.25	0.10	0.00	0.10	0.05
D_RF	0.25	0.25	0.20	0.30	0.25	0.20	0.15	0.20	0.25	0.25	0.30	0.25	0.20	0.20	0.20
D_XGBoost	0.15	0.15	0.20	0.25	0.05	0.10	0.05	0.00	0.10	0.20	0.10	0.15	0.05	0.00	0.05
D_GB	0.20	0.20	0.30	0.20	0.05	0.20	0.10	0.15	0.10	0.15	0.20	0.40	0.15	0.15	0.05
D_KNN	0.25	0.25	0.30	0.15	0.20	0.20	0.20	0.15	0.25	0.15	0.25	0.25	0.25	0.20	0.20
D_Lasso	0.40	0.45	0.40	0.45	0.35	0.25	0.30	0.30	0.30	0.10	0.50	0.05	0.15	0.05	0.05
D_AdaLasso	0.50	0.55	0.55	0.45	0.50	0.40	0.25	0.20	0.20	0.15	0.50	0.20	0.15	0.05	0.10
D_Ridge	0.40	0.35	0.35	0.40	0.35	0.35	0.30	0.30	0.20	0.30	0.35	0.15	0.15	0.10	0.10
D_AdaRidge	0.35	0.35	0.35	0.35	0.40	0.40	0.30	0.30	0.20	0.10	0.40	0.10	0.10	0.05	0.20
D_ElastNet	0.40	0.45	0.45	0.40	0.50	0.35	0.30	0.30	0.30	0.05	0.45	0.05	0.15	0.05	0.10
D_AdaElastNet	0.45	0.45	0.55	0.45	0.50	0.40	0.35	0.30	0.30	0.15	0.50	0.20	0.15	0.05	0.10

Table 9: ±1% coverage rates for Labour in Construction (sts_colb_q), quarterly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	0.97	0.35	0.33	0.38	0.15	0.25	0.28	0.23	0.17	0.93	0.18	0.12	0.08
LV_Avg2	1.00	1.00	0.95	0.43	0.33	0.45	0.15	0.25	0.32	0.27	0.13	0.83	0.13	0.13	0.08
LV_Avg4	1.00	1.00	0.95	0.45	0.37	0.52	0.22	0.27	0.28	0.27	0.15	0.67	0.23	0.08	0.12
LV_BATS	1.00	1.00	0.97	0.47	0.38	0.43	0.23	0.10	0.20	0.27	0.12	0.98	0.12	0.10	0.12
LV_ETS	1.00	1.00	0.97	0.40	0.37	0.43	0.22	0.10	0.22	0.27	0.15	0.98	0.10	0.15	0.12
LV_NNETAR	1.00	1.00	0.92	0.32	0.25	0.40	0.12	0.08	0.20	0.08	0.18	0.92	0.07	0.05	0.13
LV_SPLINE	1.00	1.00	0.97	0.42	0.32	0.38	0.10	0.25	0.28	0.17	0.08	0.92	0.13	0.08	0.10
LV_THETA	1.00	1.00	0.97	0.37	0.32	0.43	0.17	0.25	0.28	0.23	0.15	0.93	0.15	0.10	0.08
LV_AR1	1.00	1.00	0.97	0.35	0.33	0.43	0.17	0.10	0.20	0.28	0.15	0.98	0.10	0.12	0.10
LV_ARIMA	1.00	1.00	0.97	0.45	0.33	0.35	0.20	0.08	0.20	0.23	0.22	0.98	0.12	0.13	0.12
LV_TREND	1.00	1.00	0.95	0.45	0.43	0.60	0.23	0.23	0.32	0.28	0.25	0.50	0.12	0.13	0.13
LV_REG	1.00	1.00	0.93	0.47	0.42	0.62	0.25	0.32	0.40	0.30	0.20	0.28	0.10	0.15	0.08
LV_RATIO_LAST	0.98	1.00	0.97	0.30	0.27	0.35	0.15	0.18	0.25	0.18	0.13	0.68	0.10	0.05	0.12
LV_RATIO_HAVG	1.00	1.00	0.95	0.48	0.43	0.63	0.20	0.15	0.27	0.27	0.18	0.58	0.15	0.08	0.12
D_NAIVE	1.00	1.00	0.95	0.22	0.17	0.25	0.15	0.10	0.18	0.18	0.13	0.98	0.07	0.05	0.07
D_Avg2	1.00	1.00	0.97	0.20	0.20	0.25	0.22	0.17	0.30	0.23	0.07	0.98	0.08	0.12	0.12
D_Avg4	1.00	1.00	0.97	0.35	0.27	0.32	0.18	0.23	0.25	0.23	0.12	0.93	0.08	0.13	0.10
D_BATS	1.00	1.00	0.95	0.42	0.32	0.37	0.15	0.15	0.22	0.25	0.10	0.98	0.08	0.13	0.08
D_ETS	1.00	1.00	0.97	0.33	0.35	0.38	0.20	0.13	0.23	0.22	0.17	0.98	0.10	0.17	0.12
D_NNETAR	1.00	1.00	0.95	0.40	0.43	0.40	0.18	0.12	0.27	0.18	0.17	0.97	0.22	0.12	0.08
D_SPLINE	1.00	1.00	0.97	0.30	0.25	0.38	0.13	0.13	0.22	0.18	0.17	0.97	0.12	0.08	0.07
D_THETA	1.00	1.00	0.97	0.33	0.33	0.38	0.22	0.13	0.23	0.22	0.17	0.98	0.10	0.17	0.12
D_AR1	1.00	1.00	0.97	0.35	0.35	0.43	0.17	0.10	0.22	0.27	0.17	0.98	0.08	0.17	0.08
D_ARMA	1.00	1.00	0.95	0.42	0.28	0.33	0.15	0.13	0.23	0.18	0.10	1.00	0.12	0.15	0.08
D_TREND	1.00	1.00	0.97	0.33	0.33	0.38	0.15	0.25	0.28	0.23	0.17	0.90	0.17	0.12	0.10
D_REG	0.05	0.07	0.05	0.20	0.08	0.20	0.12	0.08	0.08	0.10	0.13	0.07	0.12	0.10	0.13
D_RATIO_LAST	0.05	0.05	0.05	0.12	0.03	0.07	0.12	0.15	0.10	0.10	0.10	0.13	0.10	0.12	0.08
D_RATIO_HAVG	0.03	0.13	0.05	0.13	0.08	0.20	0.13	0.03	0.12	0.10	0.05	0.02	0.08	0.03	0.13
D_RF	0.13	0.13	0.08	0.12	0.08	0.13	0.12	0.10	0.08	0.17	0.10	0.12	0.10	0.10	0.05
D_XGBoost	0.07	0.08	0.13	0.10	0.07	0.05	0.12	0.13	0.08	0.12	0.10	0.17	0.08	0.08	0.07
D_GB	0.23	0.22	0.20	0.20	0.17	0.25	0.12	0.15	0.13	0.15	0.18	0.20	0.15	0.12	0.03
D_KNN	0.07	0.08	0.12	0.15	0.12	0.08	0.10	0.15	0.10	0.12	0.13	0.07	0.05	0.10	0.20
D_Lasso	0.38	0.33	0.35	0.23	0.25	0.30	0.12	0.23	0.25	0.15	0.20	0.30	0.20	0.17	0.10
D_AdaLasso	0.35	0.35	0.37	0.22	0.20	0.30	0.15	0.23	0.23	0.17	0.20	0.30	0.10	0.13	0.07
D_Ridge	0.37	0.37	0.37	0.22	0.25	0.30	0.18	0.27	0.22	0.15	0.20	0.30	0.18	0.17	0.12
D_AdaRidge	0.35	0.35	0.33	0.23	0.23	0.33	0.13	0.20	0.22	0.13	0.22	0.32	0.13	0.15	0.07
D_ElastNet	0.37	0.35	0.33	0.23	0.25	0.30	0.12	0.27	0.23	0.15	0.20	0.28	0.18	0.17	0.10
D_AdaElastNet	0.35	0.35	0.35	0.22	0.20	0.30	0.13	0.23	0.23	0.17	0.20	0.30	0.10	0.13	0.07

Table 10: ±1% coverage rates for Unemployment (ei_lmhu_m), monthly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.78	0.78	0.78	0.67	0.67	0.78	0.45	0.43	0.48	0.58	0.47	0.52	0.32	0.33	0.30
LV_Avg2	0.78	0.78	0.77	0.67	0.72	0.78	0.53	0.50	0.57	0.57	0.42	0.60	0.30	0.28	0.38
LV_Avg4	0.78	0.78	0.78	0.68	0.70	0.78	0.42	0.40	0.57	0.63	0.37	0.58	0.27	0.23	0.40
LV_BATS	0.78	0.78	0.78	0.62	0.63	0.78	0.37	0.40	0.42	0.53	0.35	0.50	0.25	0.20	0.17
LV_ETS	0.78	0.78	0.78	0.63	0.63	0.78	0.35	0.37	0.40	0.53	0.37	0.50	0.22	0.22	0.20
LV_NNETAR	0.78	0.78	0.78	0.63	0.58	0.78	0.33	0.42	0.45	0.48	0.27	0.55	0.23	0.22	0.18
LV_SPLINE	0.78	0.78	0.78	0.57	0.67	0.77	0.38	0.37	0.43	0.55	0.38	0.50	0.27	0.33	0.28
LV_THETA	0.78	0.78	0.78	0.67	0.67	0.78	0.45	0.43	0.48	0.58	0.47	0.52	0.32	0.33	0.30
LV_AR1	0.78	0.78	0.78	0.60	0.62	0.78	0.32	0.38	0.37	0.55	0.38	0.50	0.23	0.20	0.18
LV_ARIMA	0.78	0.78	0.78	0.58	0.60	0.78	0.32	0.37	0.42	0.52	0.38	0.45	0.23	0.22	0.18
LV_TREND	0.78	0.78	0.78	0.72	0.75	0.80	0.50	0.55	0.57	0.57	0.52	0.48	0.42	0.27	0.25
LV_REG	0.53	0.52	0.55	0.37	0.38	0.53	0.43	0.50	0.48	0.53	0.50	0.55	0.45	0.47	0.50
LV_RATIO_LAST	0.32	0.28	0.32	0.27	0.30	0.33	0.38	0.33	0.35	0.33	0.32	0.33	0.33	0.35	0.30
LV_RATIO_HAVG	0.47	0.48	0.45	0.43	0.38	0.45	0.38	0.43	0.43	0.42	0.43	0.48	0.45	0.43	0.37
D_NAIVE	0.78	0.78	0.78	0.62	0.50	0.78	0.23	0.27	0.32	0.37	0.33	0.42	0.27	0.18	0.15
D_Avg2	0.78	0.78	0.78	0.58	0.62	0.78	0.35	0.37	0.35	0.50	0.43	0.45	0.27	0.23	0.25
D_Avg4	0.78	0.78	0.78	0.62	0.67	0.78	0.40	0.42	0.47	0.53	0.42	0.50	0.27	0.23	0.25
D_BATS	0.78	0.78	0.78	0.60	0.60	0.78	0.35	0.35	0.40	0.52	0.40	0.52	0.25	0.23	0.18
D_ETS	0.78	0.78	0.78	0.63	0.65	0.78	0.35	0.37	0.43	0.53	0.38	0.48	0.25	0.25	0.18
D_NNETAR	0.78	0.78	0.78	0.60	0.62	0.78	0.35	0.35	0.40	0.60	0.32	0.53	0.27	0.22	0.18
D_SPLINE	0.78	0.78	0.77	0.62	0.53	0.78	0.20	0.23	0.30	0.43	0.30	0.45	0.20	0.23	0.17
D_THETA	0.78	0.78	0.78	0.63	0.63	0.78	0.35	0.37	0.43	0.53	0.40	0.48	0.25	0.25	0.18
D_AR1	0.78	0.78	0.78	0.62	0.62	0.78	0.32	0.38	0.37	0.53	0.37	0.52	0.23	0.20	0.18
D_ARMA	0.78	0.78	0.78	0.60	0.62	0.78	0.33	0.37	0.38	0.53	0.40	0.52	0.23	0.20	0.15
D_TREND	0.78	0.78	0.78	0.63	0.67	0.78	0.43	0.43	0.48	0.58	0.47	0.52	0.32	0.33	0.30
D_REG	0.35	0.40	0.38	0.25	0.28	0.33	0.35	0.33	0.37	0.32	0.35	0.33	0.33	0.32	0.28
D_RATIO_LAST	0.18	0.15	0.12	0.15	0.05	0.17	0.17	0.17	0.18	0.15	0.17	0.20	0.17	0.13	0.15
D_RATIO_HAVG	0.17	0.35	0.37	0.17	0.25	0.28	0.28	0.23	0.23	0.35	0.30	0.28	0.25	0.25	0.17
D_RF	0.28	0.27	0.28	0.30	0.28	0.27	0.28	0.28	0.23	0.33	0.27	0.28	0.27	0.20	0.20
D_XGBoost	0.28	0.30	0.28	0.25	0.22	0.30	0.30	0.30	0.30	0.25	0.25	0.17	0.22	0.25	0.20
D_GB	0.43	0.47	0.47	0.40	0.33	0.45	0.30	0.32	0.32	0.43	0.28	0.40	0.27	0.20	0.22
D_KNN	0.28	0.33	0.27	0.22	0.22	0.35	0.18	0.23	0.23	0.20	0.20	0.25	0.25	0.28	0.20
D_Lasso	0.88	0.88	0.88	0.77	0.72	0.88	0.58	0.67	0.70	0.58	0.45	0.57	0.43	0.38	0.37
D_AdaLasso	0.87	0.87	0.87	0.73	0.72	0.87	0.58	0.65	0.65	0.55	0.45	0.52	0.45	0.35	0.38
D_Ridge	0.65	0.67	0.68	0.58	0.58	0.72	0.53	0.60	0.58	0.52	0.40	0.58	0.40	0.35	0.40
D_AdaRidge	0.80	0.80	0.82	0.65	0.62	0.85	0.62	0.68	0.67	0.50	0.45	0.63	0.37	0.40	0.40
D_ElastNet	0.88	0.88	0.88	0.77	0.70	0.88	0.58	0.67	0.70	0.55	0.42	0.55	0.45	0.40	0.37
D_AdaElastNet	0.87	0.87	0.87	0.73	0.72	0.87	0.57	0.65	0.65	0.57	0.47	0.53	0.45	0.35	0.38

Table 11: ±1% coverage rates for Producer Prices (sts_inpp_m), monthly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.92	0.92	0.93	0.65	0.05	0.83	0.52	0.50	0.65	0.33	0.37	0.08	0.30	0.22	0.12
LV_Avg2	0.92	0.92	0.92	0.82	0.08	0.85	0.50	0.47	0.68	0.38	0.42	0.18	0.32	0.28	0.13
LV_Avg4	0.92	0.92	0.92	0.77	0.07	0.87	0.55	0.53	0.70	0.43	0.45	0.17	0.35	0.32	0.20
LV_BATS	0.92	0.92	0.92	0.73	0.13	0.83	0.53	0.50	0.65	0.33	0.35	0.10	0.32	0.32	0.07
LV_ETS	0.92	0.92	0.92	0.75	0.15	0.83	0.50	0.48	0.65	0.35	0.35	0.10	0.30	0.27	0.12
LV_NNETAR	0.92	0.92	0.92	0.67	0.10	0.78	0.43	0.45	0.68	0.42	0.38	0.13	0.38	0.27	0.07
LV_SPLINE	0.92	0.93	0.93	0.67	0.12	0.80	0.40	0.40	0.60	0.30	0.35	0.13	0.25	0.23	0.15
LV_THETA	0.92	0.92	0.92	0.73	0.13	0.83	0.53	0.48	0.65	0.37	0.35	0.08	0.30	0.23	0.12
LV_AR1	0.92	0.92	0.92	0.70	0.12	0.83	0.52	0.50	0.67	0.37	0.33	0.08	0.28	0.25	0.10
LV_ARIMA	0.92	0.92	0.92	0.70	0.03	0.85	0.53	0.53	0.68	0.33	0.37	0.07	0.32	0.25	0.05
LV_TREND	0.92	0.92	0.92	0.80	0.13	0.88	0.65	0.63	0.80	0.52	0.43	0.20	0.40	0.32	0.20
LV_REG	0.13	0.13	0.13	0.15	0.07	0.15	0.13	0.18	0.17	0.20	0.13	0.18	0.13	0.15	0.17
LV_RATIO_LAST	0.12	0.12	0.12	0.07	0.05	0.10	0.12	0.12	0.13	0.17	0.10	0.15	0.07	0.08	0.12
LV_RATIO_HAVG	0.20	0.17	0.13	0.17	0.10	0.17	0.15	0.13	0.15	0.18	0.15	0.18	0.15	0.15	0.13
D_NAIVE	0.92	0.93	0.92	0.40	0.10	0.70	0.30	0.25	0.53	0.23	0.22	0.07	0.18	0.07	0.07
D_Avg2	0.92	0.93	0.90	0.57	0.08	0.75	0.25	0.30	0.58	0.17	0.28	0.07	0.28	0.22	0.08
D_Avg4	0.92	0.93	0.93	0.62	0.05	0.78	0.38	0.43	0.60	0.28	0.33	0.08	0.27	0.27	0.10
D_BATS	0.92	0.92	0.92	0.75	0.12	0.82	0.52	0.47	0.68	0.30	0.37	0.08	0.32	0.30	0.12
D_ETS	0.92	0.92	0.93	0.65	0.05	0.83	0.47	0.48	0.65	0.33	0.37	0.08	0.30	0.22	0.12
D_NNETAR	0.92	0.92	0.92	0.72	0.03	0.83	0.40	0.43	0.68	0.35	0.35	0.15	0.33	0.25	0.12
D_SPLINE	0.92	0.92	0.93	0.65	0.05	0.82	0.45	0.47	0.65	0.32	0.32	0.07	0.30	0.22	0.12
D_THETA	0.92	0.92	0.93	0.65	0.05	0.83	0.48	0.48	0.65	0.33	0.37	0.08	0.30	0.22	0.12
D_AR1	0.92	0.92	0.93	0.68	0.18	0.83	0.53	0.48	0.65	0.37	0.33	0.10	0.28	0.23	0.10
D_ARMA	0.92	0.92	0.92	0.67	0.12	0.83	0.47	0.45	0.68	0.33	0.37	0.08	0.33	0.25	0.05
D_TREND	0.92	0.92	0.93	0.65	0.05	0.83	0.50	0.50	0.65	0.33	0.37	0.08	0.30	0.22	0.12
D_REG	0.10	0.08	0.10	0.08	0.05	0.03	0.08	0.13	0.13	0.18	0.12	0.22	0.12	0.15	0.08
D_RATIO_LAST	0.07	0.07	0.07	0.05	0.00	0.07	0.07	0.10	0.12	0.05	0.05	0.05	0.10	0.10	0.07
D_RATIO_HAVG	0.00	0.00	0.08	0.03	0.03	0.03	0.00	0.07	0.07	0.00	0.00	0.03	0.15	0.08	0.02
D_RF	0.07	0.07	0.08	0.03	0.10	0.03	0.05	0.07	0.07	0.08	0.08	0.05	0.08	0.07	0.08
D_XGBoost	0.08	0.03	0.08	0.08	0.10	0.05	0.12	0.12	0.10	0.10	0.10	0.07	0.10	0.03	0.05
D_GB	0.13	0.13	0.13	0.12	0.03	0.10	0.10	0.20	0.15	0.05	0.08	0.03	0.08	0.05	0.08
D_KNN	0.12	0.05	0.07	0.07	0.02	0.13	0.02	0.07	0.07	0.12	0.07	0.10	0.07	0.07	0.07
D_Lasso	0.20	0.20	0.22	0.18	0.12	0.17	0.18	0.20	0.22	0.18	0.13	0.10	0.17	0.10	0.08
D_AdaLasso	0.17	0.18	0.22	0.18	0.12	0.15	0.17	0.20	0.20	0.18	0.13	0.07	0.13	0.12	0.08
D_Ridge	0.15	0.18	0.18	0.12	0.08	0.15	0.12	0.15	0.15	0.17	0.13	0.15	0.13	0.12	0.05
D_AdaRidge	0.20	0.20	0.22	0.12	0.13	0.18	0.18	0.20	0.18	0.12	0.17	0.10	0.15	0.10	0.08
D_ElastNet	0.20	0.20	0.20	0.17	0.12	0.17	0.18	0.20	0.23	0.17	0.13	0.08	0.15	0.10	0.07
D_AdaElastNet	0.17	0.18	0.22	0.18	0.12	0.15	0.17	0.20	0.20	0.18	0.13	0.07	0.13	0.10	0.08

Table 12: ±1% coverage rates for Industrial Production (sts_inpr_m), monthly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.87	0.85	0.87	0.70	0.60	0.70	0.35	0.25	0.63	0.30	0.42	0.20	0.33	0.18	0.07
LV_Avg2	0.87	0.85	0.85	0.72	0.60	0.72	0.38	0.48	0.63	0.28	0.53	0.30	0.45	0.27	0.20
LV_Avg4	0.87	0.85	0.85	0.75	0.73	0.72	0.42	0.40	0.67	0.32	0.62	0.30	0.38	0.28	0.20
LV_BATS	0.87	0.85	0.87	0.73	0.68	0.73	0.43	0.40	0.63	0.30	0.42	0.32	0.38	0.20	0.12
LV_ETS	0.87	0.85	0.87	0.73	0.68	0.75	0.37	0.35	0.68	0.33	0.43	0.33	0.35	0.23	0.10
LV_NNETAR	0.87	0.85	0.87	0.70	0.63	0.67	0.33	0.43	0.58	0.17	0.47	0.17	0.42	0.17	0.13
LV_SPLINE	0.87	0.85	0.85	0.65	0.62	0.70	0.33	0.30	0.58	0.33	0.48	0.27	0.33	0.25	0.15
LV_THETA	0.87	0.85	0.87	0.73	0.63	0.75	0.37	0.35	0.68	0.32	0.43	0.33	0.33	0.18	0.07
LV_AR1	0.87	0.85	0.87	0.75	0.60	0.73	0.38	0.37	0.70	0.30	0.42	0.22	0.35	0.22	0.10
LV_ARIMA	0.87	0.85	0.85	0.73	0.68	0.73	0.50	0.42	0.65	0.37	0.43	0.23	0.37	0.20	0.10
LV_TREND	0.87	0.87	0.87	0.80	0.68	0.78	0.57	0.52	0.72	0.37	0.63	0.38	0.52	0.25	0.33
LV_REG	0.27	0.20	0.20	0.28	0.25	0.23	0.18	0.20	0.23	0.22	0.25	0.23	0.23	0.22	0.23
LV_RATIO_LAST	0.10	0.12	0.12	0.12	0.10	0.12	0.08	0.10	0.10	0.07	0.13	0.10	0.13	0.12	0.10
LV_RATIO_HAVG	0.20	0.20	0.20	0.23	0.20	0.20	0.22	0.17	0.20	0.18	0.20	0.17	0.20	0.18	0.15
D_NAIVE	0.87	0.85	0.80	0.52	0.45	0.53	0.20	0.15	0.43	0.13	0.23	0.07	0.27	0.08	0.05
D_Avg2	0.87	0.83	0.83	0.57	0.45	0.63	0.23	0.22	0.48	0.17	0.37	0.18	0.20	0.15	0.07
D_Avg4	0.87	0.87	0.87	0.60	0.60	0.65	0.20	0.18	0.53	0.22	0.47	0.15	0.32	0.15	0.07
D_BATS	0.87	0.85	0.87	0.75	0.67	0.73	0.47	0.42	0.68	0.32	0.35	0.27	0.37	0.23	0.08
D_ETS	0.87	0.85	0.87	0.70	0.60	0.68	0.35	0.25	0.63	0.30	0.42	0.20	0.33	0.18	0.07
D_NNETAR	0.87	0.83	0.83	0.70	0.60	0.60	0.37	0.35	0.58	0.30	0.47	0.25	0.38	0.18	0.07
D_SPLINE	0.87	0.85	0.85	0.70	0.60	0.68	0.32	0.20	0.57	0.30	0.42	0.18	0.32	0.18	0.07
D_THETA	0.87	0.85	0.87	0.70	0.60	0.68	0.35	0.25	0.63	0.30	0.42	0.18	0.33	0.18	0.07
D_AR1	0.87	0.85	0.87	0.73	0.60	0.73	0.40	0.37	0.70	0.30	0.42	0.22	0.35	0.23	0.10
D_ARMA	0.87	0.85	0.87	0.77	0.68	0.73	0.48	0.43	0.68	0.30	0.37	0.25	0.28	0.20	0.17
D_TREND	0.87	0.85	0.87	0.70	0.60	0.68	0.35	0.25	0.63	0.30	0.42	0.18	0.33	0.18	0.07
D_REG	0.13	0.13	0.12	0.13	0.10	0.15	0.08	0.10	0.13	0.10	0.12	0.08	0.12	0.10	0.10
D_RATIO_LAST	0.12	0.07	0.08	0.07	0.05	0.08	0.12	0.13	0.12	0.08	0.12	0.13	0.10	0.08	0.12
D_RATIO_HAVG	0.12	0.13	0.03	0.12	0.08	0.12	0.07	0.07	0.13	0.08	0.13	0.13	0.10	0.07	0.08
D_RF	0.18	0.20	0.23	0.18	0.18	0.25	0.17	0.20	0.22	0.18	0.17	0.17	0.17	0.13	0.08
D_XGBoost	0.18	0.18	0.23	0.25	0.23	0.20	0.12	0.15	0.22	0.15	0.17	0.05	0.12	0.12	0.12
D_GB	0.30	0.32	0.28	0.23	0.28	0.30	0.27	0.25	0.25	0.15	0.32	0.18	0.28	0.18	0.15
D_KNN	0.13	0.13	0.10	0.08	0.12	0.17	0.13	0.12	0.20	0.13	0.12	0.12	0.15	0.20	0.13
D_Lasso	0.48	0.48	0.45	0.48	0.58	0.33	0.32	0.27	0.37	0.13	0.33	0.20	0.28	0.15	0.12
D_AdaLasso	0.47	0.50	0.43	0.42	0.57	0.37	0.28	0.25	0.37	0.17	0.25	0.22	0.30	0.15	0.08
D_Ridge	0.33	0.37	0.38	0.23	0.42	0.32	0.27	0.30	0.27	0.17	0.22	0.15	0.22	0.18	0.08
D_AdaRidge	0.42	0.38	0.38	0.40	0.50	0.40	0.27	0.22	0.33	0.13	0.35	0.18	0.35	0.17	0.08
D_ElastNet	0.48	0.48	0.45	0.45	0.62	0.35	0.30	0.27	0.35	0.15	0.33	0.20	0.27	0.15	0.13
D_AdaElastNet	0.47	0.50	0.43	0.42	0.57	0.37	0.28	0.25	0.37	0.17	0.28	0.22	0.32	0.13	0.07

Table 13: ±1% coverage rates for Retail Trade (sts_trtu_m), monthly.

8 Figures

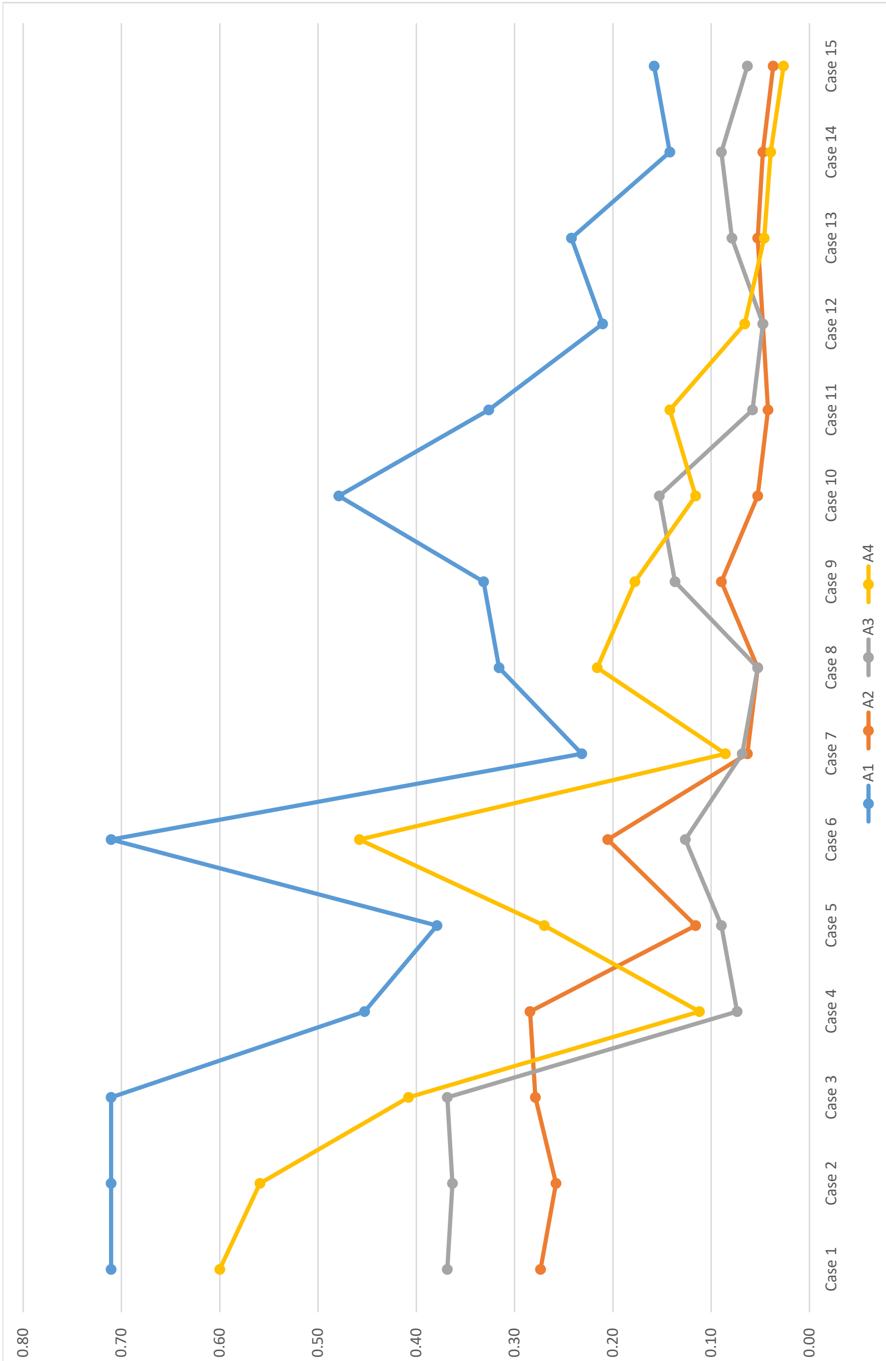

Figure 1: ±1% coverage rates. Averages across all models for various missing value cases. Results for annual series; A1: Employment (lfsi_emp_a), A2: Producer Prices (sts_inpp_a), A3:Industrial Production (sts_inpr_a), A4: Retail Trade (sts_trtu_a).

