REPUBLIC OF SLOVENIA
FISCAL COUNCIL

An ex post evaluation of forecasts of macroeconomic and fiscal aggregates in the reference period 2016 – 2019

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Data available up to and including 20 August 2020 was used.

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EXECUTIVE SUMMARY

The forecast differences of macroeconomic aggregates of the Institute of Macroeconomic Analysis and Development and the forecast differences of fiscal aggregates of the Ministry of Finance with regard to outturn on average over the last four years, and even over a longer period of time, have not been statistically significantly inconsistent with the principle of accuracy or with the principle of unbiasedness. Forecast differences are an unavoidable part of any forecast, so it is reasonable to compare the forecasts of domestic institutions with those of other institutions. We have established that forecast differences of both national institutions from the outturn do not vary significantly from those forecasts drawn up for Slovenia by international institutions. In this regard, the order of magnitude of differences between the forecasts of institutions is relatively small compared to the size of the differences of all forecasts from the outturn.

Nevertheless, it was possible to identify a few features that need to be highlighted in the review of forecast differences. Regarding the forecasts of the macroeconomic aggregates, these refer mainly to a certain conditionality of forecast differences of economic activity in relation to the economic cycle and to less accurate forecasts of nominal variables. As regards the forecasts of the fiscal aggregates, they relate mainly to overestimating EU funds revenue, to the persistence of successive deviations in general government expenditure in the same direction, to the need to ensure greater transparency in the drawing up of public finance forecasts and, in particular, to the absence of credible medium-term fiscal planning. In connection with these findings, we have also made suggestions for improving the quality of the forecasts of both national institutions.

In accordance with the transposition of Directive EU/2011/85 into Slovenian legislation from 2020 onwards, every two years the Fiscal Council is obliged to evaluate and publicly publish the results of the assessment of macroeconomic and fiscal forecast differences. National institutional frameworks also set out the practice of assessing forecast differences and of endorsing the macroeconomic and fiscal forecasts. Forecast differences are evaluated on a regular basis by the majority of independent fiscal institutions, and an assessment of the forecast differences for all the EU countries is also published by the European Commission.

Objective and realistic macroeconomic and fiscal forecasts constitute an important basis for the effectiveness of fiscal planning and thus contribute to the credible pursuit and achievement of fiscal sustainability. An independent analysis of forecast differences, possibly detecting deviations from the principles of unbiased and realistic forecast, can thus help to reduce forecast differences in future forecasting exercises and thereby improve the adequacy of economic policy orientations.

Due to the interconnectedness and dependency of the forecasts of macroeconomic and fiscal aggregates, the present document combines an evaluation of the forecast differences of the two forecasts. In Slovenia, the Institute of Macroeconomic Analysis and Development of the Republic of Slovenia and the Bank of Slovenia have been regularly reviewing the quality of their macroeconomic forecasts and publishing them, including a comparison with other institutions. In the meantime, no domestic institution has so far prepared and published an assessment of fiscal forecast differences in Slovenia.

In the analysis, in line with domestic legislation, we focused on the forecast differences for the last four years (2016-2019), which for some aggregates, following the examples of this type of analysis by the majority of institutions, has been extended to the maximum period for which the comparable

forecasts are currently available (2005-2019). Although the period has been extended, the time series entering the analysis remain short. This fact constitutes an important limitation to the provision of value judgments of forecast differences and it is therefore appropriate to consider the proposals listed below only as recommendations.

Significant detected features of macroeconomic forecast differences and proposals for the Institute of Macroeconomic Analysis and Development of the Republic of Slovenia:

- Although the longer successive differences from the forecast do not indicate repeated one-way bias, the periods of successive differences in the same direction exceed four years, both in the over- and under-estimation of economic activity growth. In line with a favourable economic cycle, the economic activity for the last four years has been under-estimated.

    Proposal: In drawing up the forecasts, it would be necessary to take into account to a greater extent that the sequence of differences can be conditioned by the economic cycle, with due respect to an awareness of the constraints imposed by existing methods on determining the cyclical conditions.

- Nominal GDP growth forecasts are relatively less accurate than the real GDP growth forecasts. Although the differences in the inflation forecasts do not indicate the abovementioned, this may reflect problems in forecasting the GDP deflator or individual components of the GDP deflator. A similar conclusion applies to forecasts of nominal developments in other macroeconomic aggregates, which are relevant for the drawing up of fiscal projections.

    Proposal: Since the fiscal planning is mainly based on nominal variables, where forecast differences compared to the forecasts of real economic activity indicators are relatively higher, additional attention should be paid to the accuracy of the forecast of nominal variables.