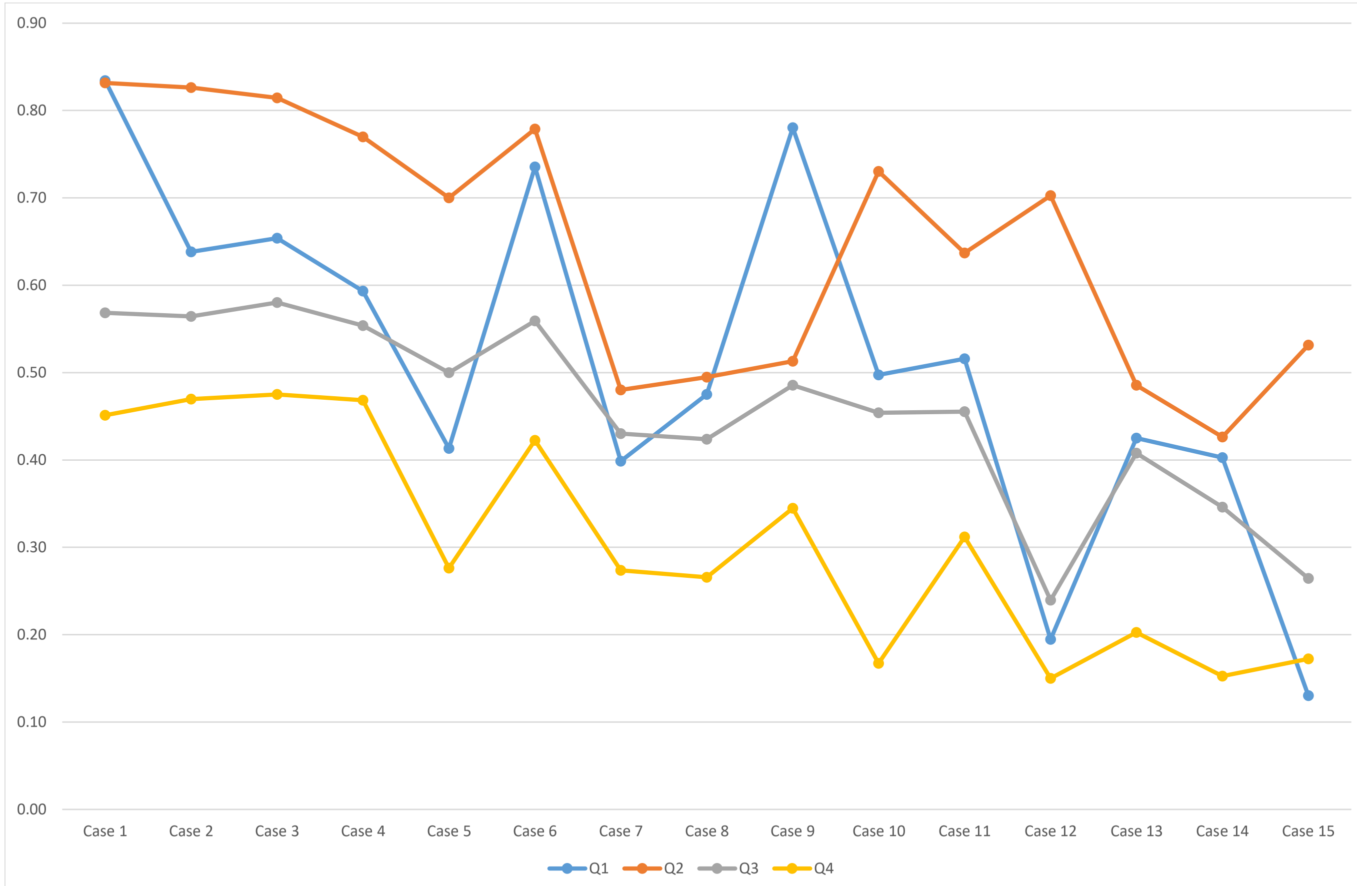

Figure 2: ±1% coverage rates. Averages across all models for various missing value cases. Results for quarterly series; Q1: GNI (naidq_10_gdp), Q2: Employment (namq_10_a10_e), Q3: GDP Level (namq_10_gdp), Q4: Labour in Construction (sts_colb_q).

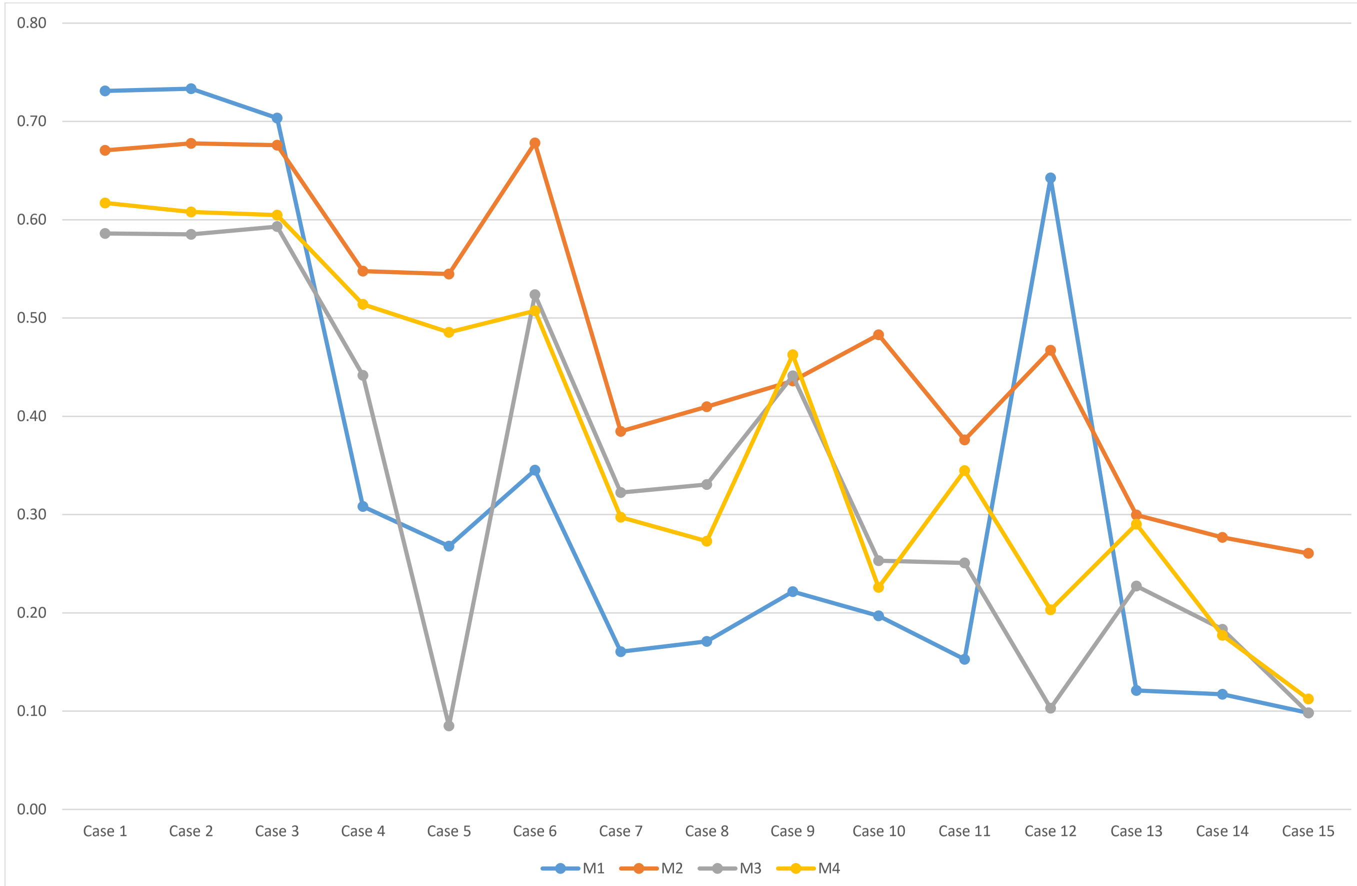

Figure 3: ±1% coverage rates. Averages across all models for various missing value cases. Results for monthly series; M1: Unemployment (ei_lmhu_m), M2: Producer Prices (sts_inpp_m), M3: Industrial Production (sts_inpr_m), M4: Retail Trade (sts_trtu_m).

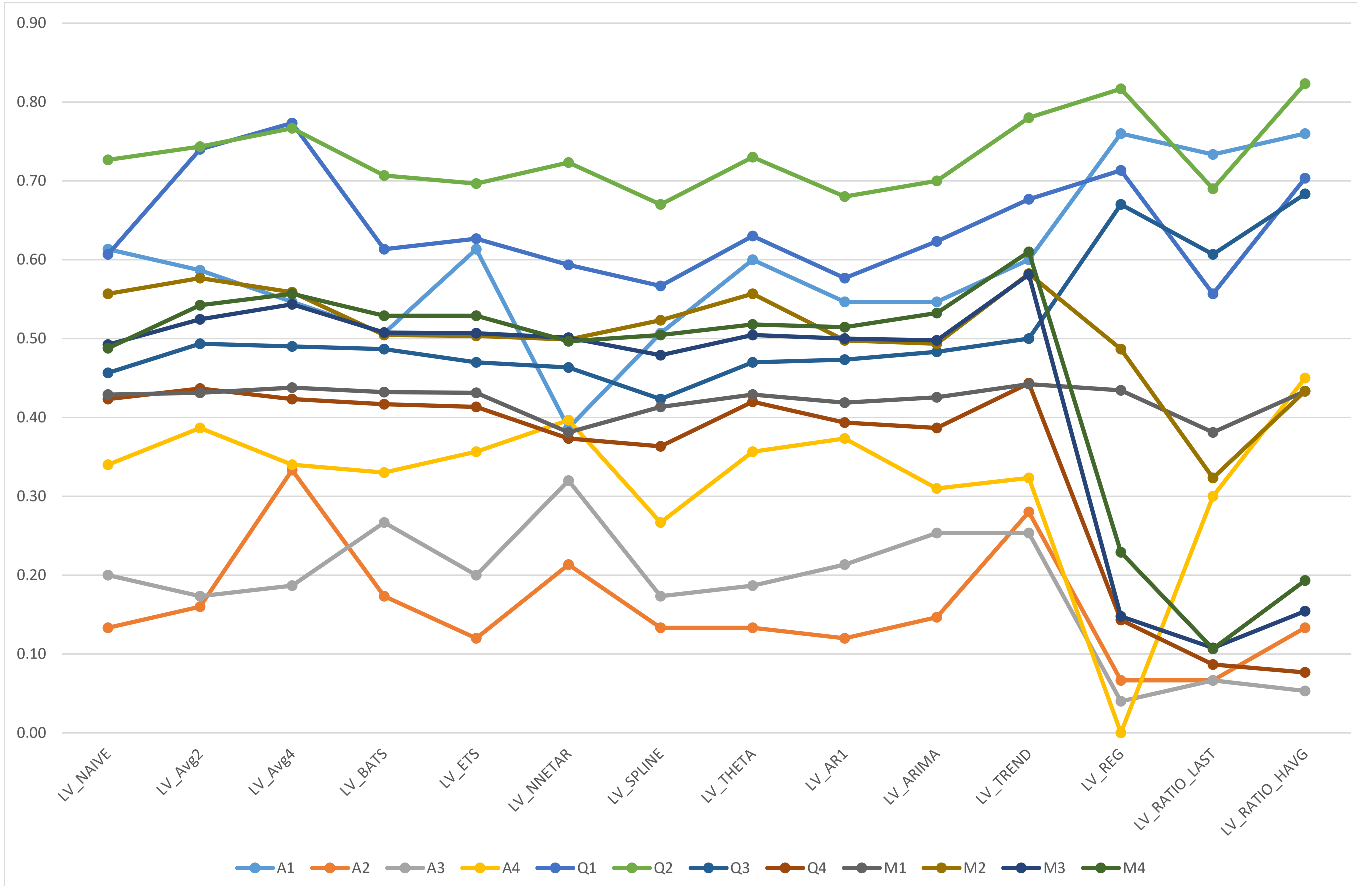

Figure 4: ±1% coverage rates. Averaging across various missing value cases for specific models: univariate time series forecasting in levels. Annual series; A1: Employment (lfsi_emp_a), A2: Producer Prices (sts_inpp_a), A3:Industrial Production (sts_inpr_a), A4: Retail Trade (sts_trtu_a). Quarterly series; Q1: GNI (naidq_10_gdp), Q2: Employment (namq_10_a10_e), Q3: GDP Level (namq_10_gdp), Q4: Labour in Construction (sts_colb_q). Monthly series; M1: Unemployment (ei_lmhu_m), M2: Producer Prices (sts_inpp_m), M3: Industrial Production (sts_inpr_m), M4: Retail Trade (sts_trtu_m).

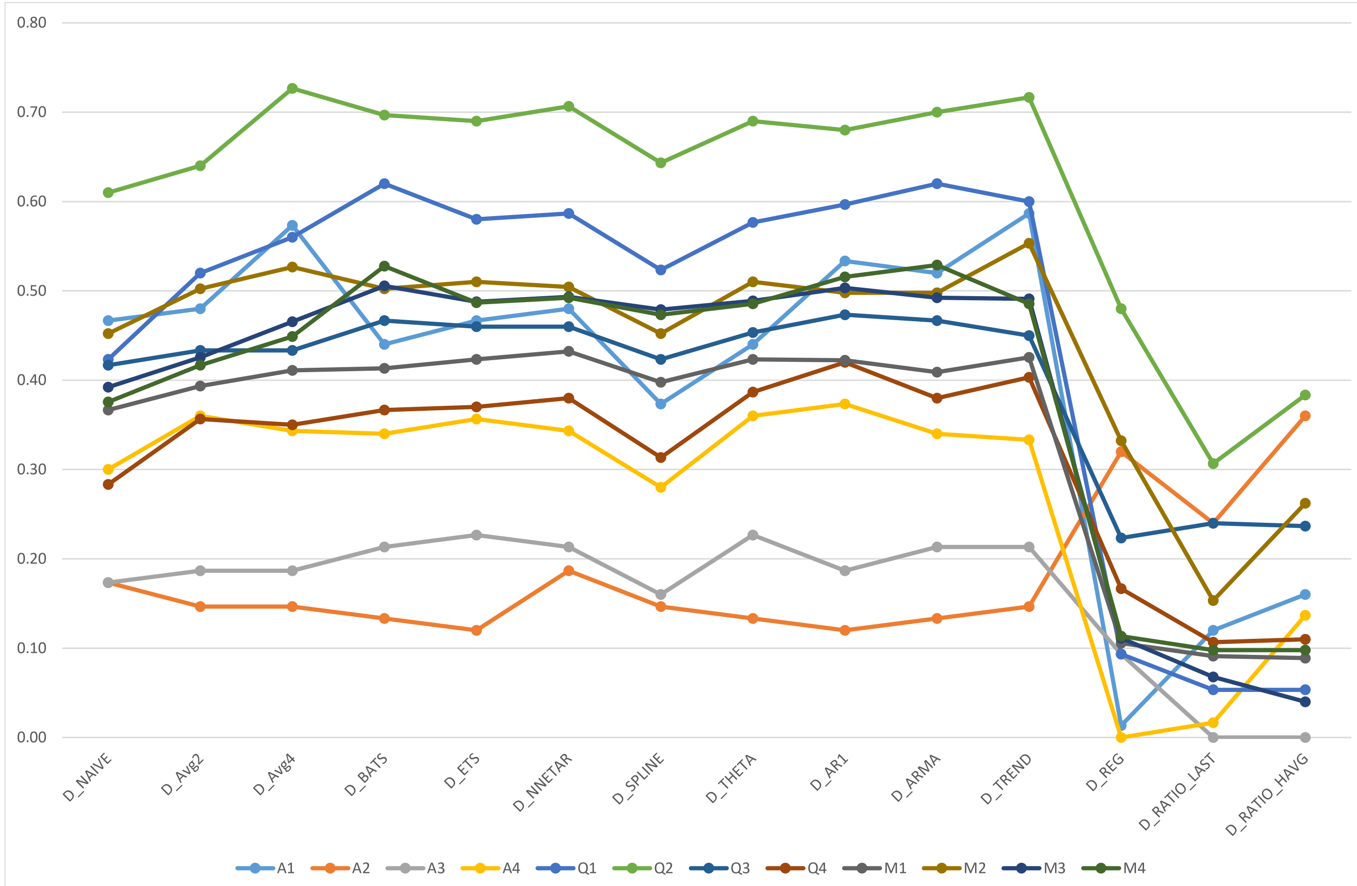

Figure 5: ±1% coverage rates. Averaging across various missing value cases for specific models: univariate time series forecasting in stationary series. Annual series; A1: Employment (lfsi_emp_a), A2: Producer Prices (sts_inpp_a), A3:Industrial Production (sts_inpr_a), A4: Retail Trade (sts_trtu_a). Quarterly series; Q1: GNI (naidq_10_gdp), Q2: Employment (namq_10_a10_e), Q3: GDP Level (namq_10_gdp), Q4: Labour in Construction (sts_colb_q). Monthly series; M1: Unemployment (ei_lmhu_m), M2: Producer Prices (sts_inpp_m), M3: Industrial Production (sts_inpr_m), M4: Retail Trade (sts_trtu_m).

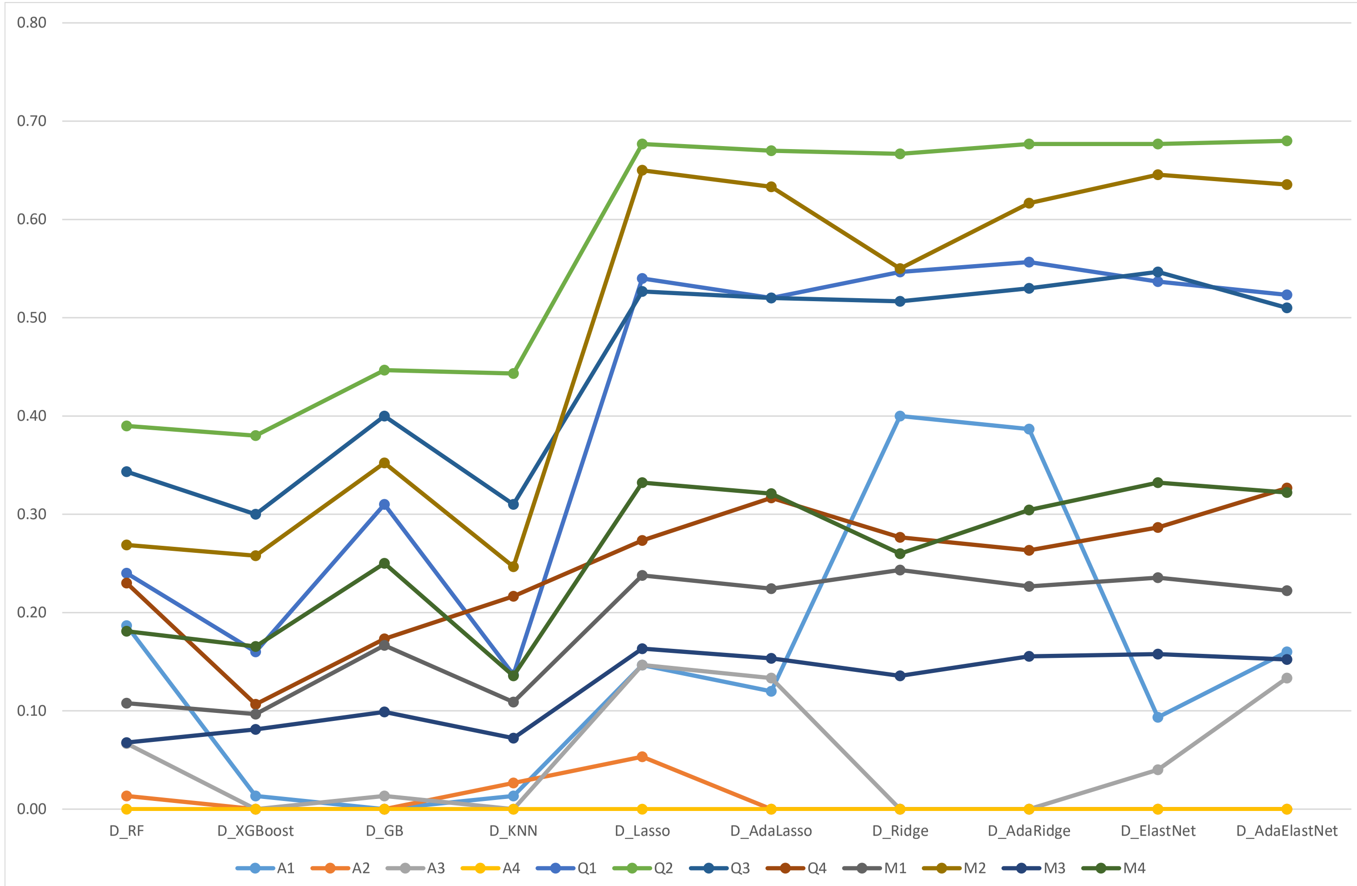

Figure 6: ±1% coverage rates. Averaging across various missing value cases for specific models: machine learning models. Annual series; A1: Employment (lfsi_emp_a), A2: Producer Prices (sts_inpp_a), A3:Industrial Production (sts_inpr_a), A4: Retail Trade (sts_trtu_a). Quarterly series; Q1: GNI (naidq_10_gdp), Q2: Employment (namq_10_a10_e), Q3: GDP Level (namq_10_gdp), Q4: Labour in Construction (sts_colb_q). Monthly series; M1: Unemployment (ei_lmhu_m), M2: Producer Prices (sts_inpp_m), M3: Industrial Production (sts_inpr_m), M4: Retail Trade (sts_trtu_m).

9 Appendix A: Methodologies

In this section, we provide a more detailed discussion of our methodologies.

9.1 Univariate Approaches

Initially, we underline the univariate imputation methods that refer to the analysis of a single variable at a time, without considering relationships with other variables.

9.1.1 Naive Imputation - D_NAIVE

The Naive Imputation methodology involves replacing the missing values in the data series with the most recent available observation (last observed value) of the variable under consideration. The process starts by identifying missing values within the dataset (i.e., in our case the) and subsequently updating the data by substituting the missing values with the most recently observed values.

For h-step ahead forecasting, the methodology extrapolates the most recent available observations, assuming no structural changes in the underlying data, providing a simplistic and straightforward approach for handling missing data.

The Naive Imputation methodology can be represented mathematically as follows:

$$\widehat{Y}_T = Y_{T-1}, \text{ for } t = \{1, 2, ..., T\}. \tag{15}$$

Where:

- $\hat{Y}_T$ represents the one-step-ahead forecast.
- Y_{T-1} represents the most recent actual value available in the dataset.

9.1.2 Rolling Average Imputation - D_Avg2 & D_Avg4

The Rolling Average Imputation methodology addresses missing values in a dataset by computing a rolling average for each variable, by utilizing a specified number of previous observations. The rolling average approach ensures that imputed values reflect recent trends in the data. Initially, columns with missing values are identified, and for each variable, missing values are replaced with the average of the most recent observations.

For h-step ahead forecasting, missing values are replaced by the mean of the last n observations. In our code, we utilize either the last 2 or 4 observations, depending on the specified averaging period.

The Rolling Average Imputation methodology can be represented mathematically as follows:

$$\hat{Y}_T = \frac{1}{n}\sum_{i=1}^{n} Y_{t-i}, \text{ for } t = \{1,\, 2,\, ...,\, T\}. \tag{16}$$

Where:

- $\hat{Y}_t$ represents the h-step ahead forecast.
- n represents the number of previous observations included in the rolling average.
- Y_{t-i} represents the observed values for the variable at time $t - i$.

9.1.3 Bayesian Structural Time Series (BATS) Imputation - D_BATS

Another univariate approach we employ for imputing missing values corresponds to the BATS model (De Livera, A.M., Hyndman, R.J., & Snyder, R. D., 2011). The BATS model combines an exponential smoothing and ARIMA framework along with Box-Cox transformation of the target variable. The Box-Cox transformation can be beneficial as it deals with non-linear data and stabilizes the variance.

BATS decomposes the data series into trend, seasonality, and regression elements, integrating observed data and prior assumptions to capture the inherent dynamics of the data. For every variable containing missing values, BATS constructs a model based on the available data and employs a probabilistic approach to generate forecasts. These forecasts are subsequently utilized to fill in the missing values within the dataset.

The BATS Imputation methodology can be represented mathematically as follows:

$$y_t^{\omega} = \begin{cases} (y_t^{\omega} - 1)/\omega; & \omega \neq 0 \\ \log y_t; & \omega = 0 \end{cases} \tag{17}$$

$$y_t^{\omega} = l_{t-1} + \phi b_{t-1} + \sum_{i=1}^{T} s_{t-m_i}^{i} + d_t \tag{18}$$

$$l_t = l_{t-1} + \phi b_{t-1} + \alpha d_t \tag{19}$$

$$b_t = (1-\phi)b + \phi b_{t-1} + \beta d_t \tag{20}$$

$$s_t^i = s_{t-m_i}^i + \gamma_i d_t \tag{21}$$

$$d_t = \sum_{i=1}^{p} \phi_i d_{t-i} + \sum_{i=1}^{q} \theta_i \varepsilon_{t-i} + \varepsilon_t \tag{22}$$

Where:

- $m_1, ..., m_T$ denote the seasonal periods.
- l_t is the local level in period t.
- b is the long-run trend.
- b_t is the short-run trend in period t.
- s_t^i represents the i_{th} seasonal component at time t.
- d_t denotes an $ARMA(p,q)$ process.
- ε_t is a Gaussian white noise process with zero mean and constant variance.
- The smoothing parameters are given by α, β, and γ_i for $i = 1, ..., T$.
- ϕ_i and θ_i are the $ARMA(p,q)$ coefficients.

9.1.4 Exponential Smoothing State Space Model (ETS) Imputation - D_ETS

The Exponential Smoothing State Space Model (ETS) is a state space model that utilizes the exponential smoothing framework to capture patterns and trends in the data (Hyndman, et al., 2008). This makes it well-suited for managing missing values and predicting the dynamics of variables. For each variable with missing values, the methodology fits an ETS model to the observed data and generates forecasts using the fitted model. These forecasts are then used to replace missing values in the dataset.

The Simple ETS with additive errors can be represented mathematically as follows:

$$y_t = l_{t-1} + b_{t-1} + \epsilon_t \tag{23}$$

$$l_t = l_{t-1} + b_{t-1} + \alpha\epsilon_t \tag{24}$$

$$b_t = b_{t-1} + \alpha\beta^*\epsilon_t \tag{25}$$

$$\hat{y}_t = l_{t-1} + b_{t-1} \tag{26}$$

Where:

- $\hat{y}_t$ denotes the one-step forecast of y_t.
- l_{t-1} is the estimated level at time $t-1$.
- b_{t-1} is the estimated trend at time $t-1$.
- l_{t-1} and b_{t-1} are estimated using the relevant exponential smoothing parameters α and β.

9.1.5 NNETAR Imputation - D_NNETAR

In the context of univariate imputation methods, we add another model to evaluate the performance of non-linear neural network techniques. The NNETAR methodology employs a single hidden layer feed-forward neural network with lagged inputs for time series forecasting. By leveraging neural networks, this approach aims to capture complex patterns and relationships within the data series, with a view to managing missing values and forecasting time series data. For each variable with missing values, the methodology fits an NNETAR model to the observed data and generates forecasts using the fitted model. These forecasts are then used to replace missing values in the dataset.

The estimation is implemented by training a feed-forward neural network using lagged values of y as inputs and a single hidden layer with a specified number of nodes. Then, forecasts are generated by averaging the predictions from these networks. The network is trained for one-step forecasting, and multi-step forecasts are computed recursively based on previous predictions.

9.1.6 Spline Imputation - D_SPLINE

Another technique we employ for imputing missing values by obtaining local linear forecasts for univariate data series corresponds to the Cubic Spline model (Hyndman, King, Pitrun, and Billahm 2005).

The cubic smoothing spline model shares similarities with the Autoregressive Integrated Moving Average (ARIMA) model, specifically the ARIMA(0,2,2) configuration, albeit with a more constrained parameter space. Unlike the ARIMA model, it incorporates a smooth historical trend as well as a linear forecast function. The process entails fitting a cubic spline to historical data, automatically determining the number and positions of knots. Forecasts are then generated by extending the spline function beyond observed data points to predict future values.

9.1.7 Theta Method Imputation - D_Theta

The Theta model (Assimakopoulos and Nikolopoulos, 2000), is a forecasting method that builds on the utility of the simple exponential smoother. The model operates on the principle of adjusting the local curvatures of the employed data series. This adjustment is derived from the θ coefficient, which is directly applied to the second differences of the data series.

The Theta Model forecast at time t can be represented mathematically as follows:

$$X^{"}_{new} = \theta X^{"}_{observed} \tag{27}$$

$$X^{"}_{observed} = X_t - 2X_{t-1} + X_{t-2} \tag{28}$$

9.1.8 Autoregressive Imputation - D_AR1 & D_ARMA

The ARMA (AutoRegressive Moving Average) model is a widely used approach for time series forecasting, blending autoregressive (AR) and moving average (MA) elements. It's characterized by two primary parameters: p, indicating the order of the autoregressive part, and q, representing the order of the moving average part. These parameters dictate the inclusion of lagged observations in the model. In our application, the parameters of the ARMA model, the coefficients of the autoregressive and moving average terms, are estimated using maximum likelihood estimation (MLE).

Mathematically, the ARMA(p, q) model can be expressed as:

$$y_t = c + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \cdots + \phi_p y_{t-p} + \varepsilon_t + \theta_1 \varepsilon_{t-1} + \theta_2 \varepsilon_{t-2} + \cdots + \theta_q \varepsilon_{t-q} \tag{29}$$

where:

- y_t is the observed value at time t.
- c is a constant term.
- $\phi_1, \phi_2, \ldots, \phi_p$ are the autoregressive coefficients.
- ε_t is the error term (assumed to be white noise).
- $\theta_1, \theta_2, \ldots, \theta_q$ are the moving average coefficients.
- $y_{t-1}, y_{t-2}, \ldots, y_{t-p}$ are the past observed values (autoregressive terms).
- $\varepsilon_{t-1}, \varepsilon_{t-2}, \ldots, \varepsilon_{t-q}$ are the past forecast errors (moving average terms).

In our case, for the imputation of missing values, we make use of two frameworks that are derived from the ARMA family, the AR(1) model and the Auto-ARMA framework.

The AR(1) model is a special case of the ARMA(1,0) model, which only includes an autoregressive component of order 1 ($p = 1$). Mathematically, the AR(1) model can be expressed as:

$$y_t = c + \phi_1 y_{t-1} + \epsilon_t \tag{30}$$

where:

- y_t is the observed value at time t.
- c is a constant term.
- ϕ_1 is the autoregressive coefficient (for lag 1).
- ϵ_t is the error term (assumed to be white noise).
- y_{t-1} is the observed value at the previous time step.

On the other hand, the Auto-ARMA (Auto-Regressive Moving Average) is a statistical algorithm that automatically determines the optimal parameters (p and q) for an ARMA model (Hyndman, RJ and Khandakar, Y.,2008). It searches through combinations of the autoregressive (AR) and moving average (MA) parameters to find the best fit for the given data series.

9.1.9 Trend Imputation - D_TREND

This method computes the trend component by employing linear regression and substitutes missing values with predicted ones. It iterates through columns containing missing data, applies linear regression to estimate the linear model parameters, and then uses the estimated parameters to extrapolate the data series, thus imputing the missing data.

The linear regression aims to model the relationship between a dependent variable y and one or more independent variables $x_1, x_2, \ldots, x_p$. Mathematically, the linear regression model can be represented as:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_p x_p + \varepsilon \tag{31}$$

where:

- y is the dependent variable (response variable),
- $x_1, x_2, \ldots, x_p$ are the independent variables (predictors),
- β_0 is the intercept term (constant),
- $\beta_1, \beta_2, \ldots, \beta_p$ are the coefficients (parameters) of the independent variables,
- ε is the error term representing the unexplained variation in the dependent variable.

The aim of the linear regression is to estimate the coefficients $\beta_0, \beta_1, \ldots, \beta_p$ that best fit the observed data, minimizing the sum of squared errors between the observed and predicted values. The model parameters are estimated using ordinary least squares (OLS), which minimizes the sum of squared residuals.

In our univariate scenario, we solely utilize one independent variable, which is the data series requiring the imputation of missing values. We utilize the available data points up to the first missing value to perform the linear model fitting and therefore the imputation.

9.2 Multivariate Approaches

Additionally, we consider multivariate imputation methods that refer to the analysis of multiple variables simultaneously, considering the relationships and interactions among them. In our case, we use only the available variables that do not contain missing values, to predict the aggregated data series under consideration.

9.2.1 Random Forest Imputation - D_RF

The Random Forest algorithm (Breiman, L., 2001) operates by constructing an ensemble bagging process with decision trees trained as follows:

- A random sample is drawn from the independent variables under consideration (i.e., the training set)
- At each knot, the split is made using a random sample of the predictor variables

This ensemble is built via bootstrap sampling and incorporates random subsets of predictor variables at each split to mitigate correlation between trees. In our regression-based task, the final prediction is derived as the average of predictions from all trees, smoothing out individual tree predictions for a more stable forecast.

9.2.2 Gradient Boosting Imputation - D_XGBoost & D_GB

Expanding on the effectiveness of tree-based structures for regression tasks, we explore a cutting-edge machine learning framework designed to address the overfitting tendencies of simple decision trees and improve the performance of more generalized methods like random forests.

Extreme Gradient Boosting (XGBoost) is a highly efficient gradient boosting framework that enhances predictive modeling tasks by sequentially training decision trees to correct errors (Jerome H. Friedman 2001 & Chen, et al., 2016). It iteratively improves predictions by focusing on areas where the model performs poorly, and during prediction, each tree contributes its prediction, with the final output being the sum of these predictions across all trees. It employs a gradient descent optimization technique to minimize a predefined loss function during training, and through ensemble learning, it systematically combines the predictive power of multiple learners into a single model, resulting in aggregated output from several models. This ensemble method includes bagging, where decision trees are trained in parallel to reduce variance. Data sampled with replacement is fed to these learners for training. In addition to bagging XGBoost employs the technique of boosting, where each tree learns from its predecessors and updates the residual errors. Thus, the tree that grows next in the sequence will learn from an updated version of the residuals.

XGBoost operates similarly to the Gradient Boosting Machine (GBM) algorithm, with trees built sequentially to correct errors made by previous trees, using squared error as the objective function. Thus, XGBoost serves as an improved version of the GBM algorithm, sharing a similar working procedure with the addition of trees built sequentially to correct errors made by previous trees.

9.2.3 Weighted K-Nearest Neighbor Imputation - D_KNN

Another approach that we utilize is based on the K-Nearest Neighbor (KNN) model. It's important to note that KNN is classified as a nonparametric method, emphasizing its reliance on data rather than predetermined parameters for prediction. In regression tasks, the K-Nearest Neighbors (KNN) algorithm operates by estimating the output value for a given query point. It achieves this by leveraging the average output values of its K nearest neighbors in the feature space. The determination of these nearest neighbors is facilitated by employing a distance metric, in our case the Minkowski distance. Specifically, in the multivariate case, the K-Nearest Neighbors (KNN) algorithm predicts the output value for a query point by considering the average of the output values of its K nearest neighbors in the multivariate feature space.

Our employed model, the Weighted KNN model (Hechenbichler K. and Schliep K.P., 2004) suggests an extension of the traditional KNN approach that emphasizes the importance of observations that closely resemble the predicted query point (y, x). This extension suggests that closer neighbors within the learning set should exert a stronger influence on the decision-making process. Unlike standard KNN, which assigns equal influence to all nearest neighbors, this extension aims to weight neighbors based on their similarity to the query point.

Here is how the prediction process works:

- **Identifying Nearest Neighbors**: Given a query point with multiple features, the algorithm identifies the K nearest neighbors in the feature space. To determine the optimal kernel function, the algorithm typically employs cross-validation and evaluates various kernel functions to determine the one that yields the best performance for the given dataset.

- **Weighted Average Prediction**: Once the nearest neighbors are identified, the algorithm computes the average of the output values of these neighbors. However, in the multivariate case, it's crucial to consider the varying importance of different features. Therefore, the algorithm applies feature weighting techniques to give more weight to certain features during the averaging process.

- **Assigning Prediction**: The computed average value serves as the prediction for the query point in the multivariate space.

9.2.4 LASSO Imputation - D_Lasso & D_AdaLasso

In our regression-based setup, the LASSO (Least Absolute Shrinkage and Selection Operator) regression technique is important for cases where the number of observations is relatively small compared to the independent variables (Friedman, J., Hastie, T. and Tibshirani, R., 2010). LASSO adds a penalty term to the standard linear regression objective function, which encourages sparsity in the coefficient estimates and facilitates feature selection. Thus, LASSO is a modification of linear regression, where the model is penalized for the sum of absolute values of the weights. Consequently, the absolute values of weights are generally reduced, with many tending to become zeros. During training, the objective function becomes:

$$L = \sum_{i=1}^{N} (\hat{y}_i - y_i)^2 + \lambda \sum_{j=1}^{p} |\beta_j| \tag{32}$$

In this formulation:

- $\hat{y}_i$ represents the predicted values.
- y_i denotes the observed values.
- λ is the regularization parameter controlling the strength of the penalty term.

- β_j are the coefficients to be estimated.

In this formulation, the first term represents the ordinary least squares (OLS) regression loss function, which aims to minimize the difference between observed and predicted values. The second term imposes a penalty on the absolute values of the coefficients, encouraging sparsity in the model by shrinking some coefficients towards zero. By minimizing this combined objective function, LASSO simultaneously selects important features and estimates their coefficients, thereby facilitating the development of parsimonious model specifications. Therefore, the estimated weights that are derived by optimizing the objective function are used for the prediction of the h-step ahead target variable, which in our case is the aggregated data series.

Moreover, building on the LASSO framework we employ an additional technique that transforms the simple LASSO to an adaptive formulation. The key difference between LASSO and adaptive LASSO lies in the way the penalty term is applied to the regression coefficients. In LASSO, the penalty term is fixed and equal for all coefficients, promoting sparsity by shrinking some coefficients to exactly zero. On the other hand, adaptive LASSO adjusts the penalty term individually for each coefficient based on their estimated magnitudes. This adaptive nature allows the penalty to be more aggressive for coefficients with larger estimated values, effectively reducing their impact on the final model.

9.2.5 RIDGE Imputation - D_Ridge & D_AdaRidge

Similarly to the LASSO framework, RIDGE regression goes a step further by penalizing the model for the sum of squared values of the weights, which leads to weights having not only smaller absolute values but also tend to penalize extreme weights, resulting in a more evenly distributed group of weights (Friedman, J., Hastie, T. and Tibshirani, R., 2010).

Ridge regression assigns a penalty that is the squared magnitude of the coefficients to the loss function, multiplied by lambda. Similar to Lasso, Ridge also penalizes coefficients that the model overemphasizes. The value of lambda plays a crucial role in determining how much weight is assigned to the penalty for the coefficients. A larger value of lambda implies that coefficients tend to get closer to zero. Unlike Lasso, the Ridge model does not shrink coefficients to zero. It retains coefficients in the model, even if the corresponding variables are not containing important for the estimation information. However, this aspect is not helpful for cases where there are more features than observations. In that case, the objective function becomes:

$$L = \sum_{i=1}^{N} (\hat{y}_i - y_i)^2 + \lambda \sum_{j=1}^{p} |\beta_j|^2 \tag{33}$$

In this formulation:

- $\hat{y}_i$ represents the predicted values,
- y_i denotes the observed values,
- λ is the regularization parameter controlling the strength of the penalty term,
- β_j are the coefficients to be estimated.

Additionally, similar to LASSO, we also utilize the adaptive version of RIDGE regression by adjusting the penalty term for each coefficient based on their estimated magnitudes.

9.2.6 Elastic Net Imputation - D_ElastNet & D_AdaElastNet

Elastic Net combines characteristics of both Lasso and Ridge regression techniques, reducing the impact of different features while not eliminating all of them (Friedman, J., Hastie, T. and Tibshirani, R., 2010). By incorporating both absolute value penalization and squared penalization, Elastic Net aims to enhance model predictions. That is, by combining feature elimination from Lasso and feature coefficient reduction from the Ridge model, thereby leveraging the advantages of both penalization techniques and overcoming the drawbacks of each method.

$$L = \sum_{i=1}^{N} (\hat{y}_i - y_i)^2 + \lambda_1 \sum_{j=1}^{p} \beta_j^2 + \lambda_2 \sum_{j=1}^{p} |\beta_j|$$

In this formulation:

- $\hat{y}_i$ represents the predicted values,
- y_i denotes the observed values,
- λ_1 and λ_2 are the regularization parameters controlling the strength of the RIDGE and LASSO penalties respectively,
- β_j are the coefficients to be estimated.

In addition, with a view to enhancing the performance of our employed computational model, we make use of the adaptive version of Elastic Net regression. Thus, the adaptation ensures that coefficients with larger magnitudes are penalized more heavily, aiming for a better regularization of the model and potentially improving its predictive performance.

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10 Appendix B: ±3% coverage rates

10.1 Tables

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.60	0.60	1.00	0.60	0.60	0.60	0.60	0.20
LV_Avg2	1.00	1.00	1.00	1.00	1.00	1.00	0.40	0.40	0.80	1.00	0.60	0.60	0.40	0.40	0.40
LV_Avg4	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.80	0.80	1.00	0.80	0.60	0.40	0.20	0.40
LV_BATS	1.00	1.00	1.00	1.00	0.80	1.00	0.60	0.60	0.60	1.00	0.80	0.60	0.60	0.40	0.20
LV_ETS	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.60	0.60	1.00	0.60	0.40	0.60	0.60	0.20
LV_NNETAR	1.00	1.00	1.00	1.00	0.80	1.00	0.00	0.00	0.40	0.60	0.60	0.60	0.20	0.00	0.20
LV_SPLINE	1.00	1.00	1.00	0.60	0.60	1.00	0.40	0.40	0.40	0.80	0.40	0.20	0.40	0.40	0.20
LV_THETA	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.60	0.60	1.00	0.60	0.60	0.60	0.60	0.20
LV_AR1	1.00	1.00	1.00	0.80	0.80	1.00	0.40	0.40	0.40	1.00	0.60	0.60	0.60	0.60	0.40
LV_ARIMA	1.00	1.00	1.00	0.80	0.80	1.00	0.40	0.40	0.60	1.00	0.80	0.60	0.60	0.60	0.60
LV_TREND	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.80	0.80	1.00	0.80	0.60	0.60	0.40	0.40
LV_REG	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00	1.00	1.00	1.00	1.00	0.80	0.60	0.60
LV_RATIO_LAST	1.00	1.00	1.00	1.00	1.00	1.00	0.60	1.00	1.00	1.00	1.00	1.00	0.60	1.00	0.80
LV_RATIO_HAVG	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.80	1.00
D_NAIVE	1.00	1.00	1.00	0.80	0.60	1.00	0.40	0.40	0.40	1.00	0.60	0.20	0.40	0.20	0.20
D_Avg2	1.00	1.00	1.00	0.80	0.80	1.00	0.40	0.40	0.60	1.00	0.40	0.20	0.40	0.40	0.20
D_Avg4	1.00	1.00	1.00	1.00	0.80	1.00	0.60	0.60	0.60	1.00	0.60	0.60	0.60	0.60	0.20
D_BATS	1.00	1.00	1.00	0.60	0.80	1.00	0.40	0.60	0.60	1.00	0.60	0.60	0.60	0.40	0.20
D_ETS	1.00	1.00	1.00	0.80	0.80	1.00	0.40	0.40	0.40	1.00	0.60	0.60	0.60	0.40	0.20
D_NNETAR	1.00	1.00	1.00	0.80	0.80	1.00	0.40	0.40	0.40	0.80	0.60	0.40	0.60	0.40	0.20
D_SPLINE	1.00	1.00	1.00	0.60	0.60	0.80	0.20	0.20	0.20	0.60	0.40	0.00	0.20	0.20	0.00
D_THETA	1.00	1.00	1.00	0.80	0.80	1.00	0.40	0.40	0.40	1.00	0.60	0.60	0.60	0.40	0.40
D_AR1	1.00	1.00	1.00	0.80	0.80	1.00	0.40	0.40	0.40	1.00	0.60	0.40	0.60	0.40	0.20
D_ARMA	1.00	1.00	1.00	0.80	0.60	1.00	0.40	0.40	0.60	1.00	0.60	0.60	0.60	0.40	0.40
D_TREND	1.00	1.00	1.00	1.00	0.80	1.00	0.60	0.60	0.60	1.00	0.60	0.60	0.60	0.40	0.40
D_REG	0.60	0.20	0.20	0.60	0.20	0.60	0.20	0.40	0.00	0.60	0.40	0.40	0.00	0.20	0.40
D_RATIO_LAST	0.40	0.20	0.20	0.40	0.20	0.40	0.00	0.40	0.40	0.40	0.40	0.20	0.40	0.40	0.20
D_RATIO_HAVG	0.60	0.60	0.60	0.20	0.00	0.60	0.20	0.20	0.60	0.60	0.40	0.60	0.00	0.00	0.40
D_RF	0.40	0.40	0.40	0.20	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
D_XGBoost	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_GB	0.20	0.20	0.20	0.40	0.20	0.00	0.00	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20
D_KNN	0.20	0.20	0.20	0.20	0.20	0.20	0.40	0.40	0.40	0.20	0.20	0.40	0.20	0.20	0.20
D_Lasso	0.40	0.40	0.40	0.60	0.40	0.40	0.40	0.40	0.20	0.40	0.40	0.00	0.20	0.20	0.20
D_AdaLasso	0.20	0.20	0.20	0.60	0.40	0.20	0.20	0.20	0.00	0.20	0.60	0.00	0.40	0.20	0.20
D_Ridge	0.60	0.60	0.60	0.60	0.40	0.60	0.40	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.40
D_AdaRidge	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
D_ElastNet	0.40	0.40	0.40	0.40	0.20	0.40	0.20	0.20	0.00	0.40	0.60	0.20	0.40	0.40	0.20
D_AdaElastNet	0.20	0.20	0.20	0.40	0.20	0.20	0.20	0.20	0.00	0.20	0.60	0.20	0.40	0.40	0.20

Table 14: ±3% coverage rates for Employment (lfsi_emp_a), annual.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.40	0.60	0.60	0.80	0.80	0.80	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
LV_Avg2	0.40	0.60	0.60	1.00	0.60	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LV_Avg4	0.40	0.60	0.60	1.00	0.80	0.80	0.20	0.20	0.20	0.40	0.20	0.20	0.20	0.20	0.20
LV_BATS	0.60	0.60	0.60	0.80	0.60	0.60	0.00	0.00	0.20	0.00	0.00	0.20	0.00	0.00	0.00
LV_ETS	0.40	0.60	0.60	0.80	0.80	0.60	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
LV_NNETAR	0.40	0.60	0.60	0.80	0.80	0.60	0.00	0.00	0.20	0.20	0.00	0.20	0.00	0.00	0.00
LV_SPLINE	0.40	0.60	0.60	0.60	0.60	0.80	0.20	0.20	0.20	0.20	0.40	0.20	0.20	0.00	0.00
LV_THETA	0.40	0.60	0.60	0.80	0.80	0.80	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
LV_AR1	0.40	0.60	0.60	0.80	0.80	0.80	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00
LV_ARIMA	0.40	0.60	0.60	0.80	0.80	0.80	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
LV_TREND	0.40	0.60	0.60	1.00	0.80	0.80	0.20	0.20	0.20	0.40	0.20	0.20	0.20	0.20	0.20
LV_REG	0.40	0.40	0.40	0.40	0.20	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
LV_RATIO_LAST	0.40	0.40	0.60	0.00	0.40	0.60	0.40	0.20	0.20	0.20	0.20	0.00	0.20	0.20	0.00
LV_RATIO_HAVG	0.40	0.40	0.20	0.40	0.20	0.20	0.40	0.20	0.40	0.60	0.40	0.60	0.40	0.40	0.20
D_NAIVE	0.60	0.60	0.60	0.60	0.60	0.80	0.20	0.20	0.40	0.20	0.20	0.20	0.40	0.40	0.00
D_Avg2	0.60	0.60	0.80	0.80	0.40	0.80	0.20	0.40	0.40	0.40	0.00	0.00	0.00	0.00	0.00
D_Avg4	0.40	0.60	0.60	0.80	0.40	0.80	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
D_BATS	0.40	0.60	0.60	0.80	0.80	0.60	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
D_ETS	0.40	0.60	0.60	0.80	0.80	0.60	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
D_NNETAR	0.40	0.60	0.60	0.80	0.80	0.60	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00
D_SPLINE	0.40	0.60	0.80	0.40	0.60	0.80	0.00	0.00	0.00	0.20	0.00	0.00	0.20	0.00	0.00
D_THETA	0.40	0.60	0.60	0.80	0.60	0.60	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
D_AR1	0.40	0.60	0.60	0.80	0.80	0.80	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
D_ARMA	0.40	0.60	0.60	0.80	0.80	0.80	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
D_TREND	0.40	0.60	0.60	0.80	0.60	0.80	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
D_REG	0.40	0.40	0.40	0.40	0.20	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
D_RATIO_LAST	0.40	0.60	0.60	0.40	0.40	0.60	0.20	0.40	0.40	0.40	0.20	0.40	0.20	0.20	0.40
D_RATIO_HAVG	0.40	0.20	0.20	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
D_RF	0.20	0.20	0.20	0.20	0.20	0.00	0.20	0.00	0.20	0.20	0.20	0.00	0.20	0.20	0.00
D_XGBoost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_GB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_KNN	0.20	0.00	0.20	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.20	0.20	0.20
D_Lasso	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.00	0.00	0.00	0.20	0.40	0.00
D_AdaLasso	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00
D_Ridge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_AdaRidge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_ElastNet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.00	0.00	0.00	0.20	0.00	0.00
D_AdaElastNet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 15: ±3% coverage rates for Producer Prices (sts_inpp_a), annual.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.80	0.80	0.80	0.60	0.40	0.60	0.20	0.20	0.60	0.20	0.40	0.20	0.40	0.20	0.20
LV_Avg2	0.80	0.80	0.80	0.40	0.00	0.80	0.00	0.00	0.60	0.40	0.20	0.00	0.00	0.00	0.00
LV_Avg4	0.80	0.80	0.80	0.40	0.20	0.60	0.20	0.40	0.40	0.40	0.40	0.00	0.40	0.00	0.00
LV_BATS	0.80	0.80	0.80	0.40	0.00	0.60	0.40	0.40	0.20	0.40	0.40	0.40	0.40	0.40	0.00
LV_ETS	0.80	0.80	0.80	0.60	0.20	0.60	0.20	0.40	0.60	0.40	0.20	0.20	0.20	0.20	0.00
LV_NNETAR	0.80	0.80	0.80	0.60	0.20	0.80	0.60	0.60	0.60	0.40	0.60	0.20	0.40	0.60	0.20
LV_SPLINE	0.80	0.80	0.80	0.40	0.00	0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.20
LV_THETA	0.80	0.80	0.80	0.60	0.40	0.60	0.20	0.40	0.60	0.40	0.40	0.20	0.20	0.20	0.00
LV_AR1	0.80	0.80	0.80	0.40	0.20	0.60	0.40	0.40	0.40	0.20	0.40	0.20	0.40	0.40	0.00
LV_ARIMA	0.80	0.80	0.80	0.60	0.20	0.60	0.20	0.20	0.60	0.20	0.40	0.20	0.40	0.20	0.20
LV_TREND	0.80	0.80	0.80	0.40	0.40	0.60	0.40	0.40	0.40	0.40	0.60	0.40	0.60	0.60	0.40
LV_REG	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20	0.20	0.00	0.20	0.20	0.20
LV_RATIO_LAST	0.20	0.20	0.20	0.20	0.60	0.20	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LV_RATIO_HAVG	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
D_NAIVE	0.80	0.80	0.80	0.40	0.00	0.40	0.40	0.40	0.20	0.20	0.20	0.00	0.20	0.20	0.00
D_Avg2	0.80	0.80	0.80	0.40	0.20	0.80	0.00	0.00	0.40	0.40	0.20	0.00	0.20	0.20	0.00
D_Avg4	0.80	0.80	0.80	0.60	0.00	0.60	0.20	0.20	0.40	0.20	0.20	0.00	0.20	0.20	0.20
D_BATS	0.80	0.80	0.80	0.40	0.20	0.60	0.00	0.20	0.60	0.20	0.40	0.20	0.40	0.20	0.20
D_ETS	0.80	0.80	0.80	0.40	0.20	0.60	0.20	0.20	0.60	0.20	0.40	0.20	0.40	0.20	0.20
D_NNETAR	0.80	0.80	0.80	0.40	0.40	0.60	0.20	0.20	0.40	0.20	0.20	0.40	0.40	0.20	0.40
D_SPLINE	0.80	0.80	0.80	0.40	0.00	0.60	0.20	0.20	0.00	0.20	0.40	0.20	0.20	0.20	0.20
D_THETA	0.80	0.80	0.80	0.40	0.20	0.60	0.20	0.20	0.40	0.20	0.20	0.20	0.20	0.20	0.20
D_AR1	0.80	0.80	0.80	0.60	0.20	0.60	0.40	0.40	0.40	0.20	0.20	0.20	0.20	0.00	0.00
D_ARMA	0.80	0.80	0.80	0.40	0.20	0.60	0.20	0.20	0.60	0.20	0.40	0.20	0.40	0.20	0.20
D_TREND	0.80	0.80	0.80	0.60	0.20	0.60	0.20	0.20	0.40	0.20	0.20	0.20	0.20	0.20	0.20
D_REG	0.20	0.20	0.20	0.40	0.60	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
D_RATIO_LAST	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_RATIO_HAVG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.00
D_RF	0.20	0.20	0.20	0.20	0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.00
D_XGBoost	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_GB	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.20
D_KNN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_Lasso	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.00
D_AdaLasso	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.40	0.20	0.20	0.00	0.20	0.20
D_Ridge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_AdaRidge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_ElastNet	0.20	0.20	0.20	0.00	0.20	0.20	0.00	0.00	0.00	0.40	0.00	0.20	0.20	0.20	0.00
D_AdaElastNet	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.40	0.20	0.00	0.00	0.40	0.20

Table 16: ±3% coverage rates for Industrial Production (sts_inpr_a), annual.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	1.00	0.75	1.00	1.00	0.25	0.40	0.50	0.20	0.20	0.50	0.00	0.00	0.00
LV_Avg2	1.00	1.00	1.00	0.50	1.00	1.00	0.25	0.60	0.50	0.40	0.40	0.00	0.00	0.25	0.00
LV_Avg4	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.40	0.50	0.20	0.20	0.00	0.50	0.25	0.00
LV_BATS	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.40	0.50	0.20	0.40	0.50	0.25	0.25	0.00
LV_ETS	1.00	1.00	1.00	0.75	1.00	1.00	0.50	0.60	0.50	0.20	0.20	0.50	0.00	0.00	0.00
LV_NNETAR	1.00	1.00	1.00	0.50	1.00	1.00	0.25	0.60	0.50	0.40	0.40	0.00	0.50	0.25	0.00
LV_SPLINE	1.00	1.00	1.00	0.75	0.75	1.00	0.25	0.40	0.50	0.20	0.20	0.25	0.00	0.00	0.00
LV_THETA	1.00	1.00	1.00	0.75	1.00	1.00	0.50	0.60	0.50	0.20	0.20	0.50	0.00	0.00	0.00
LV_AR1	1.00	1.00	1.00	0.75	1.00	1.00	0.50	0.60	0.50	0.20	0.20	0.50	0.00	0.00	0.00
LV_ARIMA	1.00	1.00	1.00	0.75	0.75	1.00	0.25	0.40	0.50	0.20	0.20	0.00	0.00	0.00	0.00
LV_TREND	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.60	0.50	0.20	0.40	0.00	0.50	0.25	0.00
LV_REG	0.40	0.25	0.25	0.25	0.00	0.40	0.00	0.20	0.00	0.00	0.20	0.00	0.00	0.00	0.00
LV_RATIO_LAST	0.80	0.50	0.50	0.50	0.75	0.80	0.75	0.40	1.00	0.60	0.80	0.50	1.00	0.75	0.75
LV_RATIO_HAVG	1.00	0.50	0.75	0.75	0.75	1.00	1.00	0.80	1.00	0.80	1.00	0.50	1.00	1.00	1.00
D_NAIVE	1.00	1.00	1.00	0.50	0.75	1.00	0.25	0.40	0.25	0.40	0.20	0.50	0.00	0.00	0.00
D_Avg2	1.00	1.00	1.00	0.75	0.75	1.00	0.00	0.20	0.50	0.20	0.20	0.75	0.00	0.00	0.00
D_Avg4	1.00	1.00	1.00	0.75	0.75	1.00	0.25	0.40	0.50	0.40	0.20	0.25	0.00	0.00	0.00
D_BATS	1.00	1.00	1.00	0.75	0.75	1.00	0.25	0.40	0.50	0.20	0.20	0.00	0.00	0.00	0.00
D_ETS	1.00	1.00	1.00	0.75	0.75	1.00	0.25	0.40	0.50	0.20	0.20	0.50	0.00	0.00	0.00
D_NNETAR	1.00	1.00	0.75	0.75	1.00	1.00	0.50	0.60	0.50	0.20	0.00	0.25	0.00	0.00	0.00
D_SPLINE	1.00	1.00	0.75	0.50	1.00	1.00	0.25	0.40	0.50	0.00	0.20	0.50	0.00	0.00	0.00
D_THETA	1.00	1.00	1.00	0.75	0.75	1.00	0.25	0.40	0.50	0.20	0.20	0.50	0.00	0.00	0.00
D_AR1	1.00	1.00	1.00	0.75	1.00	1.00	0.50	0.60	0.50	0.20	0.20	0.50	0.00	0.00	0.00
D_ARMA	1.00	1.00	1.00	0.75	0.75	1.00	0.25	0.40	0.50	0.20	0.20	0.25	0.00	0.00	0.00
D_TREND	1.00	1.00	1.00	0.75	0.75	1.00	0.25	0.40	0.50	0.00	0.20	0.75	0.00	0.00	0.00
D_REG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_RATIO_LAST	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_RATIO_HAVG	0.60	0.00	0.50	0.00	0.25	0.60	0.50	0.40	0.50	0.60	0.40	0.75	0.00	0.25	1.00
D_RF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_XGBoost	0.20	0.00	0.00	0.00	0.00	0.20	0.00	0.20	0.00	0.20	0.20	0.00	0.00	0.00	0.00
D_GB	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.00	0.00	0.00	0.00
D_KNN	0.20	0.00	0.00	0.00	0.00	0.20	0.00	0.20	0.00	0.00	0.20	0.00	0.00	0.00	0.00
D_Lasso	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_AdaLasso	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_Ridge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_AdaRidge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_ElastNet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_AdaElastNet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 17: ±3% coverage rates for Retail Trade (sts_trtu_a), annual.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	1.00	1.00	0.90	1.00	0.90	0.90	1.00	1.00	1.00	0.75	1.00	0.95	0.50
LV_Avg2	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	0.70	1.00	1.00	0.60
LV_Avg4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.85	1.00	0.95	0.65
LV_BATS	1.00	1.00	1.00	1.00	0.85	1.00	0.90	0.90	1.00	1.00	1.00	0.65	1.00	0.85	0.45
LV_ETS	1.00	1.00	1.00	1.00	0.85	1.00	0.90	0.90	1.00	1.00	1.00	0.65	0.95	0.95	0.50
LV_NNETAR	1.00	1.00	1.00	1.00	0.80	1.00	0.90	0.90	1.00	1.00	1.00	0.65	1.00	0.95	0.50
LV_SPLINE	1.00	1.00	1.00	0.95	0.80	1.00	0.90	0.90	1.00	0.95	0.95	0.60	0.95	0.90	0.40
LV_THETA	1.00	1.00	1.00	1.00	0.90	1.00	0.90	0.90	1.00	1.00	1.00	0.75	1.00	0.95	0.50
LV_AR1	1.00	1.00	1.00	1.00	0.85	1.00	0.90	0.90	1.00	1.00	0.95	0.60	0.90	0.85	0.35
LV_ARIMA	1.00	1.00	1.00	1.00	0.85	1.00	0.90	0.90	1.00	1.00	1.00	0.75	0.95	0.95	0.45
LV_TREND	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	0.95	0.95	0.70
LV_REG	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90	0.60
LV_RATIO_LAST	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00	0.90	0.85	0.75	0.60	0.40
LV_RATIO_HAVG	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.80	0.50
D_NAIVE	1.00	0.90	0.90	0.90	0.75	1.00	0.80	0.90	1.00	0.90	0.90	0.40	0.90	0.75	0.30
D_Avg2	1.00	1.00	0.95	0.95	0.85	1.00	0.90	0.90	1.00	0.95	0.95	0.50	0.95	0.90	0.35
D_Avg4	1.00	1.00	1.00	1.00	0.90	1.00	0.90	0.90	1.00	1.00	1.00	0.60	0.95	0.95	0.40
D_BATS	1.00	1.00	1.00	1.00	0.85	1.00	0.90	0.90	1.00	1.00	1.00	0.65	1.00	0.95	0.50
D_ETS	1.00	1.00	1.00	1.00	0.85	1.00	0.90	0.90	1.00	1.00	1.00	0.75	1.00	0.95	0.50
D_NNETAR	1.00	1.00	1.00	1.00	0.75	1.00	0.90	0.90	1.00	0.95	1.00	0.75	0.95	0.90	0.55
D_SPLINE	1.00	1.00	1.00	1.00	0.80	1.00	0.90	0.90	1.00	0.95	0.90	0.65	0.90	0.90	0.45
D_THETA	1.00	1.00	1.00	1.00	0.85	1.00	0.90	0.90	1.00	1.00	1.00	0.65	1.00	0.95	0.50
D_AR1	1.00	1.00	1.00	1.00	0.85	1.00	0.90	0.90	1.00	1.00	0.95	0.65	0.95	0.85	0.50
D_ARMA	1.00	1.00	1.00	1.00	0.85	1.00	0.90	0.90	1.00	1.00	1.00	0.75	0.95	0.95	0.50
D_TREND	1.00	1.00	1.00	1.00	0.90	1.00	0.90	0.90	1.00	1.00	1.00	0.65	1.00	0.95	0.50
D_REG	0.30	0.70	0.60	0.35	0.25	0.30	0.30	0.30	0.35	0.30	0.35	0.30	0.35	0.35	0.30
D_RATIO_LAST	0.25	0.25	0.30	0.30	0.25	0.30	0.25	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
D_RATIO_HAVG	0.45	0.25	0.20	0.35	0.20	0.35	0.35	0.25	0.40	0.40	0.40	0.40	0.35	0.30	0.30
D_RF	0.65	0.60	0.60	0.55	0.65	0.65	0.65	0.60	0.60	0.50	0.75	0.35	0.75	0.65	0.35
D_XGBoost	0.50	0.50	0.50	0.40	0.55	0.50	0.55	0.55	0.45	0.40	0.60	0.40	0.60	0.70	0.25
D_GB	0.70	0.70	0.70	0.65	0.65	0.70	0.70	0.75	0.65	0.70	0.80	0.50	0.75	0.75	0.35
D_KNN	0.45	0.75	0.55	0.55	0.45	0.45	0.35	0.30	0.35	0.35	0.50	0.40	0.45	0.35	0.40
D_Lasso	1.00	1.00	1.00	1.00	0.90	1.00	0.60	0.85	1.00	0.95	1.00	0.35	1.00	0.80	0.60
D_AdaLasso	1.00	1.00	1.00	1.00	0.90	1.00	0.75	0.85	1.00	0.95	1.00	0.35	0.95	0.75	0.45
D_Ridge	1.00	1.00	1.00	1.00	0.90	1.00	0.80	0.80	1.00	1.00	1.00	0.50	0.95	0.85	0.40
D_AdaRidge	1.00	1.00	1.00	1.00	0.90	1.00	0.75	0.85	1.00	0.95	1.00	0.55	1.00	0.90	0.55
D_ElastNet	1.00	1.00	1.00	1.00	0.90	1.00	0.65	0.85	1.00	0.95	1.00	0.40	1.00	0.75	0.55
D_AdaElastNet	1.00	1.00	1.00	1.00	0.90	1.00	0.75	0.85	1.00	0.95	1.00	0.35	0.95	0.75	0.50