Significant perceived features of fiscal forecast differences and proposals for the Ministry of Finance:

- Although the general government revenue for the past four years has been slightly under-estimated on average, similar to the economic activity growth, we have not detected the persistence of a significant bias of forecasts over a longer period. However, there are weaknesses regarding the direction of their forecasts, in particular in forecasting revenue increases. We estimate that an important factor behind this was the EU funds revenue over-estimation.

    Proposal: The analytical capacity of forecasting revenue should be strengthened, taking into account the precautionary principle in accordance with the Fiscal Rule Act and, in particular, the ability to forecast budget flows with the EU funds should be increased.

- The sequence of the forecast differences in the same direction persisted the longest in connection with the under-estimated share of government expenditure in GDP, although the analysis for only the last four years suggests an over-estimation. In this regard, we note that most of the differences in the forecasts of fiscal indicators have resulted from forecast differences in nominal fiscal variables, i.e. the general government expenditure forecast in this specific case.

    Proposal: Since fiscal policy has a discretionary option to determine the level of expenditure of the general government sector, it is necessary to pursue the legally prescribed precautionary principle in planning, whereas the agreements on the increase of individual categories of expenditure should not

be accepted after the adoption of the general government plans without measures neutralising such increases.

- The findings of the forecast difference evaluation also point to the potential absence of a link between the forecasts of the variables constituting the macroeconomic basis and the forecasts of the related government revenue categories.

  Proposal: Transparency of government forecasts should be increased by regularly publishing or updating elasticity coefficients of the revenue components that depend on macroeconomic bases. A clear costing of individual economic policy measures would also make a significant contribution to greater transparency. Moreover, greater transparency in budget documents would also be desirable for revenue components not related to the economic cycle.

- The sequence and long period of the general government balance over-estimation is directly linked, in particular, to the conclusion that expenditure was under-estimated. In this regard, the assessments show that, in the absence of major shocks, the forecast differences of structural balance stemmed from the forecast difference of the nominal balance of the general government sector, more than from the forecast difference of the output gap. Such findings, to a large extent, also reflect the way in which the achievement of fiscal targets in fiscal planning is postponed to later years of the forecast horizon.

  Proposal: Fiscal planning should be more medium-term oriented, on the basis of a credible medium-term framework of public finances with clear objectives and transparently evaluated measures.

Differences in macroeconomic and fiscal forecasts may also depend to a significant extent on factors beyond the control of the institutions that prepare these forecasts. In this context, two main factors have been identified:

- Differences in macroeconomic forecasts are significantly influenced by the quality of official statistical releases. In reviewing the scope of the revisions of individual aggregates by the Statistical Office of the Republic of Slovenia, the nominal value of private consumption stands out, which is an important aggregate to draw up the fiscal projections.

  Proposal: Additional efforts by the Statistical Office of the Republic of Slovenia to improve the quality of the first release of the data on private consumption.

- An important part of forecast differences of the government revenue relate to the forecast of revenue from EU funds. In this context, investment and subsidies expenditure forecasts also differ significantly. This reduces the transparency, predictability and efficiency of public finances.

  Proposal: The medium-term planning and preparation of projects, co-financed by EU funds, should be implemented in a more comprehensive, realistic and transparent manner. This will be even more important in the light of the newly available financial instruments and EU funds in the coming years.

In 2022, the Fiscal Council will prepare the next ex post assessment of the macroeconomic and fiscal forecast differences for the 2018-2021 period. The assessment is expected to be significantly impaired, following the provisions of the Act Providing Additional Liquidity to the Economy to Mitigate the Consequences of the COVID-19 Epidemic (ZDLGPE), which assumes that the forecasts for 2020 and 2021 are not taken into account in the forthcoming evaluations of the forecast differences.

1. Legal framework

The EU Council Directive (2011/85/EU)[1] on requirements for budgetary frameworks of the Member States stipulates, in paragraph six of Article 4, that the macroeconomic and budgetary forecasts for fiscal planning must be subject to regular, unbiased and comprehensive evaluation based on objective criteria, including ex post evaluation. The results of the evaluations must be made public and taken into account appropriately in future macroeconomic and budgetary forecasts. In the event that an evaluation detects a significant biases affecting macroeconomic forecasts over a period of at least four consecutive years, the Member State concerned must take the necessary measures to correct them and make them public. The 2015 Fiscal Rule Act (hereinafter: the FRA), which in Article 7 lists the tasks of the Fiscal Council,[2] has not envisaged the preparing of the ex post evaluations of forecast differences among these tasks. The provisions of Directive EU/2011/85 were partially transposed into the Slovenian legislation in February 2018 with the Act Amending the Public Finance Act (hereinafter: the ZJF-H).[3] Article 9g provides that every two years, the Fiscal Council shall carry out and make publicly available an analysis of the macroeconomic aggregate forecast for the past four years and present it in a report and, in the event of any identified discrepancies, communicate to the Government the relevant findings on the basis of which the Government shall prepare corrective measures. Since the ZJF-H only required an assessment of the forecast differences of the macroeconomic aggregates, it has not fully transposed the provisions of Directive 2011/85/EU into the Slovenian legislation. To this end, in Article 37b of the Decree amending the Decree on development planning documents and procedures for the preparation of the central government budget[4] that was adopted in May 2018 (hereinafter: the Decree) it stipulates that the Fiscal Council must also ex post assess the revenue and expenditure forecasts of the general government for the past four years. The ZJF-H and the Decree also provide for the Fiscal Council to prepare first such an analysis in 2020. As the legislation requires the Fiscal Council to carry out an analysis every two years, the next ex post assessment of macroeconomic and fiscal forecasts will be carried out in 2022.[5]