Table 18: $\pm 3\%$ coverage rates for GNI (naidq_10_gdp), quarterly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90	0.95	0.90	1.00	0.80	0.70	0.90
LV_Avg2	1.00	1.00	1.00	1.00	0.95	1.00	0.75	0.75	0.80	0.90	0.95	1.00	0.75	0.75	0.75
LV_Avg4	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90	0.95	0.95	1.00	0.80	0.80	0.80
LV_BATS	1.00	1.00	1.00	1.00	0.95	1.00	0.75	0.80	0.80	0.95	0.90	0.95	0.70	0.65	0.80
LV_ETS	1.00	1.00	1.00	1.00	0.95	1.00	0.75	0.80	0.80	0.90	0.90	0.95	0.70	0.65	0.75
LV_NNETAR	1.00	1.00	1.00	1.00	0.90	1.00	0.80	0.85	0.90	0.90	0.90	0.95	0.80	0.70	0.85
LV_SPLINE	1.00	1.00	1.00	1.00	0.90	1.00	0.80	0.80	0.85	0.90	0.85	0.95	0.75	0.75	0.70
LV_THETA	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90	0.95	0.90	1.00	0.80	0.70	0.90
LV_AR1	1.00	1.00	1.00	1.00	0.95	1.00	0.80	0.85	0.85	0.90	0.90	0.95	0.80	0.75	0.80
LV_ARIMA	1.00	1.00	1.00	1.00	0.95	1.00	0.80	0.80	0.80	0.90	0.90	0.95	0.70	0.65	0.80
LV_TREND	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.95	0.95	0.95	0.95	0.90	0.85	0.95
LV_REG	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	0.95	0.95	0.90	0.90
LV_RATIO_LAST	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90	1.00	0.95	0.90	0.80	0.75	0.85
LV_RATIO_HAVG	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	0.95	0.90	0.85	0.90
D_NAIVE	1.00	1.00	1.00	1.00	0.85	1.00	0.75	0.65	0.65	0.90	0.85	0.95	0.70	0.70	0.75
D_Avg2	1.00	1.00	1.00	1.00	0.90	1.00	0.70	0.75	0.75	0.90	0.85	0.95	0.65	0.60	0.70
D_Avg4	1.00	1.00	1.00	1.00	0.95	1.00	0.85	0.85	0.90	0.95	0.90	0.95	0.80	0.70	0.85
D_BATS	1.00	1.00	1.00	1.00	0.95	1.00	0.75	0.85	0.85	0.90	0.90	0.95	0.70	0.65	0.80
D_ETS	1.00	1.00	1.00	1.00	0.95	1.00	0.80	0.85	0.85	0.90	0.90	0.95	0.70	0.65	0.75
D_NNETAR	1.00	1.00	1.00	1.00	0.90	1.00	0.75	0.70	0.75	0.95	0.90	1.00	0.70	0.70	0.80
D_SPLINE	1.00	1.00	1.00	1.00	0.90	0.95	0.75	0.75	0.75	0.85	0.85	0.90	0.65	0.65	0.75
D_THETA	1.00	1.00	1.00	1.00	0.95	1.00	0.80	0.85	0.85	0.90	0.90	0.95	0.70	0.65	0.80
D_AR1	1.00	1.00	1.00	1.00	0.95	1.00	0.80	0.85	0.85	0.90	0.90	0.95	0.80	0.75	0.80
D_ARMA	1.00	1.00	1.00	1.00	0.95	1.00	0.80	0.80	0.80	0.90	0.90	0.95	0.70	0.65	0.80
D_TREND	1.00	1.00	1.00	1.00	0.95	1.00	0.85	0.85	0.90	0.95	0.90	1.00	0.80	0.70	0.90
D_REG	0.85	0.85	0.90	0.75	0.75	0.85	0.75	0.90	0.85	0.90	0.85	0.90	0.75	0.75	0.85
D_RATIO_LAST	0.75	0.75	0.80	0.80	0.75	0.80	0.75	0.65	0.75	0.85	0.80	0.85	0.70	0.70	0.85
D_RATIO_HAVG	0.85	0.95	0.65	0.20	0.75	0.60	0.75	0.90	0.75	0.90	0.90	0.40	0.85	0.80	0.85
D_RF	0.70	0.70	0.70	0.70	0.70	0.70	0.75	0.75	0.75	0.75	0.70	0.70	0.75	0.75	0.70
D_XGBoost	0.80	0.80	0.80	0.75	0.70	0.60	0.80	0.80	0.70	0.85	0.70	0.70	0.65	0.80	0.75
D_GB	0.75	0.75	0.75	0.75	0.80	0.80	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.70	0.75
D_KNN	0.65	0.65	0.65	0.75	0.65	0.60	0.70	0.75	0.75	0.75	0.65	0.75	0.70	0.75	0.70
D_Lasso	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.85	1.00	0.90	1.00	0.95	0.80	0.85
D_AdaLasso	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.90	1.00	0.90	1.00	0.90	0.85	0.85
D_Ridge	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	0.95	0.85	0.80
D_AdaRidge	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.90	1.00	0.90	0.85	0.80
D_ElastNet	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.85	1.00	0.90	1.00	0.95	0.80	0.85
D_AdaElastNet	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.90	1.00	0.90	1.00	0.90	0.80	0.85

Table 19: ±3% coverage rates for Employment (namq_10_a10_e), quarterly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.85	0.85	0.85	0.85	0.85	0.85	0.65	0.65	0.70	0.65	0.65	0.45	0.65	0.65	0.55
LV_Avg2	0.85	0.85	0.85	0.85	0.85	0.85	0.70	0.70	0.75	0.80	0.75	0.55	0.75	0.60	0.55
LV_Avg4	0.85	0.85	0.85	0.85	0.85	0.85	0.70	0.70	0.70	0.80	0.80	0.60	0.80	0.65	0.50
LV_BATS	0.85	0.85	0.85	0.85	0.85	0.85	0.65	0.65	0.75	0.70	0.70	0.50	0.65	0.60	0.50
LV_ETS	0.85	0.85	0.85	0.85	0.85	0.85	0.65	0.65	0.75	0.70	0.70	0.45	0.65	0.60	0.50
LV_NNETAR	0.85	0.85	0.85	0.85	0.90	0.85	0.65	0.65	0.70	0.50	0.65	0.50	0.65	0.55	0.40
LV_SPLINE	0.85	0.85	0.85	0.85	0.80	0.85	0.70	0.70	0.75	0.65	0.75	0.40	0.75	0.65	0.30
LV_THETA	0.85	0.85	0.85	0.85	0.85	0.85	0.65	0.65	0.70	0.70	0.65	0.50	0.65	0.60	0.50
LV_AR1	0.85	0.85	0.85	0.85	0.85	0.85	0.65	0.65	0.75	0.70	0.70	0.50	0.65	0.65	0.50
LV_ARIMA	0.85	0.85	0.85	0.85	0.85	0.85	0.65	0.65	0.75	0.70	0.70	0.50	0.65	0.65	0.50
LV_TREND	0.85	0.85	0.85	0.85	0.85	0.85	0.65	0.65	0.65	0.70	0.65	0.70	0.60	0.60	0.65
LV_REG	0.90	0.90	0.90	0.95	0.90	0.90	0.90	0.95	0.90	0.90	0.80	0.85	0.80	0.75	0.60
LV_RATIO_LAST	0.90	0.90	0.90	0.90	0.85	0.90	0.90	0.90	0.90	0.80	0.85	0.55	0.80	0.60	0.45
LV_RATIO_HAVG	0.90	0.90	0.90	0.90	0.90	0.90	0.95	0.95	0.95	0.90	0.85	0.80	0.85	0.65	0.60
D_NAIVE	0.85	0.85	0.85	0.85	0.75	0.85	0.65	0.65	0.75	0.70	0.75	0.15	0.65	0.60	0.25
D_Avg2	0.85	0.85	0.85	0.85	0.80	0.85	0.70	0.70	0.70	0.65	0.75	0.25	0.70	0.55	0.25
D_Avg4	0.85	0.85	0.85	0.85	0.80	0.85	0.65	0.65	0.70	0.65	0.65	0.20	0.65	0.55	0.35
D_BATS	0.85	0.85	0.85	0.85	0.85	0.85	0.65	0.65	0.75	0.70	0.70	0.45	0.65	0.65	0.50
D_ETS	0.85	0.85	0.85	0.85	0.85	0.85	0.65	0.65	0.75	0.65	0.70	0.45	0.65	0.65	0.55
D_NNETAR	0.85	0.85	0.85	0.85	0.85	0.85	0.70	0.70	0.75	0.70	0.60	0.40	0.60	0.60	0.40
D_SPLINE	0.85	0.85	0.85	0.85	0.80	0.80	0.75	0.75	0.80	0.70	0.60	0.25	0.65	0.70	0.35
D_THETA	0.85	0.85	0.85	0.85	0.80	0.85	0.65	0.65	0.75	0.65	0.70	0.40	0.65	0.65	0.50
D_AR1	0.85	0.85	0.85	0.85	0.85	0.85	0.65	0.65	0.75	0.70	0.70	0.50	0.65	0.55	0.50
D_ARMA	0.85	0.85	0.85	0.85	0.85	0.85	0.65	0.65	0.75	0.70	0.70	0.40	0.65	0.65	0.50
D_TREND	0.85	0.85	0.85	0.85	0.85	0.85	0.65	0.65	0.70	0.65	0.65	0.40	0.65	0.65	0.50
D_REG	0.50	0.60	0.60	0.55	0.60	0.45	0.40	0.40	0.45	0.50	0.45	0.45	0.40	0.45	0.40
D_RATIO_LAST	0.35	0.40	0.40	0.35	0.40	0.25	0.30	0.35	0.40	0.40	0.40	0.40	0.40	0.35	0.40
D_RATIO_HAVG	0.65	0.60	0.60	0.60	0.60	0.50	0.40	0.40	0.55	0.60	0.50	0.55	0.45	0.60	0.40
D_RF	0.65	0.65	0.70	0.65	0.60	0.65	0.60	0.60	0.70	0.65	0.65	0.40	0.60	0.70	0.50
D_XGBoost	0.45	0.45	0.45	0.50	0.50	0.50	0.50	0.50	0.55	0.45	0.45	0.40	0.45	0.50	0.25
D_GB	0.65	0.60	0.60	0.65	0.70	0.65	0.60	0.60	0.55	0.55	0.70	0.45	0.70	0.70	0.55
D_KNN	0.50	0.55	0.55	0.55	0.55	0.50	0.55	0.55	0.50	0.45	0.50	0.50	0.50	0.45	0.50
D_Lasso	0.90	0.90	0.90	0.90	0.75	0.90	0.85	0.80	0.85	0.70	0.90	0.60	0.85	0.65	0.50
D_AdaLasso	0.85	0.80	0.85	0.85	0.80	0.90	0.85	0.85	0.90	0.75	0.90	0.55	0.80	0.65	0.35
D_Ridge	0.85	0.85	0.90	0.85	0.85	0.80	0.70	0.75	0.85	0.75	0.75	0.60	0.80	0.65	0.55
D_AdaRidge	0.80	0.80	0.85	0.90	0.85	0.80	0.85	0.80	0.80	0.80	0.80	0.65	0.80	0.70	0.55
D_ElastNet	0.85	0.85	0.90	0.95	0.80	0.90	0.80	0.85	0.85	0.75	0.95	0.65	0.85	0.70	0.45
D_AdaElastNet	0.80	0.80	0.90	0.80	0.80	0.90	0.90	0.85	0.85	0.90	0.75	0.90	0.55	0.80	0.60	0.40

Table 20: ±3% coverage rates for GDP (namq_10_gdp), quarterly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.85	0.90	0.90	0.90	0.70	0.95	0.65	0.65	0.65	0.65	0.75	0.40	0.50	0.30	0.55
LV_Avg2	0.85	0.90	0.85	0.90	0.70	0.95	0.70	0.70	0.65	0.70	0.75	0.80	0.65	0.45	0.40
LV_Avg4	0.85	0.90	0.90	0.90	0.85	0.95	0.70	0.70	0.65	0.75	0.75	0.75	0.60	0.50	0.50
LV_BATS	0.85	0.90	0.90	0.90	0.70	0.90	0.75	0.75	0.70	0.60	0.70	0.50	0.50	0.35	0.55
LV_ETS	0.85	0.90	0.90	0.90	0.70	0.95	0.70	0.70	0.70	0.55	0.70	0.45	0.50	0.40	0.50
LV_NNETAR	0.85	0.80	0.80	0.90	0.70	0.95	0.70	0.70	0.65	0.45	0.70	0.40	0.45	0.25	0.25
LV_SPLINE	0.85	0.90	0.90	0.90	0.65	0.90	0.65	0.65	0.65	0.40	0.45	0.35	0.40	0.20	0.35
LV_THETA	0.85	0.90	0.90	0.90	0.70	0.95	0.65	0.70	0.70	0.60	0.70	0.40	0.50	0.40	0.50
LV_AR1	0.85	0.90	0.90	0.90	0.70	0.95	0.65	0.70	0.70	0.65	0.70	0.30	0.50	0.30	0.40
LV_ARIMA	0.85	0.90	0.90	0.90	0.70	0.90	0.70	0.70	0.70	0.65	0.60	0.40	0.55	0.45	0.30
LV_TREND	0.85	0.90	0.90	0.85	0.85	0.95	0.80	0.80	0.80	0.80	0.80	0.80	0.55	0.50	0.50
LV_REG	0.25	0.25	0.25	0.45	0.40	0.25	0.55	0.30	0.30	0.30	0.40	0.25	0.40	0.45	0.30
LV_RATIO_LAST	0.25	0.30	0.30	0.40	0.30	0.25	0.35	0.35	0.30	0.35	0.30	0.25	0.30	0.30	0.30
LV_RATIO_HAVG	0.20	0.20	0.20	0.25	0.35	0.15	0.30	0.20	0.20	0.15	0.25	0.20	0.25	0.25	0.15
D_NAIVE	0.85	0.90	0.90	0.85	0.65	0.85	0.55	0.45	0.50	0.25	0.45	0.20	0.25	0.10	0.25
D_Avg2	0.85	0.90	0.90	0.90	0.65	0.90	0.60	0.60	0.55	0.55	0.45	0.40	0.30	0.20	0.30
D_Avg4	0.85	0.90	0.90	0.85	0.65	0.95	0.55	0.55	0.60	0.50	0.55	0.25	0.30	0.30	0.45
D_BATS	0.85	0.90	0.90	0.90	0.75	0.90	0.65	0.65	0.70	0.45	0.65	0.45	0.40	0.15	0.20
D_ETS	0.85	0.90	0.90	0.90	0.65	0.95	0.60	0.55	0.65	0.65	0.75	0.40	0.40	0.30	0.50
D_NNETAR	0.85	0.80	0.80	0.85	0.65	0.95	0.65	0.55	0.55	0.65	0.60	0.40	0.55	0.25	0.40
D_SPLINE	0.85	0.90	0.90	0.90	0.65	0.95	0.55	0.55	0.55	0.15	0.55	0.30	0.50	0.15	0.15
D_THETA	0.85	0.90	0.90	0.90	0.65	0.95	0.65	0.65	0.65	0.65	0.65	0.35	0.45	0.25	0.50
D_AR1	0.85	0.90	0.90	0.90	0.70	0.90	0.70	0.70	0.70	0.65	0.70	0.50	0.50	0.40	0.40
D_ARMA	0.85	0.90	0.90	0.90	0.70	0.95	0.75	0.75	0.70	0.65	0.65	0.40	0.45	0.35	0.35
D_TREND	0.85	0.90	0.90	0.90	0.70	0.95	0.65	0.65	0.65	0.65	0.65	0.35	0.45	0.25	0.55
D_REG	0.30	0.30	0.40	0.60	0.35	0.25	0.35	0.25	0.30	0.35	0.30	0.30	0.30	0.30	0.30
D_RATIO_LAST	0.25	0.25	0.25	0.40	0.40	0.25	0.25	0.25	0.30	0.25	0.25	0.25	0.25	0.25	0.20
D_RATIO_HAVG	0.20	0.05	0.30	0.65	0.40	0.20	0.35	0.40	0.50	0.05	0.50	0.25	0.05	0.10	0.10
D_RF	0.45	0.45	0.45	0.45	0.50	0.50	0.35	0.35	0.35	0.45	0.35	0.50	0.30	0.25	0.35
D_XGBoost	0.35	0.35	0.35	0.40	0.40	0.30	0.15	0.20	0.20	0.40	0.45	0.40	0.10	0.05	0.40
D_GB	0.45	0.45	0.45	0.50	0.45	0.35	0.35	0.30	0.25	0.35	0.40	0.55	0.25	0.20	0.30
D_KNN	0.55	0.55	0.55	0.60	0.50	0.50	0.50	0.50	0.45	0.45	0.40	0.40	0.45	0.45	0.45
D_Lasso	0.65	0.70	0.65	0.70	0.70	0.65	0.45	0.45	0.50	0.35	0.80	0.35	0.30	0.20	0.35
D_AdaLasso	0.70	0.75	0.75	0.65	0.60	0.70	0.40	0.40	0.40	0.40	0.85	0.30	0.20	0.10	0.35
D_Ridge	0.70	0.75	0.75	0.65	0.65	0.70	0.40	0.40	0.35	0.55	0.55	0.30	0.30	0.25	0.35
D_AdaRidge	0.65	0.65	0.60	0.70	0.60	0.70	0.45	0.40	0.35	0.45	0.70	0.40	0.20	0.20	0.50
D_ElastNet	0.70	0.70	0.70	0.65	0.70	0.70	0.40	0.40	0.45	0.40	0.80	0.40	0.30	0.15	0.35
D_AdaElastNet	0.75	0.75	0.75	0.60	0.60	0.70	0.40	0.35	0.40	0.35	0.85	0.35	0.20	0.15	0.35

Table 21: ±3% coverage rates for Labour in Construction (sts_colb_q), quarterly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	1.00	0.75	0.70	0.88	0.48	0.48	0.72	0.63	0.48	1.00	0.40	0.40	0.33
LV_Avg2	1.00	1.00	1.00	0.78	0.77	0.93	0.47	0.52	0.62	0.67	0.35	1.00	0.38	0.35	0.35
LV_Avg4	1.00	1.00	1.00	0.80	0.80	0.93	0.53	0.50	0.60	0.65	0.38	1.00	0.47	0.40	0.30
LV_BATS	1.00	1.00	1.00	0.80	0.75	0.93	0.45	0.45	0.65	0.55	0.48	1.00	0.28	0.32	0.27
LV_ETS	1.00	1.00	1.00	0.78	0.75	0.92	0.45	0.45	0.65	0.65	0.47	1.00	0.35	0.35	0.25
LV_NNETAR	1.00	1.00	0.98	0.72	0.62	0.90	0.45	0.40	0.63	0.50	0.30	1.00	0.30	0.35	0.25
LV_SPLINE	1.00	1.00	1.00	0.78	0.73	0.90	0.47	0.47	0.57	0.53	0.38	1.00	0.33	0.28	0.25
LV_THETA	1.00	1.00	1.00	0.75	0.70	0.93	0.47	0.52	0.72	0.63	0.47	1.00	0.35	0.40	0.33
LV_AR1	1.00	1.00	1.00	0.77	0.72	0.93	0.43	0.35	0.62	0.68	0.48	1.00	0.32	0.37	0.32
LV_ARIMA	1.00	1.00	1.00	0.77	0.77	0.92	0.45	0.43	0.63	0.62	0.45	1.00	0.35	0.37	0.32
LV_TREND	1.00	1.00	1.00	0.87	0.82	0.97	0.50	0.57	0.67	0.72	0.47	0.92	0.32	0.42	0.38
LV_REG	1.00	1.00	1.00	0.87	0.82	0.97	0.55	0.62	0.73	0.78	0.48	0.72	0.32	0.42	0.37
LV_RATIO_LAST	1.00	1.00	1.00	0.72	0.68	0.90	0.40	0.42	0.57	0.57	0.45	0.93	0.40	0.20	0.32
LV_RATIO_HAVG	1.00	1.00	1.00	0.88	0.80	0.97	0.53	0.48	0.57	0.72	0.47	0.90	0.38	0.28	0.43
D_NAIVE	1.00	1.00	1.00	0.53	0.45	0.63	0.33	0.25	0.57	0.55	0.27	1.00	0.20	0.23	0.18
D_Avg2	1.00	1.00	1.00	0.60	0.63	0.77	0.45	0.50	0.67	0.57	0.32	1.00	0.32	0.35	0.28
D_Avg4	1.00	1.00	1.00	0.75	0.68	0.85	0.43	0.43	0.62	0.58	0.47	1.00	0.38	0.33	0.28
D_BATS	1.00	1.00	1.00	0.80	0.73	0.90	0.45	0.42	0.63	0.50	0.47	1.00	0.33	0.40	0.32
D_ETS	1.00	1.00	1.00	0.75	0.68	0.88	0.45	0.47	0.63	0.63	0.48	1.00	0.35	0.35	0.28
D_NNETAR	1.00	1.00	1.00	0.82	0.68	0.90	0.47	0.48	0.72	0.50	0.43	1.00	0.40	0.33	0.32
D_SPLINE	1.00	1.00	1.00	0.75	0.67	0.87	0.37	0.35	0.53	0.48	0.48	1.00	0.32	0.27	0.25
D_THETA	1.00	1.00	1.00	0.75	0.67	0.88	0.47	0.47	0.63	0.63	0.48	1.00	0.35	0.35	0.28
D_AR1	1.00	1.00	1.00	0.80	0.68	0.93	0.43	0.37	0.62	0.68	0.48	1.00	0.32	0.37	0.32
D_ARMA	1.00	1.00	1.00	0.80	0.73	0.93	0.48	0.37	0.63	0.50	0.50	1.00	0.33	0.37	0.27
D_TREND	1.00	1.00	1.00	0.75	0.70	0.88	0.48	0.48	0.72	0.63	0.48	1.00	0.40	0.40	0.35
D_REG	0.30	0.28	0.25	0.33	0.22	0.48	0.32	0.40	0.33	0.35	0.33	0.35	0.33	0.32	0.30
D_RATIO_LAST	0.17	0.13	0.15	0.20	0.12	0.18	0.27	0.28	0.20	0.18	0.17	0.22	0.17	0.22	0.18
D_RATIO_HAVG	0.22	0.42	0.18	0.37	0.25	0.45	0.37	0.10	0.40	0.37	0.43	0.05	0.18	0.07	0.40
D_RF	0.40	0.38	0.32	0.32	0.35	0.37	0.32	0.33	0.33	0.37	0.37	0.42	0.33	0.32	0.35
D_XGBoost	0.28	0.28	0.27	0.27	0.25	0.27	0.25	0.27	0.33	0.33	0.20	0.32	0.17	0.23	0.23
D_GB	0.50	0.50	0.48	0.38	0.35	0.47	0.40	0.32	0.35	0.40	0.37	0.48	0.37	0.35	0.28
D_KNN	0.32	0.32	0.33	0.38	0.23	0.32	0.35	0.30	0.28	0.28	0.33	0.43	0.35	0.32	0.42
D_Lasso	0.83	0.83	0.83	0.65	0.52	0.75	0.45	0.55	0.55	0.47	0.47	0.75	0.47	0.38	0.40
D_AdaLasso	0.85	0.83	0.80	0.67	0.53	0.73	0.48	0.57	0.52	0.43	0.45	0.75	0.45	0.32	0.38
D_Ridge	0.83	0.83	0.83	0.63	0.58	0.75	0.47	0.57	0.60	0.50	0.50	0.75	0.48	0.38	0.42
D_AdaRidge	0.75	0.75	0.75	0.65	0.48	0.70	0.50	0.55	0.57	0.52	0.48	0.75	0.52	0.37	0.37
D_ElastNet	0.83	0.83	0.83	0.65	0.52	0.75	0.47	0.55	0.57	0.48	0.47	0.75	0.48	0.38	0.38
D_AdaElastNet	0.83	0.85	0.80	0.67	0.53	0.73	0.48	0.57	0.52	0.43	0.47	0.75	0.47	0.32	0.38

Table 22: ±3% coverage rates for Unemployment (ei_lmhu_m), monthly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.97	0.97	0.97	0.95	0.93	0.95	0.80	0.83	0.92	0.87	0.68	0.78	0.62	0.53	0.57
LV_Avg2	0.97	0.97	0.97	0.97	0.93	0.95	0.78	0.83	0.90	0.93	0.70	0.82	0.60	0.53	0.52
LV_Avg4	0.97	0.97	0.97	0.95	0.95	0.95	0.87	0.88	0.95	0.88	0.77	0.87	0.58	0.53	0.57
LV_BATS	0.97	0.97	0.97	0.92	0.93	0.97	0.62	0.77	0.80	0.82	0.55	0.75	0.52	0.47	0.40
LV_ETS	0.97	0.97	0.97	0.95	0.93	0.97	0.68	0.75	0.83	0.82	0.62	0.75	0.52	0.48	0.45
LV_NNETAR	0.97	0.97	0.97	0.92	0.93	0.95	0.72	0.77	0.87	0.78	0.45	0.72	0.45	0.35	0.42
LV_SPLINE	0.97	0.97	0.97	0.93	0.92	0.95	0.70	0.77	0.85	0.78	0.62	0.77	0.53	0.45	0.48
LV_THETA	0.97	0.97	0.97	0.95	0.93	0.95	0.80	0.83	0.92	0.87	0.68	0.78	0.62	0.53	0.57
LV_AR1	0.97	0.97	0.97	0.95	0.93	0.97	0.67	0.78	0.82	0.78	0.57	0.73	0.50	0.47	0.40
LV_ARIMA	0.97	0.97	0.97	0.93	0.93	0.97	0.63	0.75	0.80	0.80	0.60	0.72	0.50	0.48	0.47
LV_TREND	0.97	0.97	0.97	0.95	0.95	0.95	0.83	0.88	0.97	0.97	0.78	0.87	0.65	0.57	0.47
LV_REG	0.73	0.80	0.80	0.77	0.72	0.72	0.75	0.73	0.75	0.72	0.72	0.73	0.70	0.68	0.68
LV_RATIO_LAST	0.57	0.67	0.65	0.52	0.50	0.57	0.53	0.57	0.57	0.57	0.58	0.60	0.48	0.52	0.53
LV_RATIO_HAVG	0.75	0.78	0.77	0.72	0.73	0.75	0.75	0.75	0.75	0.73	0.72	0.73	0.73	0.70	0.68
D_NAIVE	0.97	0.97	0.97	0.92	0.87	0.97	0.48	0.62	0.72	0.72	0.55	0.68	0.43	0.33	0.33
D_Avg2	0.97	0.97	0.97	0.92	0.93	0.97	0.67	0.73	0.82	0.78	0.62	0.75	0.47	0.52	0.45
D_Avg4	0.97	0.97	0.97	0.95	0.93	0.95	0.72	0.78	0.82	0.82	0.63	0.75	0.58	0.47	0.48
D_BATS	0.97	0.97	0.97	0.95	0.93	0.97	0.68	0.80	0.82	0.83	0.62	0.73	0.50	0.48	0.42
D_ETS	0.97	0.97	0.97	0.95	0.93	0.97	0.70	0.82	0.83	0.83	0.65	0.78	0.53	0.47	0.43
D_NNETAR	0.97	0.97	0.97	0.92	0.92	0.97	0.67	0.75	0.83	0.78	0.50	0.78	0.48	0.45	0.47
D_SPLINE	0.97	0.97	0.97	0.88	0.88	0.97	0.53	0.63	0.70	0.68	0.53	0.70	0.37	0.37	0.32
D_THETA	0.97	0.97	0.97	0.95	0.93	0.97	0.70	0.82	0.83	0.83	0.67	0.78	0.55	0.48	0.45
D_AR1	0.97	0.97	0.97	0.95	0.93	0.97	0.67	0.78	0.82	0.80	0.57	0.73	0.53	0.47	0.40
D_ARMA	0.97	0.97	0.97	0.93	0.93	0.97	0.65	0.78	0.82	0.82	0.58	0.73	0.52	0.47	0.48
D_TREND	0.97	0.97	0.97	0.95	0.93	0.95	0.80	0.82	0.90	0.85	0.68	0.77	0.62	0.53	0.57
D_REG	0.58	0.63	0.65	0.52	0.50	0.58	0.53	0.58	0.55	0.53	0.58	0.57	0.52	0.53	0.53
D_RATIO_LAST	0.32	0.38	0.38	0.35	0.32	0.33	0.37	0.28	0.33	0.32	0.30	0.35	0.28	0.30	0.30
D_RATIO_HAVG	0.27	0.62	0.62	0.42	0.47	0.58	0.53	0.45	0.53	0.58	0.48	0.43	0.53	0.50	0.38
D_RF	0.62	0.62	0.62	0.58	0.57	0.62	0.48	0.48	0.52	0.57	0.53	0.58	0.45	0.43	0.47
D_XGBoost	0.50	0.58	0.55	0.53	0.55	0.55	0.48	0.52	0.52	0.52	0.40	0.55	0.47	0.47	0.52
D_GB	0.68	0.67	0.67	0.65	0.60	0.65	0.65	0.67	0.65	0.67	0.60	0.62	0.58	0.52	0.53
D_KNN	0.55	0.55	0.60	0.52	0.45	0.57	0.47	0.50	0.53	0.50	0.50	0.57	0.47	0.43	0.48
D_Lasso	1.00	1.00	1.00	0.98	0.92	1.00	0.97	0.97	0.97	0.92	0.80	0.85	0.72	0.63	0.63
D_AdaLasso	1.00	1.00	1.00	0.98	0.93	1.00	0.93	0.95	0.98	0.92	0.82	0.87	0.70	0.62	0.60
D_Ridge	0.93	0.93	0.93	0.95	0.88	0.93	0.92	0.92	0.93	0.88	0.72	0.80	0.67	0.65	0.63
D_AdaRidge	0.98	1.00	1.00	0.98	0.88	1.00	0.93	0.97	0.97	0.93	0.75	0.82	0.68	0.62	0.62
D_ElastNet	1.00	1.00	1.00	0.98	0.92	1.00	0.97	0.97	0.97	0.92	0.80	0.83	0.70	0.63	0.63
D_AdaElastNet	1.00	1.00	1.00	0.98	0.92	1.00	0.93	0.95	0.98	0.92	0.82	0.87	0.70	0.62	0.62

Table 23: ±3% coverage rates for Producer Prices (sts_inpp_m), monthly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.93	0.93	0.93	0.97	0.17	0.95	0.83	0.78	0.92	0.72	0.67	0.30	0.58	0.43	0.23
LV_Avg2	0.93	0.93	0.93	0.95	0.27	0.93	0.85	0.85	0.90	0.75	0.70	0.30	0.67	0.53	0.30
LV_Avg4	0.93	0.93	0.93	0.93	0.23	0.93	0.83	0.85	0.92	0.82	0.77	0.38	0.72	0.62	0.42
LV_BATS	0.93	0.93	0.93	0.95	0.25	0.95	0.85	0.83	0.88	0.73	0.58	0.30	0.53	0.47	0.18
LV_ETS	0.93	0.93	0.93	0.95	0.23	0.93	0.87	0.88	0.92	0.73	0.67	0.32	0.58	0.48	0.23
LV_NNETAR	0.93	0.93	0.93	0.93	0.15	0.95	0.80	0.83	0.85	0.77	0.60	0.37	0.53	0.48	0.20
LV_SPLINE	0.93	0.93	0.93	0.93	0.18	0.93	0.75	0.73	0.87	0.68	0.58	0.27	0.52	0.45	0.27
LV_THETA	0.93	0.93	0.93	0.95	0.23	0.93	0.87	0.90	0.92	0.73	0.67	0.30	0.57	0.50	0.23
LV_AR1	0.93	0.93	0.93	0.95	0.23	0.95	0.85	0.83	0.92	0.77	0.67	0.27	0.58	0.50	0.22
LV_ARIMA	0.93	0.93	0.93	0.97	0.15	0.93	0.82	0.85	0.88	0.77	0.60	0.35	0.55	0.50	0.23
LV_TREND	0.93	0.93	0.93	0.95	0.27	0.93	0.83	0.85	0.93	0.87	0.80	0.43	0.75	0.63	0.40
LV_REG	0.37	0.35	0.40	0.30	0.23	0.33	0.32	0.40	0.37	0.37	0.37	0.38	0.33	0.30	0.30
LV_RATIO_LAST	0.23	0.25	0.25	0.27	0.15	0.25	0.22	0.25	0.23	0.27	0.28	0.27	0.27	0.25	0.27
LV_RATIO_HAVG	0.40	0.37	0.42	0.42	0.25	0.40	0.45	0.40	0.42	0.45	0.40	0.38	0.40	0.42	0.40
D_NAIVE	0.93	0.95	0.95	0.85	0.15	0.95	0.60	0.62	0.80	0.43	0.37	0.17	0.33	0.25	0.12
D_Avg2	0.93	0.95	0.93	0.93	0.15	0.95	0.72	0.67	0.85	0.55	0.48	0.23	0.45	0.33	0.20
D_Avg4	0.93	0.93	0.93	0.95	0.18	0.95	0.77	0.77	0.87	0.58	0.53	0.27	0.53	0.42	0.20
D_BATS	0.93	0.93	0.93	0.97	0.25	0.95	0.80	0.82	0.88	0.62	0.60	0.37	0.55	0.53	0.30
D_ETS	0.93	0.93	0.93	0.97	0.17	0.95	0.82	0.77	0.90	0.70	0.67	0.28	0.58	0.43	0.23
D_NNETAR	0.93	0.93	0.93	0.97	0.12	0.95	0.80	0.83	0.90	0.70	0.62	0.32	0.55	0.48	0.28
D_SPLINE	0.93	0.93	0.93	0.97	0.17	0.95	0.78	0.73	0.85	0.67	0.63	0.27	0.52	0.45	0.22
D_THETA	0.93	0.93	0.93	0.97	0.17	0.95	0.82	0.77	0.90	0.70	0.67	0.28	0.57	0.43	0.22
D_AR1	0.93	0.93	0.93	0.95	0.25	0.95	0.83	0.83	0.92	0.72	0.65	0.28	0.58	0.48	0.22
D_ARMA	0.93	0.93	0.93	0.97	0.22	0.93	0.83	0.83	0.88	0.73	0.62	0.35	0.57	0.47	0.25
D_TREND	0.93	0.93	0.93	0.97	0.17	0.95	0.83	0.78	0.92	0.72	0.67	0.28	0.57	0.43	0.22
D_REG	0.32	0.28	0.30	0.25	0.12	0.35	0.28	0.30	0.30	0.28	0.28	0.27	0.25	0.23	0.25
D_RATIO_LAST	0.15	0.12	0.12	0.10	0.05	0.10	0.22	0.20	0.22	0.17	0.18	0.15	0.18	0.17	0.17
D_RATIO_HAVG	0.00	0.05	0.23	0.07	0.13	0.07	0.02	0.25	0.12	0.02	0.00	0.03	0.18	0.13	0.02
D_RF	0.23	0.22	0.23	0.20	0.17	0.22	0.18	0.25	0.23	0.18	0.20	0.17	0.18	0.18	0.15
D_XGBoost	0.23	0.20	0.23	0.25	0.20	0.20	0.27	0.22	0.20	0.23	0.25	0.17	0.25	0.23	0.17
D_GB	0.20	0.18	0.22	0.20	0.12	0.25	0.28	0.30	0.27	0.18	0.30	0.27	0.25	0.13	0.22
D_KNN	0.17	0.15	0.20	0.15	0.10	0.18	0.10	0.15	0.18	0.25	0.18	0.17	0.18	0.20	0.22
D_Lasso	0.40	0.40	0.40	0.33	0.15	0.38	0.42	0.45	0.50	0.32	0.23	0.30	0.32	0.22	0.15
D_AdaLasso	0.42	0.42	0.42	0.35	0.15	0.38	0.42	0.42	0.48	0.37	0.22	0.27	0.32	0.25	0.20
D_Ridge	0.33	0.35	0.35	0.35	0.12	0.33	0.28	0.28	0.38	0.35	0.23	0.23	0.32	0.25	0.15
D_AdaRidge	0.32	0.33	0.33	0.28	0.15	0.32	0.30	0.33	0.42	0.28	0.18	0.27	0.28	0.27	0.15
D_ElastNet	0.40	0.40	0.40	0.33	0.15	0.38	0.42	0.45	0.50	0.30	0.23	0.28	0.32	0.23	0.15
D_AdaElastNet	0.42	0.42	0.42	0.35	0.15	0.38	0.42	0.42	0.48	0.37	0.22	0.27	0.32	0.23	0.20

Table 24: ±3% coverage rates for Industrial Production (sts_inpr_m), monthly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.95	0.95	0.95	0.95	0.83	0.87	0.72	0.68	0.83	0.55	0.67	0.43	0.62	0.33	0.25
LV_Avg2	0.95	0.95	0.95	0.98	0.83	0.93	0.75	0.73	0.80	0.62	0.70	0.53	0.75	0.53	0.42
LV_Avg4	0.95	0.95	0.95	0.97	0.90	0.93	0.73	0.75	0.85	0.65	0.80	0.57	0.73	0.50	0.40
LV_BATS	0.95	0.95	0.95	0.98	0.87	0.92	0.73	0.75	0.78	0.63	0.65	0.53	0.65	0.48	0.33
LV_ETS	0.95	0.95	0.95	0.98	0.92	0.95	0.72	0.75	0.85	0.65	0.70	0.52	0.65	0.50	0.33
LV_NNETAR	0.95	0.95	0.95	0.97	0.88	0.95	0.63	0.73	0.82	0.47	0.62	0.43	0.67	0.33	0.27
LV_SPLINE	0.95	0.95	0.95	0.93	0.82	0.87	0.70	0.72	0.83	0.60	0.68	0.48	0.65	0.45	0.30
LV_THETA	0.95	0.95	0.95	0.97	0.90	0.95	0.75	0.78	0.85	0.63	0.68	0.52	0.67	0.45	0.33
LV_AR1	0.95	0.95	0.95	0.97	0.83	0.90	0.70	0.73	0.83	0.62	0.65	0.47	0.65	0.45	0.30
LV_ARIMA	0.95	0.95	0.95	0.98	0.88	0.88	0.72	0.73	0.82	0.62	0.67	0.53	0.67	0.50	0.33
LV_TREND	0.95	0.95	0.95	0.97	0.92	0.95	0.83	0.83	0.92	0.68	0.82	0.55	0.78	0.53	0.43
LV_REG	0.47	0.43	0.45	0.48	0.48	0.45	0.47	0.45	0.43	0.43	0.43	0.43	0.43	0.43	0.42
LV_RATIO_LAST	0.25	0.30	0.27	0.25	0.32	0.28	0.23	0.27	0.27	0.28	0.30	0.28	0.28	0.28	0.23
LV_RATIO_HAVG	0.38	0.43	0.47	0.42	0.50	0.38	0.40	0.40	0.38	0.38	0.42	0.40	0.40	0.38	0.38
D_NAIVE	0.95	0.95	0.93	0.82	0.73	0.77	0.40	0.47	0.67	0.37	0.50	0.22	0.43	0.20	0.15
D_Avg2	0.95	0.95	0.95	0.90	0.75	0.85	0.53	0.53	0.72	0.50	0.58	0.35	0.53	0.32	0.25
D_Avg4	0.95	0.95	0.95	0.93	0.83	0.83	0.58	0.57	0.75	0.52	0.60	0.43	0.57	0.35	0.22
D_BATS	0.95	0.95	0.95	0.98	0.88	0.92	0.75	0.72	0.83	0.63	0.62	0.52	0.62	0.43	0.35
D_ETS	0.95	0.95	0.95	0.95	0.83	0.87	0.72	0.68	0.82	0.57	0.67	0.43	0.60	0.33	0.25
D_NNETAR	0.95	0.95	0.95	0.98	0.85	0.85	0.67	0.67	0.80	0.55	0.62	0.50	0.68	0.40	0.37
D_SPLINE	0.95	0.95	0.95	0.93	0.82	0.85	0.62	0.63	0.78	0.57	0.67	0.43	0.62	0.32	0.25
D_THETA	0.95	0.95	0.95	0.93	0.83	0.87	0.70	0.68	0.82	0.57	0.67	0.43	0.60	0.32	0.25
D_AR1	0.95	0.95	0.95	0.97	0.82	0.90	0.70	0.73	0.83	0.62	0.63	0.47	0.65	0.45	0.28
D_ARMA	0.95	0.95	0.95	0.98	0.83	0.88	0.73	0.73	0.83	0.63	0.63	0.52	0.65	0.47	0.33
D_TREND	0.95	0.95	0.95	0.93	0.83	0.87	0.70	0.68	0.83	0.57	0.67	0.43	0.60	0.32	0.25
D_REG	0.27	0.27	0.28	0.25	0.30	0.27	0.22	0.27	0.27	0.28	0.25	0.27	0.27	0.27	0.22
D_RATIO_LAST	0.18	0.18	0.18	0.18	0.15	0.22	0.13	0.20	0.18	0.18	0.18	0.18	0.17	0.17	0.22
D_RATIO_HAVG	0.25	0.25	0.15	0.23	0.23	0.15	0.25	0.27	0.27	0.30	0.20	0.23	0.20	0.20	0.20
D_RF	0.47	0.47	0.48	0.43	0.47	0.52	0.47	0.47	0.43	0.40	0.42	0.37	0.38	0.35	0.23
D_XGBoost	0.50	0.45	0.48	0.52	0.45	0.48	0.40	0.43	0.38	0.32	0.42	0.33	0.38	0.32	0.28
D_GB	0.55	0.57	0.57	0.55	0.63	0.63	0.57	0.57	0.52	0.42	0.53	0.38	0.53	0.40	0.27
D_KNN	0.30	0.28	0.28	0.30	0.32	0.32	0.28	0.27	0.27	0.28	0.33	0.28	0.28	0.30	0.33
D_Lasso	0.87	0.87	0.87	0.82	0.82	0.77	0.62	0.55	0.73	0.40	0.62	0.43	0.57	0.37	0.28
D_AdaLasso	0.87	0.88	0.87	0.80	0.80	0.75	0.60	0.55	0.75	0.48	0.60	0.45	0.63	0.37	0.27
D_Ridge	0.70	0.70	0.70	0.68	0.75	0.72	0.67	0.58	0.67	0.50	0.58	0.38	0.55	0.35	0.33
D_AdaRidge	0.75	0.80	0.77	0.78	0.77	0.73	0.60	0.58	0.68	0.48	0.62	0.37	0.60	0.37	0.28
D_ElastNet	0.85	0.85	0.82	0.82	0.82	0.77	0.65	0.55	0.75	0.40	0.62	0.43	0.57	0.38	0.28
D_AdaElastNet	0.87	0.88	0.87	0.80	0.80	0.75	0.60	0.55	0.75	0.47	0.63	0.45	0.65	0.37	0.28

Table 25: ±3% coverage rates for Retail Trade (sts_trtu_m), monthly.

10.2 Figures

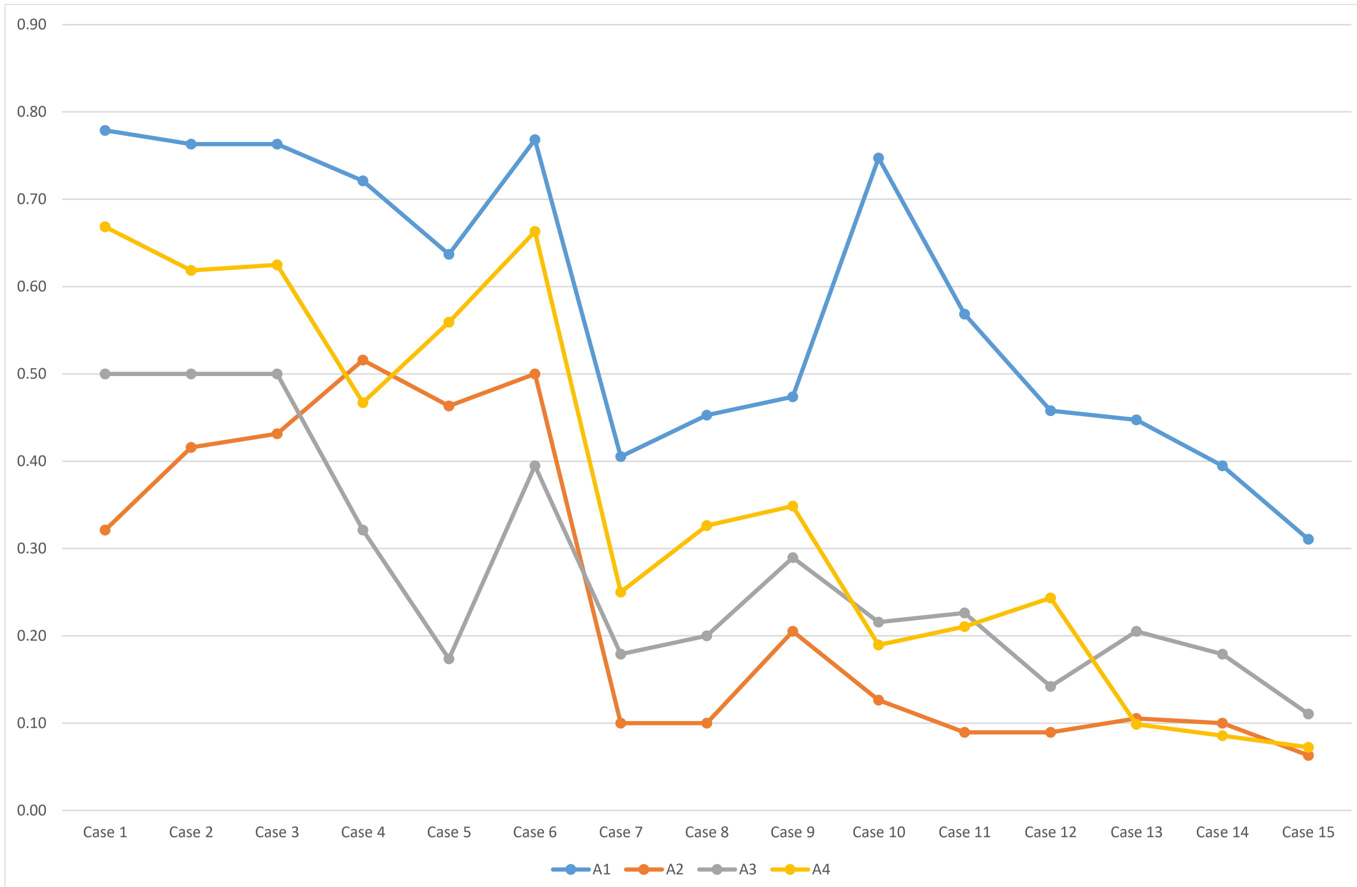

Figure 7: ±3% coverage rates. Averages across all models for various missing value cases. Results for annual series; A1: Employment (lfsi_emp_a), A2: Producer Prices (sts_inpp_a), A3:Industrial Production (sts_inpr_a), A4: Retail Trade (sts_trtu_a).

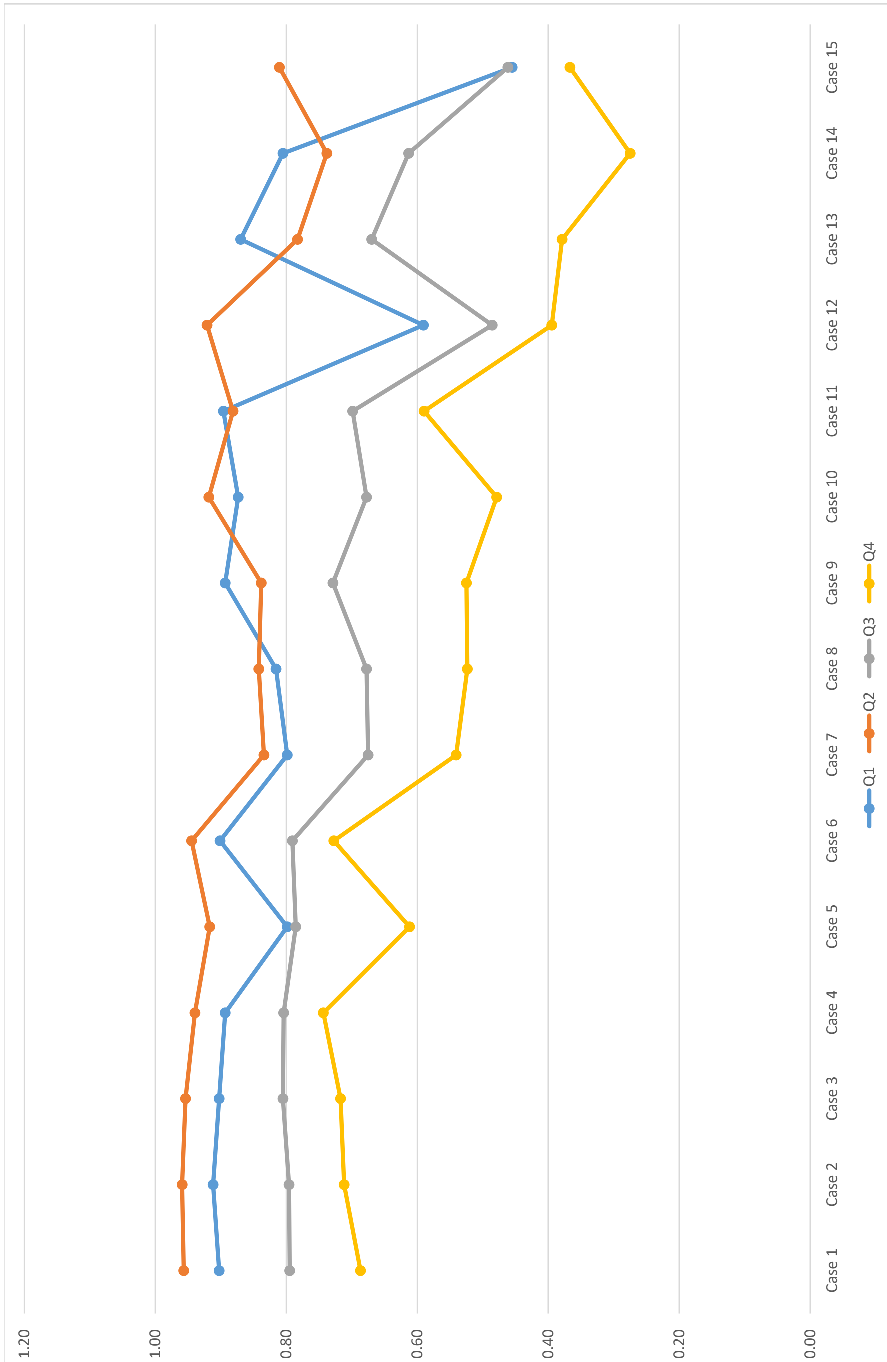

Figure 8: ±3% coverage rates. Averages across all models for various missing value cases. Results for quarterly series; Q1: GNI (naidq_10_gdp), Q2: Employment (namq_10_a10_e), Q3: GDP Level (namq_10_gdp), Q4: Labour in Construction (sts_colb_q).

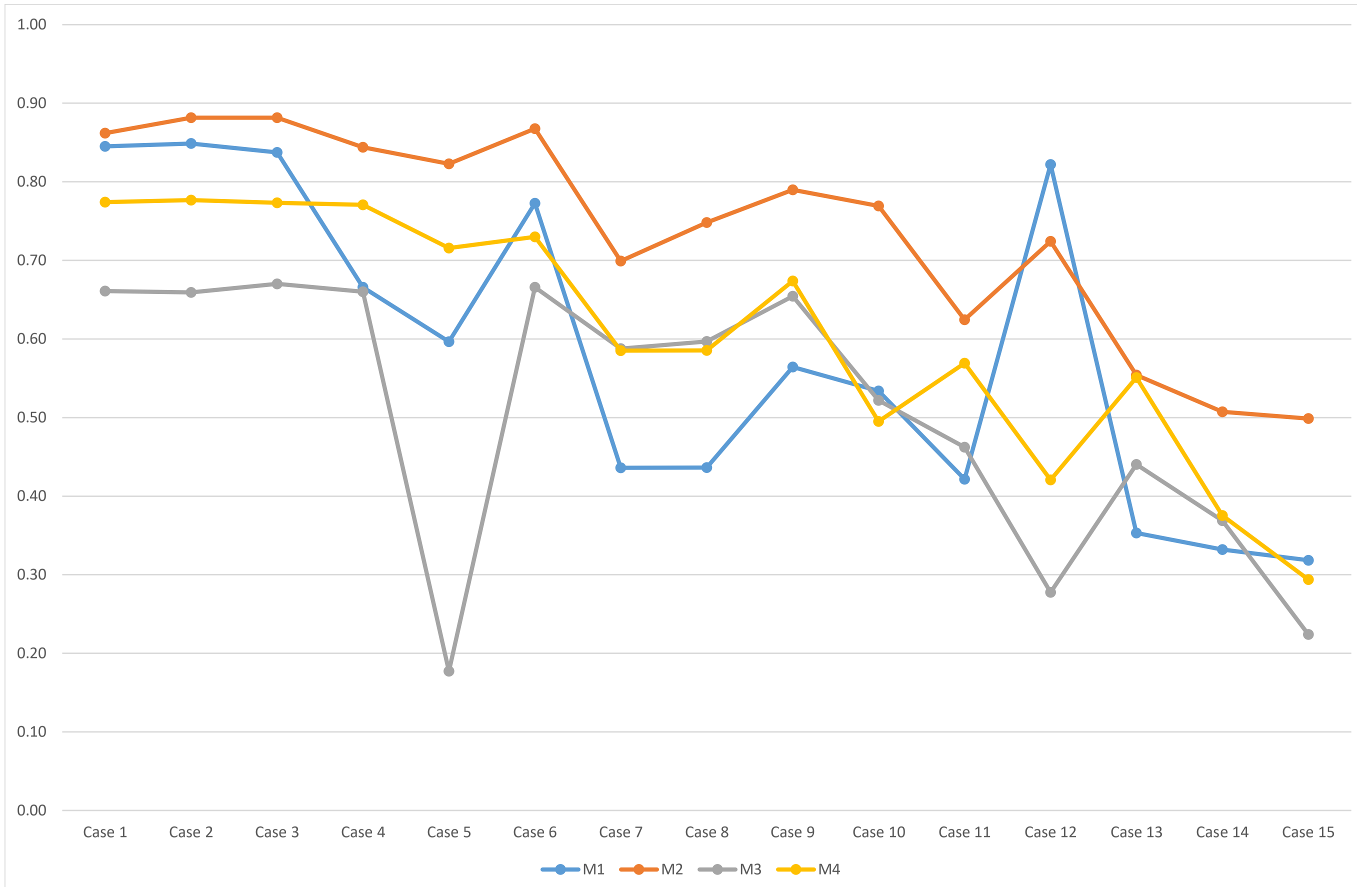

Figure 9: ±3% coverage rates. Averages across all models for various missing value cases. Results for monthly series; M1: Unemployment (ei_lmhu_m), M2: Producer Prices (sts_inpp_m), M3: Industrial Production (sts_inpr_m), M4: Retail Trade (sts_trtu_m).

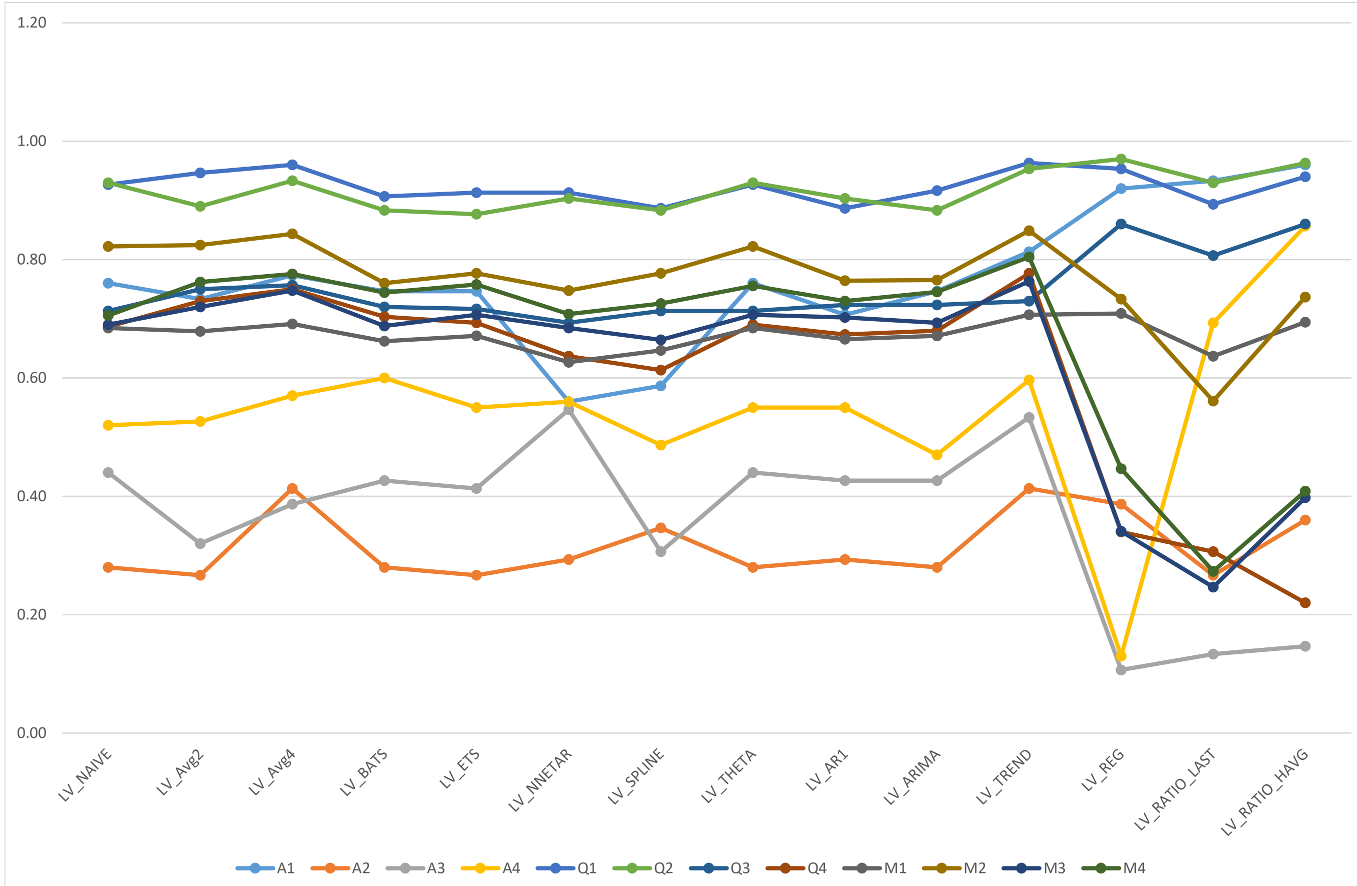

Figure 10: ±3% coverage rates. Averaging across various missing value cases for specific models: univariate time series forecasting in levels. Annual series; A1: Employment (lfsi_emp_a), A2: Producer Prices (sts_inpp_a), A3:Industrial Production (sts_inpr_a), A4: Retail Trade (sts_trtu_a). Quarterly series; Q1: GNI (naidq_10_gdp), Q2: Employment (namq_10_a10_e), Q3: GDP Level (namq_10_gdp), Q4: Labour in Construction (sts_colb_q). Monthly series; M1: Unemployment (ei_lmhu_m), M2: Producer Prices (sts_inpp_m), M3: Industrial Production (sts_inpr_m), M4: Retail Trade (sts_trtu_m).