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32011L0085&from=EN#d1e323-41-1.

[2] http://www.fs-rs.si/wp-content/uploads/2018/02/ZFisP_EN.pdf

[3] https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2018-01-0544?sop=2018-01-0544 (Only in Slovene)

[4] https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2018-01-1754?sop=2018-01-1754 (Only in Slovene)

[5] The Act Providing Additional Liquidity to the Economy to Mitigate the Consequences of the COVID-19 Epidemic (ZDLGPE); available at: https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2020-01-0897?sop=2020-01-0897, only in Slovene), adopted at the end of April 2020, Article 33 stipulates that "...Notwithstanding the first paragraph of Article 9g of the ZJF, the Fiscal Council shall not take into account macroeconomic aggregates and revenue and expenditure forecasts for 2020 and 2021 in its analysis". This will result in a serious impairment of the evaluation of forecast differences to be prepared for the 2018-2021 period by the Fiscal Council in 2022. The same applies to the drawing up of this type of analysis in 2024 (the forecast difference analysis period will be 2020-2023).

2. Methodology

2.1 Starting points for the ex post assessment of forecast differences

In Slovenia, macroeconomic forecasts, which serve as a starting point for drawing up the budget and forecasts of the general government forecasts, are prepared by the Institute for Macroeconomic Analysis and Development (IMAD),[6] while the Ministry of Finance (MoF) is responsible for drawing up forecasts of the revenue and expenditure of the general government sector.[7] Such an institutional distribution of responsibility for forecasting is not common in the EU. While the ministries of finance usually produce macroeconomic forecasts which serve as the basis for the drawing up of forecasts for fiscal aggregates, this is not the case in Slovenia and in another four EU Member States.[8] Ensuring the independent drawing up of macroeconomic forecasts reduces the risk of them being biased and thus increases credibility and, consequently, the quality of fiscal planning, provided that the latter is actually based on independently prepared macroeconomic forecasts.

IMAD and the MoF draw up comprehensive forecasts of the macroeconomic and fiscal aggregates in spring and autumn. IMAD prepares the spring macroeconomic forecast after the Statistical Office of the Republic of Slovenia (hereinafter: SORS) publishes national accounts data for the last quarter of the previous year.[9] This forecast serves as the basis for the preparation of the Stability Programme, which the Government must submit to the European Commission by the end of April each year. The autumn macroeconomic forecast is prepared by IMAD after the first annual data of national accounts are published by SORS,[10] which also includes the revision of data for the preceding four-year period. This forecast is used by the MoF as the basis for the preparation of the state budget, which the Government must submit to the National Assembly by 1 October of the current year,[11] and which also serves as the basis for the preparation of the Draft Budgetary Plan (OPN), which must be in line with the state budget and which must be forwarded to the European Commission by the Government by 15 October each year.

The different institutions do not produce forecasts at the very same time, which should be taken into account when comparing or interpreting the forecast differences. In addition to IMAD, the forecasts of macroeconomic aggregates for Slovenia are regularly and mostly in a comprehensive manner published by the Bank of Slovenia (BoS), the European Commission (EC), the International Monetary Fund (IMF) and the Organisation for Economic Cooperation and Development (OECD). Apart from the MoF, comprehensive forecasts of fiscal aggregates are published on a regular basis only by the EC and the OECD. In our assessment, the comparison of forecasts between the different institutions is based on forecasts prepared in the spring and autumn months. The time interval between their drawing up does not exceed four months, and all institutions included in the abovementioned comparison generally have the same national accounts data available when drawing up the forecasts (see Table 2.1). Nevertheless, the later forecasts have an information advantage as they can take into account more data on the evolution of other indicators of economic activity and adopted policies that

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[6] Article 9b of the ZJF-H.

[7] Article 9b of the ZJF-H.

[8] In Austria, Belgium, Luxembourg and the Netherlands. In most EU Member States, the macroeconomic forecasts, which serve as the basis for the preparation of fiscal aggregate forecasts and are produced by the ministries of finance, is endorsed by independent fiscal institutions (Jankovics and Sherwood, 2017).