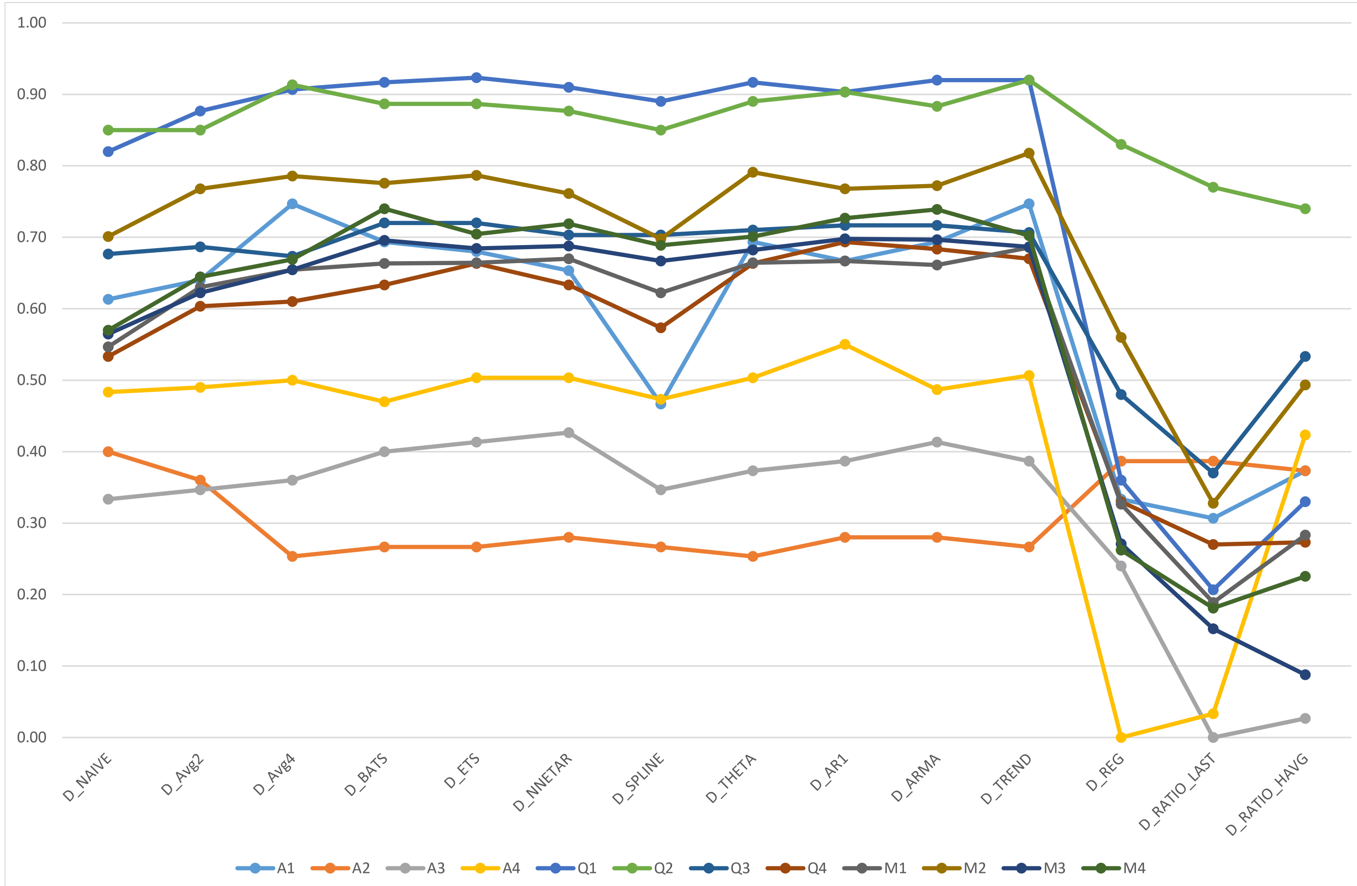

Figure 11: ±3% coverage rates. Averaging across various missing value cases for specific models: univariate time series forecasting in stationary series. Annual series; A1: Employment (lfsi_emp_a), A2: Producer Prices (sts_inpp_a), A3:Industrial Production (sts_inpr_a), A4: Retail Trade (sts_trtu_a). Quarterly series; Q1: GNI (naidq_10_gdp), Q2: Employment (namq_10_a10_e), Q3: GDP Level (namq_10_gdp), Q4: Labour in Construction (sts_colb_q). Monthly series; M1: Unemployment (ei_lmhu_m), M2: Producer Prices (sts_inpp_m), M3: Industrial Production (sts_inpr_m), M4: Retail Trade (sts_trtu_m).

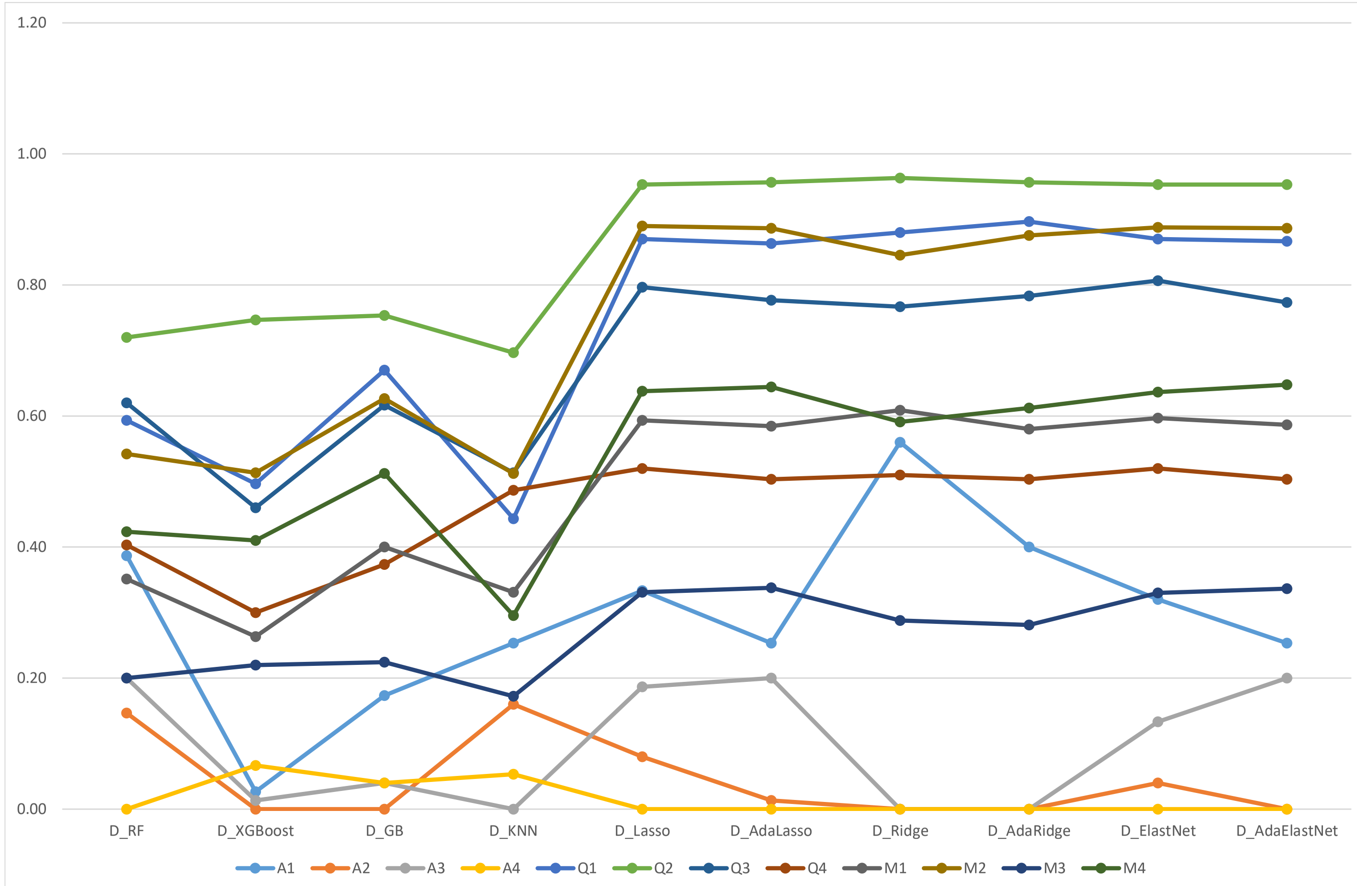

Figure 12: ±3% coverage rates. Averaging across various missing value cases for specific models: machine learning models. Annual series; A1: Employment (lfsi_emp_a), A2: Producer Prices (sts_inpp_a), A3:Industrial Production (sts_inpr_a), A4: Retail Trade (sts_trtu_a). Quarterly series; Q1: GNI (naidq_10_gdp), Q2: Employment (namq_10_a10_e), Q3: GDP Level (namq_10_gdp), Q4: Labour in Construction (sts_colb_q). Monthly series; M1: Unemployment (ei_lmhu_m), M2: Producer Prices (sts_inpp_m), M3: Industrial Production (sts_inpr_m), M4: Retail Trade (sts_trtu_m).

11 Appendix C: ±5% coverage rates

11.1 Tables

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.60	0.80	1.00	1.00	0.60	0.60	0.60	0.60
LV_Avg2	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.80	1.00	1.00	1.00	0.80	0.60	0.40	0.40
LV_Avg4	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.80	1.00	1.00	1.00	0.80	0.80	0.60	0.60
LV_BATS	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.60	0.80	1.00	1.00	0.80	0.60	0.60	0.40
LV_ETS	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.60	0.80	1.00	1.00	0.60	0.60	0.60	0.40
LV_NNETAR	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.40	0.60	0.80	0.80	0.80	0.60	0.20	0.40
LV_SPLINE	1.00	1.00	1.00	1.00	0.80	1.00	0.40	0.40	0.60	1.00	0.80	0.40	0.40	0.40	0.20
LV_THETA	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.60	0.80	1.00	1.00	0.60	0.60	0.60	0.60
LV_AR1	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.60	0.80	1.00	1.00	0.60	0.60	0.60	0.40
LV_ARIMA	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.60	0.80	1.00	1.00	0.60	0.60	0.60	0.60
LV_TREND	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.80	1.00	1.00	1.00	0.80	0.80	0.60	0.60
LV_REG	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.80	0.80
LV_RATIO_LAST	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
LV_RATIO_HAVG	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
D_NAIVE	1.00	1.00	1.00	1.00	0.80	1.00	0.40	0.40	0.60	1.00	0.80	0.60	0.40	0.40	0.20
D_Avg2	1.00	1.00	1.00	1.00	1.00	1.00	0.40	0.60	0.80	1.00	0.80	0.40	0.40	0.40	0.40
D_Avg4	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.60	0.80	1.00	0.80	0.60	0.60	0.60	0.40
D_BATS	1.00	1.00	1.00	1.00	0.80	1.00	0.60	0.60	0.80	1.00	0.80	0.60	0.60	0.60	0.60
D_ETS	1.00	1.00	1.00	1.00	0.80	1.00	0.60	0.60	0.80	1.00	1.00	0.60	0.60	0.60	0.60
D_NNETAR	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.60	0.80	1.00	0.80	1.00	0.60	0.40	0.20
D_SPLINE	1.00	1.00	1.00	0.60	0.60	1.00	0.20	0.40	0.40	0.80	0.60	0.20	0.20	0.20	0.00
D_THETA	1.00	1.00	1.00	1.00	0.80	1.00	0.40	0.60	0.80	1.00	0.80	0.60	0.60	0.60	0.40
D_AR1	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.60	0.80	1.00	0.80	0.80	0.60	0.60	0.20
D_ARMA	1.00	1.00	1.00	1.00	0.80	1.00	0.60	0.60	0.80	1.00	1.00	0.60	0.60	0.40	0.40
D_TREND	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.60	0.80	1.00	0.80	0.60	0.60	0.60	0.40
D_REG	0.80	0.80	0.80	0.80	0.80	0.60	0.60	0.60	0.80	0.80	0.60	0.60	0.60	0.60	0.60
D_RATIO_LAST	0.60	0.60	0.60	0.60	0.20	0.60	0.40	0.60	0.60	0.40	0.60	0.60	0.60	0.60	0.60
D_RATIO_HAVG	0.60	0.60	0.60	0.80	0.00	0.60	0.40	0.80	0.60	0.60	0.80	0.60	0.00	0.00	0.80
D_RF	0.40	0.60	0.40	0.40	0.40	0.40	0.40	0.40	0.60	0.40	0.60	0.40	0.60	0.60	0.60
D_XGBoost	0.00	0.00	0.00	0.40	0.20	0.20	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_GB	0.40	0.40	0.40	0.40	0.20	0.00	0.00	0.00	0.40	0.40	0.40	0.40	0.40	0.40	0.20
D_KNN	0.60	0.40	0.40	0.40	0.60	0.40	0.60	0.60	0.60	0.40	0.40	0.60	0.60	0.60	0.40
D_Lasso	0.40	0.40	0.40	0.80	0.60	0.40	0.40	0.60	0.60	0.40	0.60	0.40	0.60	0.60	0.40
D_AdaLasso	0.40	0.40	0.40	0.80	0.60	0.40	0.40	0.40	0.20	0.40	0.60	0.40	0.60	0.60	0.40
D_Ridge	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
D_AdaRidge	0.60	0.60	0.60	0.60	0.40	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
D_ElastNet	0.60	0.60	0.60	0.80	0.60	0.40	0.40	0.40	0.40	0.40	0.60	0.40	0.60	0.60	0.60
D_AdaElastNet	0.60	0.60	0.60	0.80	0.60	0.40	0.40	0.40	0.40	0.60	0.60	0.40	0.60	0.60	0.40

Table 26: ±5% coverage rates for Employment (lfsi_emp_a), annual.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.80	0.80	0.80	0.80	0.80	0.80	0.00	0.00	0.60	0.40	0.00	0.20	0.00	0.00	0.00
LV_Avg2	0.80	0.80	0.80	1.00	1.00	1.00	0.00	0.00	0.40	0.20	0.00	0.20	0.00	0.00	0.00
LV_Avg4	0.80	0.80	0.80	1.00	1.00	1.00	0.20	0.20	0.40	0.80	0.20	0.20	0.20	0.20	0.20
LV_BATS	0.80	0.80	0.80	0.80	1.00	0.80	0.00	0.40	0.40	0.20	0.20	0.40	0.00	0.00	0.00
LV_ETS	0.80	0.80	0.80	0.80	0.80	0.80	0.00	0.00	0.60	0.40	0.00	0.20	0.00	0.00	0.00
LV_NNETAR	0.80	0.80	0.80	0.80	0.80	0.80	0.20	0.20	0.40	0.40	0.20	0.20	0.00	0.00	0.00
LV_SPLINE	0.80	0.80	0.80	0.60	0.80	0.80	0.20	0.20	0.40	0.20	0.40	0.20	0.40	0.40	0.00
LV_THETA	0.80	0.80	0.80	0.80	0.80	0.80	0.00	0.00	0.60	0.40	0.00	0.20	0.00	0.00	0.00
LV_AR1	0.80	0.80	0.80	0.80	0.80	0.80	0.00	0.20	0.60	0.40	0.00	0.20	0.00	0.00	0.00
LV_ARIMA	0.80	0.80	0.80	0.80	0.80	0.80	0.00	0.00	0.60	0.40	0.00	0.00	0.00	0.00	0.00
LV_TREND	0.80	0.80	0.80	1.00	1.00	1.00	0.20	0.20	0.40	0.60	0.20	0.20	0.20	0.20	0.20
LV_REG	0.40	0.40	0.40	0.40	0.20	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
LV_RATIO_LAST	0.60	0.60	0.60	0.40	0.60	0.60	0.60	0.60	0.60	0.20	0.40	0.20	0.60	0.40	0.20
LV_RATIO_HAVG	0.60	0.60	0.80	0.60	0.60	0.40	0.60	0.80	0.80	0.80	0.60	0.80	0.60	0.60	0.80
D_NAIVE	0.80	0.80	0.80	0.60	0.60	0.80	0.20	0.40	0.40	0.60	0.40	0.60	0.40	0.40	0.20
D_Avg2	0.80	0.80	0.80	0.80	0.80	0.80	0.40	0.40	0.40	0.40	0.00	0.20	0.00	0.00	0.00
D_Avg4	0.80	0.80	0.80	0.80	0.80	0.80	0.00	0.00	0.60	0.60	0.00	0.20	0.00	0.00	0.00
D_BATS	0.80	0.80	0.80	0.80	0.80	0.80	0.00	0.20	0.60	0.40	0.00	0.20	0.00	0.00	0.00
D_ETS	0.80	0.80	0.80	0.80	0.80	0.80	0.00	0.00	0.60	0.60	0.00	0.20	0.00	0.00	0.00
D_NNETAR	0.80	0.80	0.80	0.80	0.80	0.60	0.20	0.20	0.60	0.40	0.20	0.20	0.20	0.00	0.00
D_SPLINE	0.80	0.80	0.80	0.60	0.80	0.80	0.00	0.20	0.40	0.60	0.00	0.20	0.20	0.00	0.00
D_THETA	0.80	0.80	0.80	0.80	0.80	0.80	0.00	0.20	0.60	0.60	0.00	0.20	0.00	0.00	0.00
D_AR1	0.80	0.80	0.80	0.80	0.80	0.80	0.00	0.00	0.60	0.40	0.00	0.20	0.00	0.00	0.00
D_ARMA	0.80	0.80	0.80	0.80	0.80	0.80	0.00	0.00	0.60	0.40	0.00	0.00	0.00	0.00	0.00
D_TREND	0.80	0.80	0.80	0.80	0.80	0.80	0.00	0.20	0.60	0.60	0.00	0.20	0.00	0.00	0.00
D_REG	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
D_RATIO_LAST	0.60	0.60	0.60	0.40	0.40	0.60	0.20	0.60	0.60	0.40	0.40	0.40	0.40	0.40	0.40
D_RATIO_HAVG	0.40	0.40	0.60	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
D_RF	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
D_XGBoost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_GB	0.20	0.00	0.00	0.20	0.20	0.20	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00
D_KNN	0.20	0.20	0.20	0.00	0.20	0.20	0.20	0.40	0.40	0.20	0.20	0.20	0.40	0.20	0.20
D_Lasso	0.20	0.20	0.20	0.00	0.20	0.20	0.40	0.40	0.60	0.20	0.00	0.20	0.40	0.40	0.20
D_AdaLasso	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.40	0.20	0.20	0.20	0.20	0.20	0.00
D_Ridge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_AdaRidge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_ElastNet	0.00	0.20	0.20	0.20	0.00	0.00	0.20	0.40	0.40	0.20	0.00	0.20	0.40	0.40	0.00
D_AdaElastNet	0.20	0.20	0.20	0.20	0.20	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.00

Table 27: ±5% coverage rates for Producer Prices (sts_inpp_a), annual.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	1.00	0.80	0.60	1.00	0.60	0.60	0.60	0.40	0.40	0.20	0.40	0.40	0.20
LV_Avg2	1.00	1.00	1.00	1.00	0.60	1.00	0.40	0.40	0.60	0.60	0.60	0.20	0.20	0.00	0.00
LV_Avg4	1.00	1.00	1.00	0.80	0.40	1.00	0.60	0.60	0.60	0.40	0.60	0.20	0.60	0.40	0.00
LV_BATS	1.00	1.00	1.00	0.60	0.20	1.00	0.60	0.60	0.40	0.40	0.40	0.40	0.40	0.40	0.20
LV_ETS	1.00	1.00	1.00	0.80	0.40	0.80	0.60	0.60	0.60	0.40	0.40	0.20	0.40	0.40	0.20
LV_NNETAR	1.00	1.00	1.00	0.80	0.20	0.80	0.60	0.60	0.60	0.40	0.60	0.40	0.60	0.60	0.20
LV_SPLINE	1.00	0.80	0.80	0.40	0.00	0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.20
LV_THETA	1.00	1.00	1.00	0.80	0.60	0.80	0.60	0.60	0.60	0.40	0.40	0.20	0.40	0.40	0.20
LV_AR1	1.00	1.00	1.00	0.60	0.40	0.80	0.40	0.40	0.60	0.60	0.40	0.20	0.40	0.40	0.20
LV_ARIMA	1.00	1.00	1.00	0.60	0.40	0.80	0.60	0.60	0.60	0.40	0.40	0.20	0.40	0.40	0.20
LV_TREND	1.00	1.00	1.00	1.00	0.40	1.00	0.60	0.60	0.60	0.40	0.60	0.40	0.60	0.60	0.40
LV_REG	0.20	0.20	0.20	0.00	0.20	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
LV_RATIO_LAST	0.20	0.20	0.40	0.40	0.60	0.20	0.20	0.20	0.20	0.20	0.00	0.20	0.00	0.00	0.00
LV_RATIO_HAVG	0.40	0.20	0.20	0.20	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.20	0.20
D_NAIVE	1.00	1.00	0.80	0.40	0.20	0.40	0.40	0.40	0.20	0.20	0.20	0.00	0.20	0.20	0.20
D_Avg2	1.00	1.00	1.00	0.80	0.20	0.80	0.20	0.20	0.60	0.40	0.20	0.00	0.20	0.20	0.00
D_Avg4	1.00	1.00	1.00	0.80	0.20	0.80	0.60	0.60	0.60	0.20	0.40	0.20	0.40	0.40	0.20
D_BATS	1.00	1.00	1.00	0.60	0.40	0.80	0.60	0.60	0.60	0.40	0.40	0.20	0.40	0.40	0.20
D_ETS	1.00	1.00	1.00	0.60	0.60	0.80	0.60	0.60	0.60	0.40	0.40	0.20	0.40	0.40	0.20
D_NNETAR	1.00	1.00	1.00	0.80	0.40	0.80	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
D_SPLINE	1.00	1.00	0.80	0.40	0.00	0.80	0.20	0.20	0.20	0.20	0.40	0.20	0.20	0.20	0.20
D_THETA	1.00	1.00	1.00	0.60	0.20	0.80	0.40	0.60	0.60	0.20	0.40	0.20	0.40	0.40	0.20
D_AR1	1.00	1.00	1.00	0.60	0.20	0.80	0.40	0.60	0.60	0.60	0.40	0.20	0.40	0.40	0.00
D_ARMA	1.00	1.00	1.00	0.60	0.40	0.80	0.60	0.60	0.60	0.40	0.40	0.20	0.40	0.40	0.20
D_TREND	1.00	1.00	1.00	0.80	0.20	0.80	0.40	0.60	0.60	0.20	0.40	0.20	0.40	0.40	0.20
D_REG	0.20	0.20	0.20	0.40	0.60	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
D_RATIO_LAST	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_RATIO_HAVG	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.20
D_RF	0.20	0.20	0.20	0.20	0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.00
D_XGBoost	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00
D_GB	0.00	0.20	0.20	0.20	0.00	0.00	0.20	0.00	0.00	0.00	0.20	0.20	0.20	0.20	0.40
D_KNN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_Lasso	0.20	0.20	0.20	0.20	0.40	0.20	0.20	0.20	0.20	0.40	0.20	0.40	0.40	0.40	0.20
D_AdaLasso	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.40	0.20	0.20	0.20	0.40	0.40
D_Ridge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
D_AdaRidge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_ElastNet	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.40	0.00	0.40	0.40	0.40	0.20
D_AdaElastNet	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.40	0.20	0.40	0.20	0.40	0.20

Table 28: ±5% coverage rates for Industrial Production (sts_inpr_a), annual.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.60	0.50	0.20	0.40	0.75	0.25	0.00	0.00
LV_Avg2	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.60	0.75	0.40	0.40	0.25	0.25	0.25	0.00
LV_Avg4	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.80	0.75	0.20	0.60	0.25	0.50	0.25	0.00
LV_BATS	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.60	0.75	0.40	0.40	0.75	0.25	0.25	0.25
LV_ETS	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.60	0.50	0.20	0.20	0.75	0.25	0.00	0.00
LV_NNETAR	1.00	1.00	1.00	0.75	1.00	1.00	0.50	0.60	0.50	0.40	0.60	0.75	0.50	0.25	0.25
LV_SPLINE	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.60	0.50	0.20	0.40	0.50	0.00	0.00	0.00
LV_THETA	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.60	0.50	0.20	0.20	0.75	0.25	0.00	0.00
LV_AR1	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.60	0.50	0.20	0.20	0.75	0.00	0.00	0.00
LV_ARIMA	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.60	0.75	0.20	0.40	0.50	0.25	0.00	0.00
LV_TREND	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.60	1.00	0.40	0.60	0.25	0.50	0.25	0.00
LV_REG	0.40	0.25	0.25	0.25	0.25	0.40	0.25	0.40	0.25	0.40	0.40	0.25	0.25	0.25	0.25
LV_RATIO_LAST	1.00	0.75	1.00	0.75	1.00	1.00	1.00	0.60	1.00	1.00	1.00	0.50	1.00	1.00	1.00
LV_RATIO_HAVG	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D_NAIVE	1.00	1.00	1.00	0.75	0.75	1.00	0.25	0.40	0.25	0.40	0.40	0.75	0.00	0.00	0.25
D_Avg2	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.60	0.50	0.20	0.20	0.75	0.00	0.00	0.00
D_Avg4	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.60	0.50	0.40	0.40	0.75	0.25	0.00	0.00
D_BATS	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.60	0.50	0.20	0.40	0.50	0.25	0.00	0.00
D_ETS	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.60	0.50	0.20	0.40	0.75	0.25	0.00	0.00
D_NNETAR	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.60	0.50	0.20	0.40	0.75	0.25	0.00	0.00
D_SPLINE	1.00	1.00	1.00	0.75	1.00	1.00	0.25	0.40	0.50	0.20	0.40	0.50	0.25	0.00	0.00
D_THETA	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.40	0.50	0.20	0.40	0.50	0.25	0.00	0.00
D_AR1	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.60	0.50	0.20	0.40	0.75	0.00	0.00	0.00
D_ARMA	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.60	0.50	0.20	0.40	0.75	0.25	0.00	0.00
D_TREND	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.40	0.50	0.20	0.40	0.75	0.25	0.00	0.00
D_REG	0.20	0.00	0.00	0.00	0.00	0.20	0.00	0.20	0.00	0.20	0.20	0.00	0.00	0.00	0.00
D_RATIO_LAST	0.20	0.25	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_RATIO_HAVG	0.60	0.00	0.75	0.50	1.00	0.60	0.50	0.60	0.50	1.00	1.00	0.75	0.25	0.25	1.00
D_RF	0.20	0.00	0.00	0.00	0.00	0.20	0.00	0.20	0.00	0.20	0.20	0.00	0.00	0.00	0.00
D_XGBoost	0.20	0.00	0.00	0.00	0.00	0.20	0.00	0.20	0.00	0.20	0.20	0.00	0.00	0.00	0.00
D_GB	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.00	0.00	0.00	0.00
D_KNN	0.20	0.00	0.00	0.00	0.00	0.20	0.00	0.20	0.00	0.20	0.20	0.00	0.00	0.00	0.00
D_Lasso	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_AdaLasso	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_Ridge	0.20	0.00	0.00	0.00	0.00	0.20	0.00	0.20	0.00	0.20	0.20	0.00	0.00	0.00	0.00
D_AdaRidge	0.20	0.00	0.00	0.00	0.00	0.20	0.00	0.20	0.00	0.20	0.20	0.00	0.00	0.00	0.00
D_ElastNet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D_AdaElastNet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 29: ±5% coverage rates for Retail Trade (sts_trtu_a), annual.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.85
LV_Avg2	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	0.90
LV_Avg4	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	0.90
LV_BATS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.75
LV_ETS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.85
LV_NNETAR	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.80
LV_SPLINE	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	0.70	1.00	1.00	0.70
LV_THETA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.85
LV_AR1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00	1.00	0.65
LV_ARIMA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.85
LV_TREND	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
LV_REG	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	0.95	0.95
LV_RATIO_LAST	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	0.80	0.65
LV_RATIO_HAVG	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	0.85
D_NAIVE	1.00	1.00	0.95	1.00	0.95	1.00	0.90	0.90	1.00	1.00	1.00	0.65	1.00	0.90	0.50
D_Avg2	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	0.65	1.00	1.00	0.65
D_Avg4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00	1.00	0.70
D_BATS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.85
D_ETS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.85
D_NNETAR	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	0.95	0.80
D_SPLINE	1.00	1.00	1.00	1.00	0.90	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00	1.00	0.75
D_THETA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.85
D_AR1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.80
D_ARMA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.85
D_TREND	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.85
D_REG	0.45	0.90	0.80	0.45	0.55	0.50	0.40	0.40	0.45	0.45	0.45	0.45	0.45	0.45	0.45
D_RATIO_LAST	0.30	0.60	0.40	0.30	0.35	0.30	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
D_RATIO_HAVG	0.45	0.40	0.40	0.50	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
D_RF	0.85	0.85	0.85	0.75	0.85	0.85	0.85	0.85	0.80	0.75	0.95	0.65	0.95	1.00	0.65
D_XGBoost	0.65	0.65	0.70	0.75	0.60	0.75	0.75	0.75	0.65	0.55	0.75	0.50	0.70	0.80	0.45
D_GB	0.80	0.85	0.80	0.85	0.80	0.85	0.90	0.90	0.80	0.80	0.80	0.65	0.80	0.80	0.65
D_KNN	0.70	0.80	0.80	0.70	0.75	0.75	0.80	0.75	0.65	0.60	0.80	0.55	0.70	0.75	0.55
D_Lasso	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.55	1.00	1.00	0.90
D_AdaLasso	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.65	1.00	1.00	0.80
D_Ridge	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.65	1.00	1.00	0.90
D_AdaRidge	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00	1.00	0.95
D_ElastNet	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.55	1.00	1.00	0.85
D_AdaElastNet	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.60	1.00	1.00	0.85

Table 30: $\pm5\%$ coverage rates for GNI (naidq_10_gdp), quarterly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.95	0.95	1.00	1.00	0.90	0.90	0.90
LV_Avg2	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00	0.80	0.80	0.85
LV_Avg4	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.95	1.00	1.00	1.00	0.90	0.90	0.90
LV_BATS	1.00	1.00	1.00	1.00	1.00	1.00	0.85	0.85	0.90	0.95	1.00	1.00	0.85	0.80	0.90
LV_ETS	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.85	0.90	0.95	0.95	1.00	0.80	0.75	0.85
LV_NNETAR	1.00	1.00	1.00	1.00	1.00	1.00	0.85	0.90	0.95	0.95	1.00	0.95	0.90	0.85	0.85
LV_SPLINE	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.85	0.90	0.90	0.95	0.95	0.85	0.80	0.85
LV_THETA	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.95	0.95	1.00	1.00	0.90	0.90	0.90
LV_AR1	1.00	1.00	1.00	1.00	1.00	1.00	0.85	0.90	0.90	0.95	0.95	1.00	0.85	0.85	0.85
LV_ARIMA	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.80	0.85	0.90	0.95	1.00	0.80	0.80	0.85
LV_TREND	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	0.95	0.90	0.95
LV_REG	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95
LV_RATIO_LAST	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	0.95	0.95	0.95	0.85
LV_RATIO_HAVG	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	0.95	0.90
D_NAIVE	1.00	1.00	1.00	1.00	0.95	1.00	0.80	0.90	0.90	0.90	0.90	0.95	0.85	0.80	0.85
D_Avg2	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.80	0.90	0.95	0.95	1.00	0.85	0.80	0.85
D_Avg4	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.95	0.95	0.95	1.00	0.90	0.90	0.90
D_BATS	1.00	1.00	1.00	1.00	1.00	1.00	0.85	0.85	0.90	0.90	0.95	1.00	0.85	0.85	0.85
D_ETS	1.00	1.00	1.00	1.00	1.00	1.00	0.85	0.85	0.90	0.95	0.95	1.00	0.85	0.85	0.85
D_NNETAR	1.00	1.00	1.00	1.00	0.95	1.00	0.85	0.90	0.95	0.95	1.00	1.00	0.90	0.90	0.90
D_SPLINE	1.00	1.00	1.00	1.00	0.90	1.00	0.75	0.85	0.85	0.85	0.95	0.90	0.80	0.75	0.80
D_THETA	1.00	1.00	1.00	1.00	1.00	1.00	0.85	0.85	0.90	0.95	0.95	1.00	0.85	0.85	0.85
D_AR1	1.00	1.00	1.00	1.00	1.00	1.00	0.85	0.90	0.90	0.95	0.95	1.00	0.85	0.85	0.85
D_ARMA	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.80	0.85	0.90	0.95	1.00	0.80	0.80	0.85
D_TREND	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.95	0.95	1.00	1.00	0.90	0.90	0.90
D_REG	0.90	0.95	0.95	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
D_RATIO_LAST	1.00	0.95	0.90	0.95	0.80	1.00	0.95	0.85	0.90	1.00	1.00	1.00	0.85	0.85	1.00
D_RATIO_HAVG	0.90	1.00	0.80	0.30	0.95	0.80	0.95	0.95	0.90	0.95	1.00	0.50	0.90	0.90	0.90
D_RF	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.85	0.90	0.90	0.90	0.90	0.90	0.90	0.90
D_XGBoost	0.85	0.85	0.85	0.90	0.90	0.85	0.90	0.90	0.85	0.85	0.85	0.85	0.90	0.90	0.85
D_GB	0.85	0.85	0.85	0.90	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
D_KNN	0.90	0.90	0.85	0.85	0.85	0.85	0.90	0.85	0.85	0.85	0.80	0.85	0.85	0.85	0.85
D_Lasso	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	0.95	1.00
D_AdaLasso	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	0.95	1.00
D_Ridge	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	0.95	1.00
D_AdaRidge	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	0.95	1.00
D_ElastNet	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	0.95	1.00
D_AdaElastNet	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	0.95	1.00

Table 31: ±5% coverage rates for Employment (namq_10_a10_e), quarterly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.80	0.85	0.70	0.75	0.70	0.70	0.65	0.70
LV_Avg2	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.85	0.80	0.85	0.70	0.80	0.70	0.65
LV_Avg4	0.90	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.80	0.80	0.70	0.80	0.80	0.65
LV_BATS	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.80	0.85	0.70	0.80	0.70	0.70	0.65	0.65
LV_ETS	0.90	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.70	0.80	0.70	0.80	0.75	0.65
LV_NNETAR	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.80	0.85	0.60	0.75	0.65	0.70	0.65	0.55
LV_SPLINE	0.90	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.80	0.80	0.60	0.75	0.65	0.55
LV_THETA	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.80	0.85	0.70	0.75	0.70	0.75	0.65	0.65
LV_AR1	0.90	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.75	0.80	0.70	0.75	0.70	0.65
LV_ARIMA	0.90	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.70	0.80	0.70	0.70	0.70	0.65
LV_TREND	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.80	0.85	0.75	0.75	0.75	0.70	0.60	0.75
LV_REG	0.95	0.95	0.95	0.95	0.95	0.95	0.90	0.95	0.95	0.95	0.85	0.90	0.85	0.80	0.80
LV_RATIO_LAST	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.85	0.85	0.80	0.85	0.75	0.70
LV_RATIO_HAVG	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.90	0.90	0.85	0.80
D_NAIVE	0.90	0.90	0.90	0.90	0.85	0.90	0.85	0.85	0.85	0.80	0.75	0.25	0.75	0.65	0.40
D_Avg2	0.90	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.90	0.70	0.75	0.45	0.70	0.60	0.40
D_Avg4	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.80	0.85	0.75	0.80	0.50	0.70	0.60	0.55
D_BATS	0.90	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.70	0.80	0.65	0.75	0.65	0.70
D_ETS	0.90	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.75	0.80	0.70	0.75	0.65	0.70
D_NNETAR	0.90	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.70	0.75	0.65	0.65	0.60	0.60
D_SPLINE	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.85	0.75	0.70	0.70	0.70	0.70	0.60
D_THETA	0.90	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.75	0.80	0.70	0.75	0.65	0.70
D_AR1	0.90	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.75	0.80	0.70	0.80	0.70	0.65
D_ARMA	0.90	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.70	0.80	0.70	0.75	0.70	0.75
D_TREND	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.80	0.85	0.70	0.75	0.70	0.70	0.65	0.70
D_REG	0.75	0.75	0.75	0.65	0.65	0.70	0.60	0.60	0.70	0.70	0.75	0.65	0.75	0.75	0.65
D_RATIO_LAST	0.40	0.50	0.55	0.40	0.55	0.40	0.40	0.45	0.50	0.50	0.50	0.50	0.50	0.50	0.50
D_RATIO_HAVG	0.75	0.70	0.70	0.70	0.70	0.75	0.45	0.75	0.70	0.70	0.70	0.70	0.70	0.70	0.70
D_RF	0.70	0.65	0.70	0.65	0.65	0.65	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
D_XGBoost	0.65	0.65	0.65	0.70	0.65	0.75	0.70	0.70	0.65	0.70	0.65	0.55	0.75	0.65	0.50
D_GB	0.80	0.80	0.80	0.75	0.80	0.75	0.75	0.75	0.75	0.70	0.75	0.65	0.80	0.75	0.65
D_KNN	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.60	0.65	0.60	0.60	0.65	0.60	0.60
D_Lasso	0.90	0.90	0.95	0.95	0.90	0.90	0.90	0.90	0.90	0.85	0.95	0.75	0.85	0.75	0.65
D_AdaLasso	0.95	0.95	0.95	1.00	0.90	0.95	0.90	0.95	0.95	0.80	0.95	0.65	0.85	0.75	0.60
D_Ridge	0.90	0.90	0.95	0.95	0.90	0.90	0.90	0.90	0.90	0.80	0.80	0.70	0.80	0.80	0.65
D_AdaRidge	0.90	0.90	0.95	0.95	0.85	0.90	0.85	0.85	0.85	0.85	0.80	0.70	0.85	0.75	0.65
D_ElastNet	0.95	0.95	0.95	0.95	0.90	0.90	0.95	0.90	0.95	0.80	0.95	0.75	0.85	0.75	0.70
D_AdaElastNet	0.95	0.95	0.95	1.00	0.90	0.95	0.90	0.95	0.95	0.85	0.95	0.65	0.85	0.75	0.65

Table 32: ±5% coverage rates for GDP (namq_10_gdp), quarterly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.95	0.95	0.95	1.00	0.90	0.95	0.75	0.75	0.75	0.80	0.80	0.80	0.60	0.60	0.60
LV_Avg2	0.95	0.95	0.95	0.95	0.90	0.95	0.75	0.75	0.75	0.75	0.80	0.90	0.75	0.55	0.65
LV_Avg4	0.95	0.95	0.95	0.95	0.95	0.95	0.80	0.80	0.85	0.75	0.80	0.90	0.70	0.70	0.65
LV_BATS	0.95	0.95	0.95	1.00	0.90	0.95	0.75	0.80	0.80	0.70	0.80	0.80	0.75	0.60	0.60
LV_ETS	0.95	0.95	0.95	1.00	0.90	0.95	0.80	0.80	0.80	0.75	0.80	0.80	0.75	0.60	0.60
LV_NNETAR	0.95	0.85	0.85	1.00	0.90	0.95	0.80	0.80	0.75	0.50	0.80	0.80	0.65	0.50	0.35
LV_SPLINE	0.95	0.95	0.95	1.00	0.80	0.95	0.70	0.70	0.70	0.60	0.75	0.75	0.60	0.45	0.50
LV_THETA	0.95	0.95	0.95	1.00	0.90	0.95	0.75	0.80	0.75	0.75	0.75	0.80	0.65	0.60	0.60
LV_AR1	0.95	0.95	0.95	1.00	0.90	0.95	0.80	0.80	0.75	0.70	0.75	0.60	0.65	0.55	0.50
LV_ARIMA	0.95	1.00	1.00	1.00	0.90	0.95	0.75	0.80	0.80	0.75	0.70	0.80	0.75	0.60	0.55
LV_TREND	0.95	0.95	0.95	0.95	0.95	0.95	0.85	0.85	0.85	0.85	0.90	0.90	0.85	0.70	0.80
LV_REG	0.65	0.55	0.60	0.70	0.50	0.65	0.70	0.55	0.60	0.55	0.60	0.55	0.60	0.60	0.50
LV_RATIO_LAST	0.55	0.45	0.50	0.65	0.65	0.55	0.55	0.45	0.40	0.40	0.40	0.55	0.35	0.35	0.40
LV_RATIO_HAVG	0.50	0.50	0.55	0.40	0.60	0.55	0.40	0.45	0.55	0.45	0.65	0.45	0.60	0.55	0.50
D_NAIVE	0.95	1.00	0.95	1.00	0.85	0.95	0.70	0.75	0.65	0.50	0.55	0.45	0.35	0.35	0.35
D_Avg2	0.95	0.95	0.95	1.00	0.80	0.95	0.70	0.70	0.75	0.65	0.75	0.75	0.45	0.45	0.50
D_Avg4	0.95	0.95	0.95	1.00	0.90	0.95	0.60	0.65	0.70	0.70	0.75	0.70	0.40	0.35	0.55
D_BATS	0.95	0.95	0.95	1.00	0.85	0.95	0.70	0.80	0.75	0.60	0.70	0.80	0.55	0.45	0.50
D_ETS	0.95	0.95	0.95	1.00	0.90	0.95	0.65	0.75	0.75	0.80	0.85	0.80	0.55	0.65	0.60
D_NNETAR	0.95	0.90	0.90	1.00	0.90	0.95	0.70	0.75	0.75	0.70	0.80	0.80	0.70	0.65	0.55
D_SPLINE	0.95	0.95	0.95	1.00	0.90	0.95	0.65	0.70	0.70	0.35	0.60	0.80	0.55	0.40	0.20
D_THETA	0.95	0.95	0.95	1.00	0.90	0.95	0.65	0.70	0.75	0.80	0.85	0.80	0.55	0.55	0.60
D_AR1	0.95	0.95	0.95	1.00	0.85	0.95	0.75	0.80	0.75	0.75	0.75	0.80	0.65	0.55	0.65
D_ARMA	0.95	0.95	0.95	1.00	0.90	0.95	0.75	0.80	0.80	0.75	0.80	0.80	0.75	0.55	0.65
D_TREND	0.95	0.95	0.95	1.00	0.90	0.95	0.65	0.75	0.75	0.80	0.85	0.80	0.60	0.60	0.60
D_REG	0.60	0.70	0.60	0.70	0.60	0.65	0.55	0.40	0.40	0.55	0.55	0.60	0.40	0.35	0.50
D_RATIO_LAST	0.40	0.40	0.40	0.60	0.60	0.40	0.40	0.45	0.45	0.45	0.50	0.45	0.40	0.35	0.45
D_RATIO_HAVG	0.35	0.10	0.40	0.70	0.60	0.40	0.40	0.55	0.60	0.15	0.60	0.40	0.20	0.20	0.30
D_RF	0.55	0.55	0.55	0.45	0.55	0.55	0.50	0.50	0.50	0.55	0.55	0.55	0.40	0.35	0.55
D_XGBoost	0.45	0.55	0.50	0.55	0.45	0.55	0.30	0.30	0.30	0.60	0.50	0.55	0.30	0.30	0.50
D_GB	0.65	0.65	0.65	0.60	0.60	0.55	0.45	0.40	0.35	0.65	0.55	0.65	0.25	0.25	0.65
D_KNN	0.65	0.65	0.65	0.65	0.60	0.65	0.60	0.60	0.65	0.65	0.65	0.60	0.65	0.65	0.55
D_Lasso	0.90	0.90	0.90	0.80	0.80	0.90	0.55	0.55	0.55	0.55	0.95	0.60	0.50	0.35	0.65
D_AdaLasso	0.90	0.90	0.90	0.80	0.75	0.90	0.65	0.60	0.60	0.55	0.95	0.60	0.50	0.30	0.65
D_Ridge	0.80	0.85	0.85	0.85	0.75	0.85	0.55	0.60	0.55	0.70	0.75	0.55	0.40	0.40	0.45
D_AdaRidge	0.80	0.80	0.80	0.80	0.80	0.80	0.50	0.50	0.50	0.65	0.80	0.65	0.45	0.35	0.65
D_ElastNet	0.90	0.90	0.90	0.90	0.80	0.90	0.50	0.50	0.50	0.55	0.95	0.60	0.50	0.30	0.60
D_AdaElastNet	0.90	0.90	0.90	0.80	0.75	0.90	0.65	0.60	0.60	0.55	0.95	0.60	0.60	0.30	0.65

Table 33: ±5% coverage rates for Labour in Construction (sts_colb_q), quarterly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	1.00	0.97	0.88	0.98	0.75	0.77	0.83	0.83	0.62	1.00	0.55	0.57	0.53
LV_Avg2	1.00	1.00	1.00	0.98	0.90	0.98	0.75	0.73	0.83	0.85	0.62	1.00	0.58	0.55	0.57
LV_Avg4	1.00	1.00	1.00	0.98	0.92	0.98	0.70	0.72	0.73	0.78	0.73	1.00	0.58	0.55	0.62
LV_BATS	1.00	1.00	1.00	0.97	0.92	0.98	0.65	0.63	0.78	0.80	0.63	1.00	0.48	0.52	0.40
LV_ETS	1.00	1.00	1.00	0.95	0.92	0.98	0.65	0.62	0.78	0.78	0.62	1.00	0.53	0.53	0.55
LV_NNETAR	1.00	1.00	1.00	0.92	0.90	0.97	0.63	0.63	0.78	0.63	0.47	1.00	0.40	0.48	0.45
LV_SPLINE	1.00	1.00	1.00	0.97	0.87	0.98	0.65	0.70	0.80	0.75	0.58	1.00	0.50	0.48	0.42
LV_THETA	1.00	1.00	1.00	0.97	0.88	0.98	0.78	0.77	0.83	0.83	0.63	1.00	0.57	0.57	0.57
LV_AR1	1.00	1.00	1.00	0.97	0.90	0.98	0.68	0.63	0.78	0.83	0.63	1.00	0.55	0.55	0.53
LV_ARIMA	1.00	1.00	1.00	0.95	0.92	0.98	0.63	0.63	0.78	0.77	0.62	1.00	0.53	0.60	0.52
LV_TREND	1.00	1.00	1.00	0.98	0.93	1.00	0.75	0.77	0.78	0.87	0.80	1.00	0.60	0.55	0.60
LV_REG	1.00	1.00	1.00	0.97	0.95	1.00	0.75	0.80	0.83	0.85	0.77	0.88	0.65	0.55	0.62
LV_RATIO_LAST	1.00	1.00	1.00	0.95	0.87	0.98	0.65	0.65	0.78	0.82	0.65	0.98	0.58	0.35	0.37
LV_RATIO_HAVG	1.00	1.00	1.00	0.98	0.97	1.00	0.73	0.77	0.85	0.87	0.85	0.97	0.72	0.45	0.62
D_NAIVE	1.00	1.00	1.00	0.75	0.65	0.83	0.53	0.53	0.77	0.73	0.42	1.00	0.38	0.38	0.30
D_Avg2	1.00	1.00	1.00	0.88	0.80	0.95	0.65	0.63	0.75	0.78	0.48	1.00	0.42	0.43	0.47
D_Avg4	1.00	1.00	1.00	0.93	0.80	0.98	0.68	0.65	0.83	0.75	0.58	1.00	0.50	0.50	0.43
D_BATS	1.00	1.00	1.00	0.93	0.92	0.98	0.65	0.63	0.80	0.68	0.58	1.00	0.52	0.55	0.48
D_ETS	1.00	1.00	1.00	0.97	0.90	0.98	0.65	0.60	0.78	0.82	0.62	1.00	0.52	0.53	0.52
D_NNETAR	1.00	1.00	1.00	0.95	0.92	0.95	0.68	0.62	0.80	0.68	0.72	1.00	0.63	0.42	0.43
D_SPLINE	1.00	1.00	1.00	0.95	0.90	0.98	0.62	0.47	0.70	0.65	0.62	1.00	0.50	0.43	0.38
D_THETA	1.00	1.00	1.00	0.97	0.90	0.98	0.65	0.60	0.78	0.82	0.62	1.00	0.52	0.52	0.52
D_AR1	1.00	1.00	1.00	0.97	0.90	0.98	0.67	0.62	0.80	0.83	0.62	1.00	0.53	0.57	0.53
D_ARMA	1.00	1.00	1.00	0.95	0.92	0.98	0.70	0.67	0.82	0.72	0.62	1.00	0.53	0.55	0.42
D_TREND	1.00	1.00	1.00	0.97	0.88	0.98	0.73	0.75	0.83	0.83	0.62	1.00	0.55	0.57	0.53
D_REG	0.52	0.40	0.38	0.52	0.42	0.55	0.50	0.57	0.48	0.48	0.52	0.50	0.48	0.48	0.52
D_RATIO_LAST	0.27	0.30	0.32	0.32	0.15	0.32	0.40	0.37	0.27	0.28	0.30	0.32	0.27	0.28	0.28
D_RATIO_HAVG	0.38	0.57	0.30	0.58	0.32	0.57	0.52	0.13	0.53	0.48	0.58	0.07	0.35	0.08	0.57
D_RF	0.57	0.57	0.57	0.52	0.53	0.57	0.52	0.50	0.52	0.53	0.53	0.58	0.48	0.48	0.45
D_XGBoost	0.47	0.42	0.40	0.45	0.42	0.42	0.53	0.45	0.43	0.48	0.42	0.48	0.35	0.38	0.42
D_GB	0.62	0.63	0.58	0.60	0.53	0.67	0.57	0.62	0.58	0.55	0.57	0.62	0.53	0.43	0.42
D_KNN	0.47	0.47	0.48	0.48	0.38	0.47	0.53	0.48	0.48	0.55	0.53	0.57	0.48	0.45	0.57
D_Lasso	0.93	0.93	0.93	0.85	0.83	0.90	0.70	0.70	0.83	0.70	0.63	0.93	0.60	0.55	0.57
D_AdaLasso	0.93	0.93	0.93	0.83	0.83	0.92	0.68	0.72	0.85	0.77	0.65	0.92	0.60	0.52	0.58
D_Ridge	0.93	0.93	0.95	0.87	0.83	0.90	0.72	0.72	0.85	0.72	0.62	0.95	0.62	0.53	0.58
D_AdaRidge	0.92	0.92	0.92	0.83	0.82	0.90	0.72	0.70	0.83	0.73	0.60	0.93	0.63	0.55	0.57
D_ElastNet	0.93	0.93	0.93	0.87	0.85	0.90	0.72	0.70	0.83	0.72	0.63	0.93	0.62	0.55	0.57
D_AdaElastNet	0.93	0.93	0.93	0.83	0.83	0.92	0.68	0.72	0.85	0.77	0.65	0.92	0.60	0.52	0.58

Table 34: ±5% coverage rates for Unemployment (ei_lmhu_m), monthly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	1.00	1.00	1.00	0.98	1.00	1.00	0.93	0.97	1.00	0.98	0.78	0.95	0.73	0.72	0.70
LV_Avg2	1.00	1.00	1.00	0.98	1.00	1.00	0.93	0.98	1.00	1.00	0.83	0.90	0.78	0.72	0.72
LV_Avg4	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.97	1.00	0.98	0.85	0.93	0.82	0.68	0.67
LV_BATS	1.00	1.00	1.00	0.98	1.00	1.00	0.87	0.93	0.98	0.95	0.75	0.88	0.65	0.60	0.62
LV_ETS	1.00	1.00	1.00	0.97	1.00	1.00	0.87	0.93	0.97	0.95	0.77	0.88	0.68	0.62	0.62
LV_NNETAR	1.00	1.00	1.00	0.98	1.00	1.00	0.85	0.93	0.98	0.92	0.62	0.90	0.63	0.52	0.58
LV_SPLINE	1.00	1.00	1.00	0.97	1.00	1.00	0.90	0.90	0.97	0.97	0.78	0.88	0.67	0.62	0.62
LV_THETA	1.00	1.00	1.00	0.98	1.00	1.00	0.93	0.97	1.00	0.98	0.78	0.95	0.73	0.72	0.70
LV_AR1	1.00	1.00	1.00	0.98	1.00	1.00	0.90	0.93	0.97	0.93	0.75	0.88	0.70	0.65	0.62
LV_ARIMA	1.00	1.00	1.00	0.97	1.00	1.00	0.87	0.92	0.98	0.95	0.75	0.85	0.67	0.63	0.65
LV_TREND	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.97	0.98	0.97	0.88	0.93	0.80	0.75	0.67
LV_REG	0.87	0.87	0.87	0.90	0.80	0.85	0.87	0.85	0.88	0.83	0.87	0.85	0.85	0.82	0.83
LV_RATIO_LAST	0.73	0.80	0.80	0.70	0.68	0.73	0.73	0.72	0.75	0.75	0.75	0.75	0.72	0.70	0.68
LV_RATIO_HAVG	0.85	0.92	0.90	0.93	0.83	0.83	0.90	0.87	0.87	0.87	0.83	0.88	0.83	0.80	0.80
D_NAIVE	1.00	1.00	1.00	0.97	0.98	1.00	0.83	0.85	0.88	0.88	0.65	0.88	0.62	0.55	0.52
D_Avg2	1.00	1.00	1.00	0.97	1.00	1.00	0.87	0.92	0.97	0.93	0.73	0.88	0.63	0.62	0.58
D_Avg4	1.00	1.00	1.00	0.97	1.00	1.00	0.88	0.92	0.97	0.97	0.75	0.90	0.70	0.63	0.62
D_BATS	1.00	1.00	1.00	0.97	1.00	1.00	0.88	0.93	0.98	0.95	0.73	0.87	0.65	0.62	0.62
D_ETS	1.00	1.00	1.00	0.97	1.00	1.00	0.88	0.90	0.97	0.93	0.75	0.88	0.68	0.63	0.65
D_NNETAR	1.00	1.00	1.00	0.98	1.00	1.00	0.83	0.90	0.98	0.88	0.65	0.90	0.60	0.60	0.68
D_SPLINE	1.00	1.00	1.00	0.97	1.00	1.00	0.77	0.82	0.88	0.90	0.68	0.83	0.62	0.47	0.55
D_THETA	1.00	1.00	1.00	0.97	1.00	1.00	0.88	0.90	0.97	0.93	0.75	0.87	0.68	0.63	0.65
D_AR1	1.00	1.00	1.00	0.98	1.00	1.00	0.88	0.93	0.97	0.93	0.75	0.88	0.70	0.65	0.62
D_ARMA	1.00	1.00	1.00	0.98	1.00	1.00	0.87	0.93	0.98	0.93	0.73	0.87	0.68	0.63	0.65
D_TREND	1.00	1.00	1.00	0.98	1.00	1.00	0.93	0.97	1.00	0.98	0.78	0.95	0.73	0.72	0.68
D_REG	0.77	0.78	0.78	0.77	0.68	0.77	0.72	0.75	0.77	0.75	0.75	0.77	0.75	0.70	0.72
D_RATIO_LAST	0.47	0.55	0.55	0.45	0.55	0.48	0.48	0.48	0.48	0.45	0.42	0.48	0.43	0.40	0.40
D_RATIO_HAVG	0.43	0.78	0.80	0.75	0.65	0.73	0.75	0.65	0.68	0.70	0.58	0.60	0.75	0.68	0.63
D_RF	0.68	0.68	0.68	0.68	0.68	0.68	0.67	0.68	0.70	0.72	0.68	0.68	0.67	0.70	0.67
D_XGBoost	0.72	0.70	0.72	0.70	0.72	0.73	0.68	0.67	0.72	0.72	0.68	0.77	0.65	0.65	0.73
D_GB	0.77	0.75	0.77	0.77	0.73	0.80	0.72	0.72	0.72	0.75	0.72	0.75	0.67	0.72	0.73
D_KNN	0.67	0.70	0.68	0.70	0.65	0.65	0.65	0.63	0.68	0.67	0.67	0.68	0.65	0.65	0.65
D_Lasso	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.83	0.98	0.80	0.78	0.73
D_AdaLasso	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.83	0.98	0.80	0.80	0.75
D_Ridge	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.97	0.87	0.93	0.82	0.77	0.75
D_AdaRidge	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.85	0.97	0.82	0.77	0.77
D_ElastNet	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.83	0.98	0.82	0.80	0.73
D_AdaElastNet	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.83	0.98	0.80	0.80	0.75

Table 35: ±5% coverage rates for Producer Prices (sts_inpp_m), monthly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.95	0.95	0.95	0.97	0.25	0.97	0.95	0.93	0.95	0.88	0.83	0.48	0.77	0.65	0.40
LV_Avg2	0.95	0.95	0.95	0.95	0.38	0.95	0.95	0.93	0.95	0.90	0.85	0.50	0.85	0.72	0.45
LV_Avg4	0.95	0.95	0.95	0.95	0.37	0.95	0.90	0.90	0.95	0.92	0.85	0.57	0.82	0.77	0.52
LV_BATS	0.95	0.95	0.95	0.97	0.32	0.97	0.93	0.93	0.95	0.90	0.72	0.48	0.70	0.63	0.38
LV_ETS	0.95	0.95	0.95	0.97	0.33	0.97	0.95	0.95	0.95	0.88	0.83	0.50	0.77	0.67	0.40
LV_NNETAR	0.95	0.95	0.95	0.97	0.28	0.97	0.95	0.92	0.92	0.88	0.78	0.45	0.75	0.67	0.38
LV_SPLINE	0.95	0.95	0.95	0.97	0.27	0.97	0.90	0.90	0.92	0.85	0.72	0.43	0.70	0.67	0.40
LV_THETA	0.95	0.95	0.95	0.97	0.33	0.97	0.95	0.95	0.95	0.90	0.83	0.48	0.77	0.68	0.40
LV_AR1	0.95	0.95	0.95	0.97	0.35	0.97	0.95	0.95	0.95	0.90	0.78	0.48	0.75	0.65	0.42
LV_ARIMA	0.95	0.95	0.95	0.97	0.23	0.97	0.95	0.95	0.95	0.88	0.75	0.48	0.70	0.65	0.45
LV_TREND	0.95	0.95	0.95	0.95	0.45	0.95	0.92	0.92	0.95	0.92	0.87	0.65	0.87	0.80	0.57
LV_REG	0.48	0.47	0.48	0.50	0.32	0.50	0.48	0.50	0.48	0.50	0.52	0.50	0.47	0.48	0.48
LV_RATIO_LAST	0.38	0.33	0.37	0.37	0.22	0.40	0.38	0.37	0.38	0.40	0.42	0.40	0.42	0.42	0.42
LV_RATIO_HAVG	0.58	0.53	0.57	0.57	0.38	0.55	0.52	0.58	0.60	0.58	0.58	0.57	0.58	0.60	0.58
D_NAIVE	0.95	0.95	0.95	0.95	0.22	0.95	0.83	0.82	0.90	0.63	0.55	0.30	0.58	0.40	0.22
D_Avg2	0.95	0.95	0.95	0.95	0.20	0.97	0.87	0.88	0.93	0.75	0.68	0.37	0.63	0.53	0.30
D_Avg4	0.95	0.95	0.95	0.97	0.25	0.97	0.88	0.88	0.93	0.80	0.70	0.47	0.63	0.57	0.32
D_BATS	0.95	0.95	0.95	0.97	0.32	0.97	0.92	0.92	0.95	0.87	0.78	0.48	0.73	0.63	0.38
D_ETS	0.95	0.95	0.95	0.97	0.25	0.97	0.93	0.92	0.95	0.87	0.83	0.48	0.77	0.65	0.38
D_NNETAR	0.95	0.95	0.95	0.97	0.22	0.97	0.92	0.92	0.93	0.85	0.72	0.47	0.73	0.62	0.45
D_SPLINE	0.95	0.95	0.95	0.97	0.23	0.97	0.88	0.87	0.90	0.83	0.78	0.48	0.75	0.63	0.38
D_THETA	0.95	0.95	0.95	0.97	0.23	0.97	0.93	0.92	0.95	0.87	0.82	0.47	0.77	0.65	0.38
D_AR1	0.95	0.95	0.95	0.97	0.33	0.97	0.95	0.95	0.95	0.90	0.78	0.47	0.73	0.67	0.42
D_ARMA	0.95	0.95	0.95	0.97	0.28	0.97	0.95	0.95	0.95	0.87	0.75	0.48	0.70	0.65	0.45
D_TREND	0.95	0.95	0.95	0.97	0.23	0.97	0.95	0.93	0.95	0.88	0.82	0.48	0.77	0.65	0.38
D_REG	0.47	0.38	0.38	0.40	0.20	0.45	0.38	0.42	0.42	0.43	0.42	0.42	0.42	0.42	0.40
D_RATIO_LAST	0.25	0.30	0.23	0.18	0.08	0.27	0.27	0.28	0.30	0.23	0.28	0.22	0.28	0.27	0.22
D_RATIO_HAVG	0.00	0.08	0.37	0.08	0.23	0.18	0.07	0.40	0.17	0.03	0.02	0.03	0.22	0.20	0.03
D_RF	0.30	0.30	0.30	0.32	0.27	0.28	0.30	0.30	0.30	0.32	0.25	0.23	0.28	0.23	0.23
D_XGBoost	0.33	0.35	0.35	0.33	0.25	0.28	0.37	0.33	0.30	0.28	0.35	0.23	0.32	0.35	0.25
D_GB	0.40	0.40	0.42	0.42	0.23	0.40	0.38	0.42	0.43	0.35	0.35	0.37	0.38	0.25	0.30
D_KNN	0.27	0.27	0.28	0.22	0.20	0.27	0.25	0.22	0.28	0.30	0.27	0.18	0.28	0.25	0.25
D_Lasso	0.55	0.55	0.55	0.50	0.25	0.55	0.53	0.55	0.60	0.63	0.37	0.38	0.43	0.45	0.28
D_AdaLasso	0.55	0.55	0.57	0.53	0.23	0.58	0.53	0.57	0.58	0.65	0.40	0.43	0.43	0.43	0.27
D_Ridge	0.55	0.53	0.53	0.45	0.22	0.57	0.50	0.55	0.52	0.55	0.40	0.37	0.45	0.38	0.28
D_AdaRidge	0.53	0.52	0.52	0.43	0.23	0.48	0.48	0.52	0.55	0.53	0.38	0.37	0.40	0.42	0.27
D_ElastNet	0.53	0.53	0.57	0.50	0.25	0.55	0.53	0.55	0.60	0.63	0.38	0.40	0.42	0.45	0.28
D_AdaElastNet	0.55	0.55	0.57	0.53	0.25	0.58	0.53	0.57	0.58	0.65	0.40	0.43	0.43	0.47	0.28

Table 36: ±5% coverage rates for Industrial Production (sts_inpr_m), monthly.

Model	MT	MT, LU	MT, LU, HR	MT, SK, CZ, EL	MT, EL, IE, DK	MT, AT	EL, AT, NL, ES	AT, NL, ES	ES	FR	IT	DE	ES, IT	ES, IT, FR	IT, FR, DE
LV_NAIVE	0.97	0.97	0.97	0.98	0.92	0.92	0.82	0.82	0.92	0.70	0.78	0.57	0.75	0.58	0.42
LV_Avg2	0.97	0.97	0.98	0.98	0.95	0.95	0.78	0.82	0.92	0.75	0.82	0.70	0.80	0.72	0.57
LV_Avg4	0.97	0.97	0.98	0.98	0.98	0.95	0.83	0.83	0.93	0.83	0.88	0.67	0.83	0.77	0.55
LV_BATS	0.97	0.97	0.97	0.98	0.97	0.95	0.78	0.85	0.88	0.77	0.73	0.65	0.73	0.65	0.52
LV_ETS	0.97	0.97	0.97	0.98	0.97	0.95	0.82	0.83	0.92	0.80	0.80	0.68	0.75	0.70	0.50
LV_NNETAR	0.97	0.97	0.97	0.98	0.93	0.97	0.80	0.85	0.90	0.65	0.67	0.53	0.73	0.50	0.43
LV_SPLINE	0.97	0.97	0.97	0.98	0.92	0.92	0.82	0.82	0.87	0.68	0.78	0.65	0.75	0.60	0.47
LV_THETA	0.97	0.97	0.97	0.98	0.97	0.95	0.83	0.85	0.92	0.80	0.78	0.70	0.78	0.65	0.48
LV_AR1	0.97	0.97	0.97	0.98	0.93	0.95	0.83	0.85	0.92	0.72	0.80	0.67	0.75	0.63	0.50
LV_ARIMA	0.97	0.97	0.97	0.98	0.97	0.97	0.83	0.83	0.88	0.72	0.77	0.68	0.77	0.65	0.45
LV_TREND	0.97	0.97	0.98	0.98	0.97	0.98	0.85	0.85	0.93	0.82	0.87	0.77	0.85	0.75	0.58
LV_REG	0.58	0.57	0.58	0.62	0.60	0.57	0.57	0.57	0.58	0.57	0.58	0.58	0.58	0.57	0.57
LV_RATIO_LAST	0.42	0.43	0.42	0.45	0.57	0.37	0.45	0.38	0.43	0.40	0.42	0.40	0.42	0.38	0.37
LV_RATIO_HAVG	0.62	0.62	0.58	0.62	0.65	0.60	0.62	0.53	0.58	0.60	0.62	0.62	0.55	0.55	0.53
D_NAIVE	0.97	0.97	0.97	0.92	0.85	0.87	0.67	0.68	0.77	0.48	0.63	0.37	0.55	0.30	0.25
D_Avg2	0.97	0.97	0.97	0.95	0.88	0.87	0.73	0.75	0.80	0.58	0.72	0.55	0.68	0.47	0.37
D_Avg4	0.97	0.97	0.97	0.98	0.90	0.88	0.72	0.68	0.90	0.62	0.77	0.53	0.72	0.52	0.37
D_BATS	0.97	0.97	0.97	0.98	0.97	0.97	0.82	0.85	0.88	0.73	0.72	0.68	0.72	0.68	0.52
D_ETS	0.97	0.97	0.97	0.98	0.92	0.92	0.82	0.82	0.92	0.70	0.78	0.58	0.75	0.57	0.40
D_NNETAR	0.97	0.97	0.97	0.98	0.95	0.93	0.80	0.80	0.90	0.72	0.73	0.67	0.73	0.57	0.50
D_SPLINE	0.97	0.97	0.97	0.98	0.92	0.90	0.77	0.77	0.85	0.68	0.80	0.57	0.77	0.57	0.40
D_THETA	0.97	0.97	0.97	0.98	0.92	0.92	0.82	0.82	0.90	0.68	0.78	0.57	0.75	0.57	0.40
D_AR1	0.97	0.97	0.97	0.98	0.95	0.95	0.83	0.85	0.92	0.70	0.80	0.67	0.73	0.62	0.50
D_ARMA	0.97	0.97	0.97	0.98	0.97	0.97	0.83	0.85	0.90	0.75	0.73	0.67	0.73	0.65	0.48
D_TREND	0.97	0.97	0.97	0.98	0.92	0.92	0.82	0.82	0.92	0.68	0.78	0.57	0.75	0.57	0.40
D_REG	0.40	0.43	0.38	0.45	0.57	0.35	0.45	0.38	0.45	0.43	0.40	0.40	0.42	0.40	0.38
D_RATIO_LAST	0.27	0.28	0.32	0.30	0.32	0.30	0.22	0.27	0.25	0.28	0.32	0.25	0.20	0.20	0.22
D_RATIO_HAVG	0.40	0.40	0.20	0.45	0.40	0.25	0.42	0.35	0.43	0.38	0.33	0.33	0.38	0.28	0.35
D_RF	0.62	0.62	0.60	0.62	0.60	0.63	0.58	0.60	0.55	0.50	0.57	0.50	0.53	0.47	0.40
D_XGBoost	0.60	0.62	0.63	0.63	0.60	0.67	0.55	0.57	0.62	0.47	0.65	0.52	0.58	0.53	0.42
D_GB	0.70	0.67	0.67	0.72	0.73	0.78	0.68	0.68	0.72	0.55	0.63	0.55	0.65	0.48	0.45
D_KNN	0.55	0.55	0.45	0.50	0.55	0.53	0.47	0.45	0.47	0.52	0.53	0.48	0.50	0.55	0.47
D_Lasso	0.93	0.92	0.92	0.88	0.88	0.92	0.82	0.77	0.90	0.65	0.80	0.53	0.82	0.53	0.42
D_AdaLasso	0.93	0.92	0.90	0.88	0.88	0.90	0.77	0.77	0.88	0.67	0.80	0.53	0.78	0.53	0.42
D_Ridge	0.82	0.83	0.83	0.80	0.83	0.83	0.82	0.77	0.80	0.62	0.75	0.58	0.70	0.52	0.45
D_AdaRidge	0.85	0.87	0.87	0.82	0.85	0.83	0.78	0.77	0.82	0.62	0.80	0.55	0.75	0.53	0.48
D_ElastNet	0.93	0.92	0.92	0.88	0.88	0.90	0.82	0.78	0.88	0.65	0.80	0.53	0.80	0.53	0.42
D_AdaElastNet	0.93	0.92	0.90	0.88	0.88	0.90	0.77	0.78	0.88	0.67	0.82	0.53	0.78	0.53	0.42

Table 37: ±5% coverage rates for Retail Trade (sts_trtu_m), monthly.

11.2 Figures

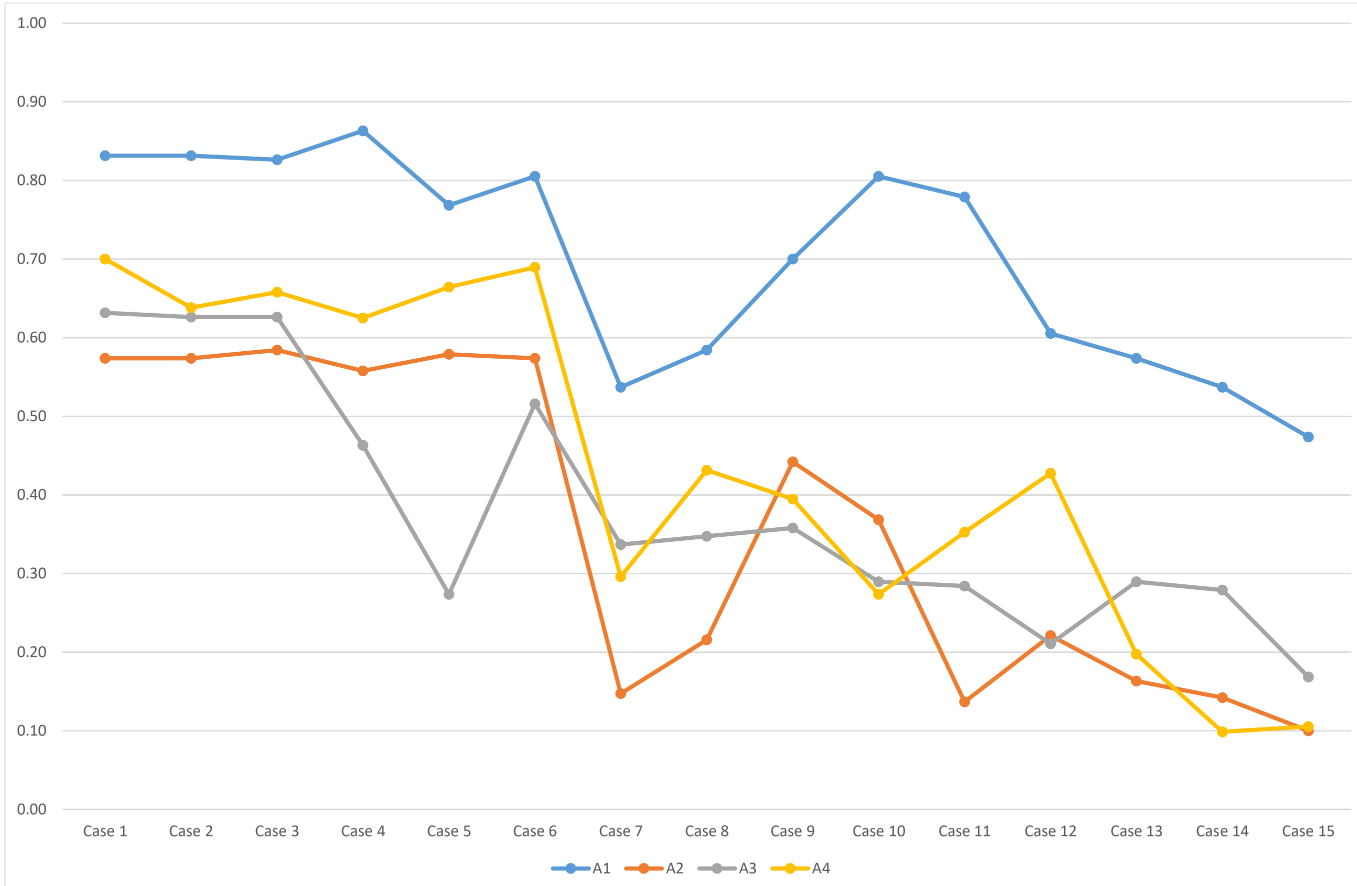

Figure 13: ±5% coverage rates. Averages across all models for various missing value cases. Results for annual series; A1: Employment (lfsi_emp_a), A2: Producer Prices (sts_inpp_a), A3:Industrial Production (sts_inpr_a), A4: Retail Trade (sts_trtu_a).

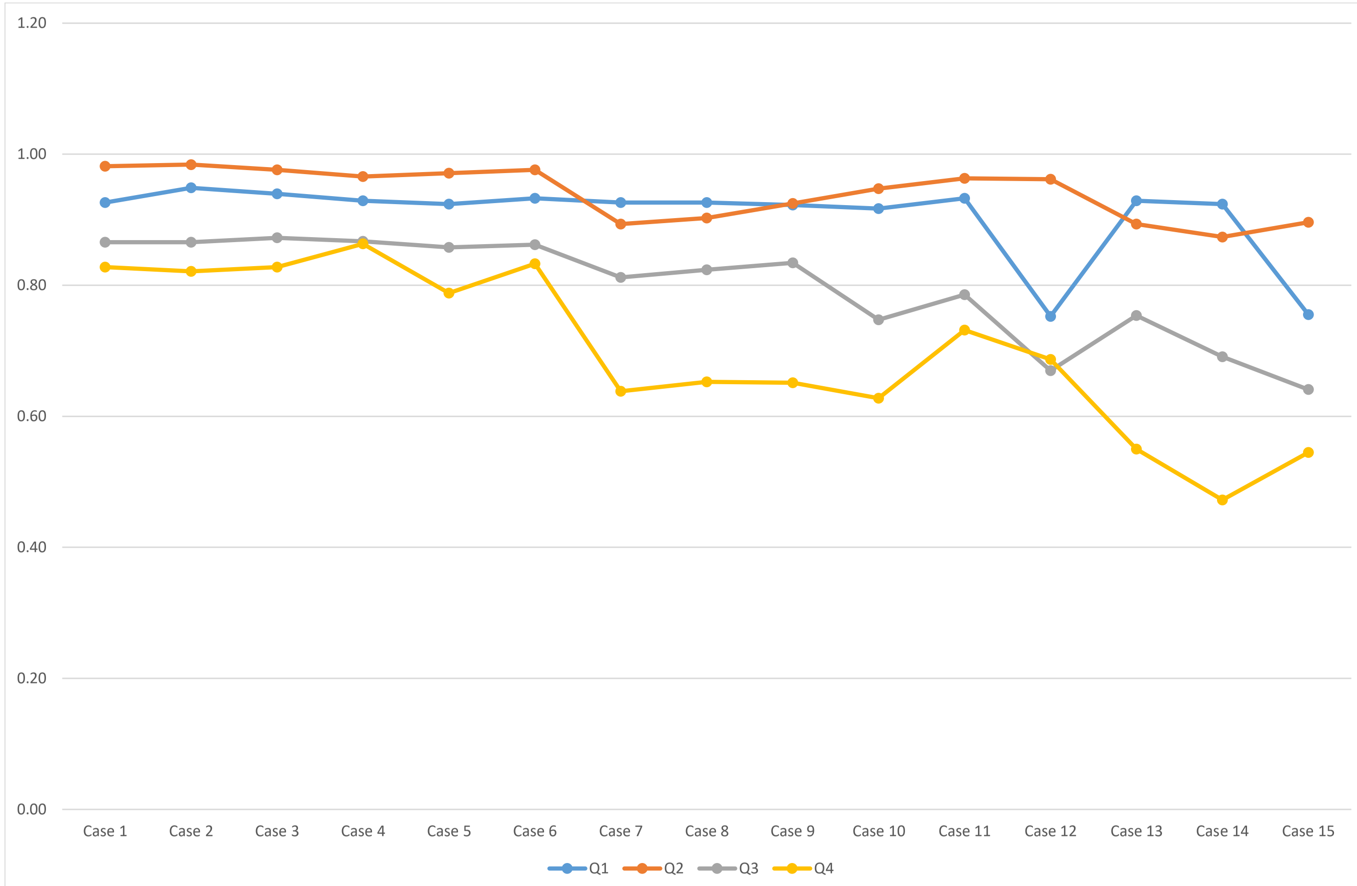

Figure 14: ±5% coverage rates. Averages across all models for various missing value cases. Results for quarterly series; Q1: GNI (naidq_10_gdp), Q2: Employment (namq_10_a10_e), Q3: GDP Level (namq_10_gdp), Q4: Labour in Construction (sts_colb_q).

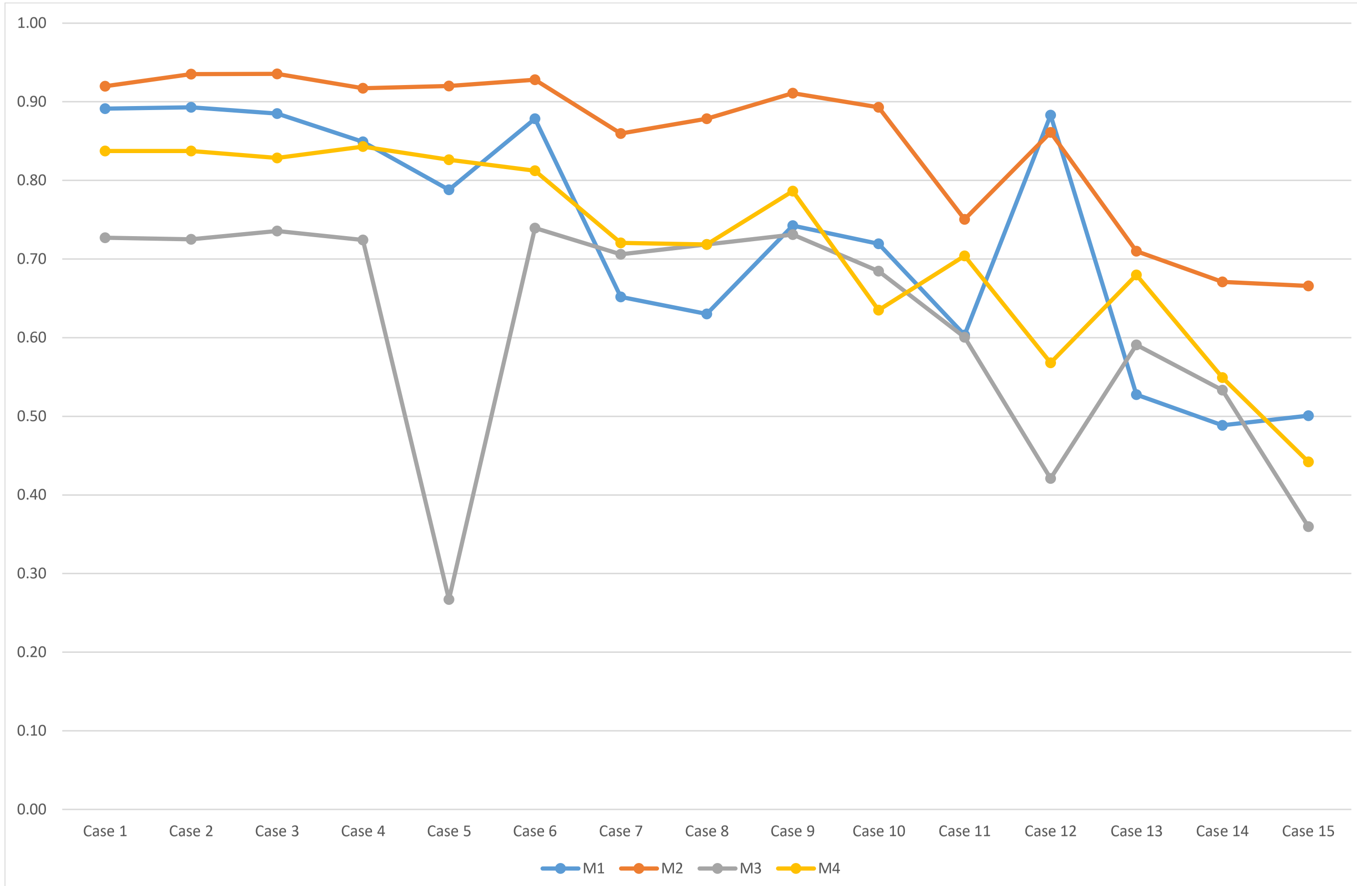

Figure 15: ±5% coverage rates. Averages across all models for various missing value cases. Results for monthly series; M1: Unemployment (ei_lmhu_m), M2: Producer Prices (sts_inpp_m), M3: Industrial Production (sts_inpr_m), M4: Retail Trade (sts_trtu_m).

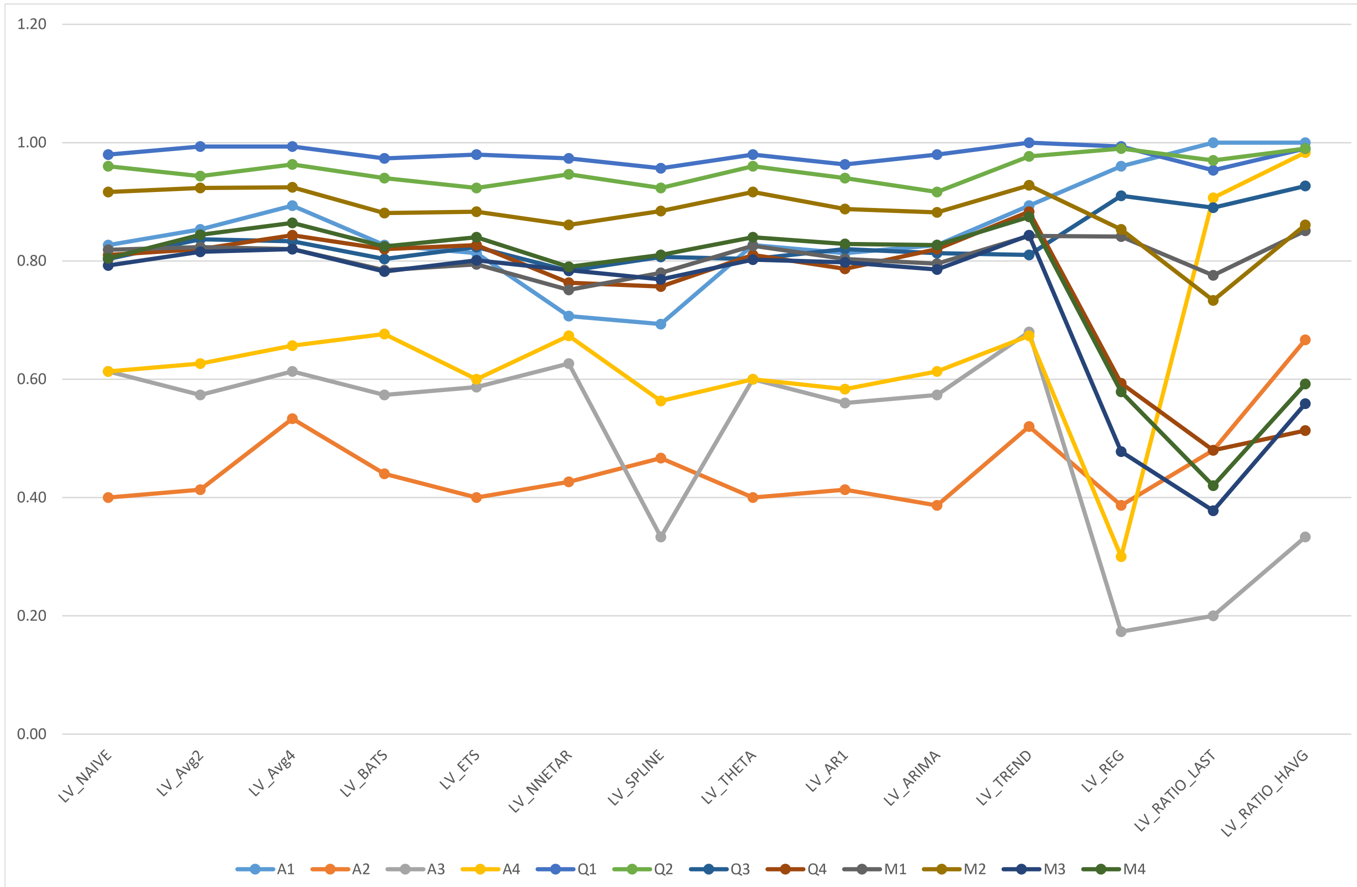

Figure 16: ±5% coverage rates. Averaging across various missing value cases for specific models: univariate time series forecasting in levels. Annual series; A1: Employment (lfsi_emp_a), A2: Producer Prices (sts_inpp_a), A3:Industrial Production (sts_inpr_a), A4: Retail Trade (sts_trtu_a). Quarterly series; Q1: GNI (naidq_10_gdp), Q2: Employment (namq_10_a10_e), Q3: GDP Level (namq_10_gdp), Q4: Labour in Construction (sts_colb_q). Monthly series; M1: Unemployment (ei_lmhu_m), M2: Producer Prices (sts_inpp_m), M3: Industrial Production (sts_inpr_m), M4: Retail Trade (sts_trtu_m).

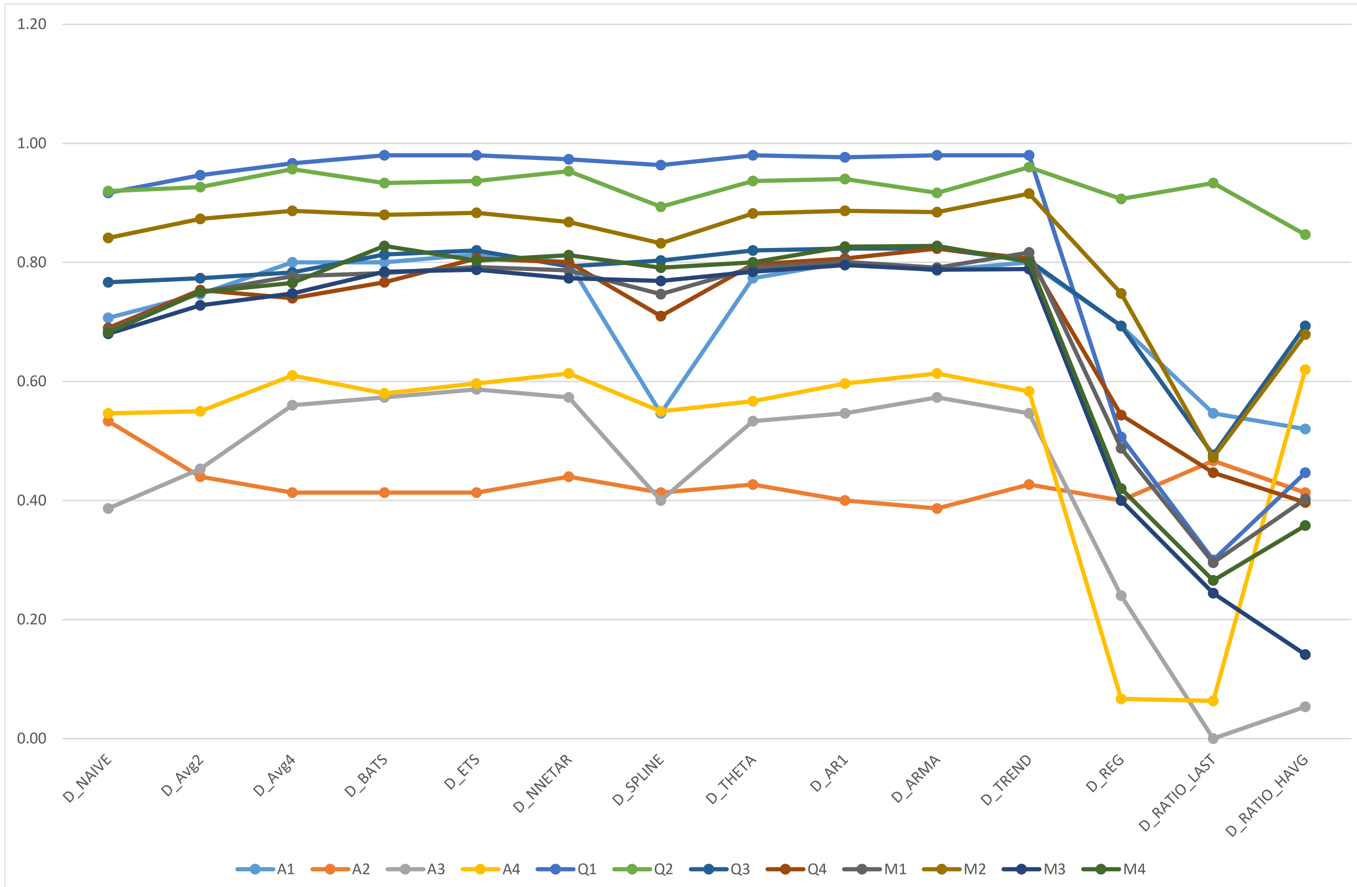

Figure 17: ±5% coverage rates. Averaging across various missing value cases for specific models: univariate time series forecasting in stationary series. Annual series; A1: Employment (lfsi_emp_a), A2: Producer Prices (sts_inpp_a), A3:Industrial Production (sts_inpr_a), A4: Retail Trade (sts_trtu_a). Quarterly series; Q1: GNI (naidq_10_gdp), Q2: Employment (namq_10_a10_e), Q3: GDP Level (namq_10_gdp), Q4: Labour in Construction (sts_colb_q). Monthly series; M1: Unemployment (ei_lmhu_m), M2: Producer Prices (sts_inpp_m), M3: Industrial Production (sts_inpr_m), M4: Retail Trade (sts_trtu_m).

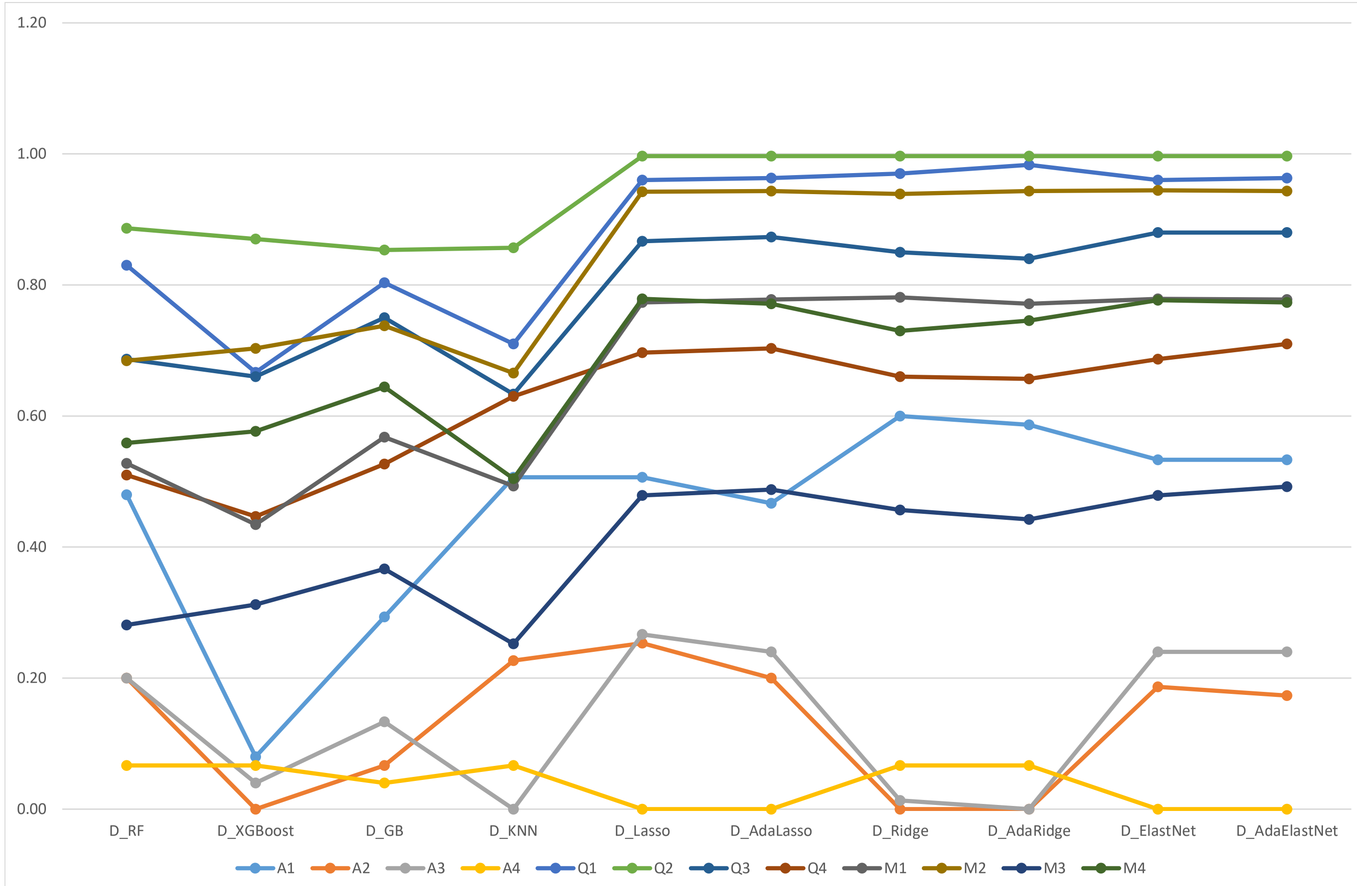

Figure 18: ±5% coverage rates. Averaging across various missing value cases for specific models: machine learning models. Annual series; A1: Employment (lfsi_emp_a), A2: Producer Prices (sts_inpp_a), A3:Industrial Production (sts_inpr_a), A4: Retail Trade (sts_trtu_a). Quarterly series; Q1: GNI (naidq_10_gdp), Q2: Employment (namq_10_a10_e), Q3: GDP Level (namq_10_gdp), Q4: Labour in Construction (sts_colb_q). Monthly series; M1: Unemployment (ei_lmhu_m), M2: Producer Prices (sts_inpp_m), M3: Industrial Production (sts_inpr_m), M4: Retail Trade (sts_trtu_m).