[9] Paragraph one of Article 9b of the ZJF-H.

[10] Paragraph three of Article 9b of the ZJF-H.

[11] Paragraph one of Article 28 of the Public Finance Act.

could influence developments in macroeconomic and fiscal aggregates.[12] As to the comparison of forecast variations, official forecasts of IMAD or the MoF are prepared first and are therefore at an information disadvantage compared with the forecasts of the other institutions. For example, in the first half of the year IMAD publishes forecasts in March whereas the Bank of Slovenia publishes them in June. This gives the Bank of Slovenia an information advantage in the preparation of forecasts, which could have an impact on the conclusions comparing the forecast deviations drawn up in the first half of the year. From the aspect of drawing-up the abovementioned key fiscal documents, the official IMAD forecasts are prepared last in view of other macroeconomic forecasts. Since in the spring the MoF prepares its forecast in April, it has available the forecasts produced by the Bank of Slovenia from December of the previous year (taking into account national accounts data up to Q2/t-1) and forecasts by IMAD from March (taking into account the national accounts data up to Q4/t-1, i.e. by two quarters of a year more than in the Bank of Slovenia forecast). Thus, the official IMAD forecasts include the most information, which the MoF can use in the current fiscal planning process as the basis for the forecasts of general government aggregates.

An analysis of forecast differences was prepared for the spring and autumn forecasts for the current (t) and next year (t+1). Other studies that produce ex post assessments of forecast differences use a similar approach.[13] Differences in projections relating to a period of more than one year have not been systematically assessed due to uncertainties about exogenous macroeconomic assumptions and future economic policies that may influence developments in fiscal aggregates. In the case of an ex post assessment of the fiscal forecasts, such a decision also results from the fact that the Draft Budgetary Plan contains forecasts for the following year only.[14] A more detailed analysis of the forecast differences in the period 2016-2019 focused on the autumn forecasts for the coming year, since these forecasts, as key fiscal documents, formed the basis for the state budget in each of the four years of the period analysed. All statistical error indicators for the forecasts for the spring and autumn forecasts are shown in Annex 7.3.

The forecasts were compared with the first available data on the annual realisation published by SORS and Eurostat respectively. For the year t, SORS publishes annual macroeconomic data at the end of February in the year t+1 and for the general government at the end of March in the year t+1. A decision to make such a comparison is mainly linked to the fact that institutions draw up their

Table 2.1: Chronological order of preparing macroeconomic (M) and fiscal (F) forecasts in the 2016–2019 period

institution	type of forecast	spring		autumn	
		month of publication	last available national acount data	month of publication	last available national acount data
IMAD	M	March	Q4/t-1	September	Q2/t
Ministry of Finance	F	April	Q4/t-1	October	Q2/t
European Commission	M/F	May	Q4/t-1	November	Q2/t
OECD	M/F	June	Q4/t-1	November	Q2/t
IMF	M/F	April	Q4/t-1	October	Q2/t
Bank of Slovenia	M	June	Q4/t-1	December	Q2/t

Source: IMAD, MoF, EC, OECD, IMF, BoS.

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[12] For a theoretical approach, see e.g. Andersson et al.(2016) and for practical application e.g. a description in IMAD (2018) and AIReF approaches (2018, Chapter 3).

[13] See e.g. Fioramanti et al.(2016) and Chabin et al. (2020) for EU Member States, CNFP (2018) for Luxembourg, Hauth et al. (2018) and Schuster (2018) for Austria, the National Audit Office (2018) for Finland and Power (2018) for Ireland.

[14] Nevertheless, in the analysis of forecast differences in the 2005-2019 period, a comparison was made between forecasts for the time horizon of up to two years from the Stability Programme, the so-called naïve forecast and the forecast based on long-term averages (see Table 5.1).

forecasts on the basis of the first data on realisation. The latter relates mainly to exogenous or technical assumptions, which are an unavoidable and important part of the preparation of the macroeconomic forecasts, and may have a significant impact on the assessment of the forecast performance in the case of a significant difference between the actual realisation and the forecast. Moreover, it is not reasonable to expect from forecasters to be able to anticipate future revisions of official statistical data. Furthermore, at the time of the publication of the first macroeconomic data, SORS does not yet have all the information available and subsequent methodological changes may occur. Data on the realisation of general government aggregates also change over time.[15] For example, the published data for the general government sector will be revised by mid-April in the regular process of explaining data to Eurostat (EDP reporting). Since Eurostat data are comparable across the EU countries, they have been used to analyse forecast deviations over time or to compare forecast errors across the EU countries (Chapters 5 and 6). Slovenia is part of the group of the EU Member States where revisions of GDP trends and the general government financial balance were among the lowest in the 2004-2019 period.[16]

The assessment of forecast differences in this document primarily – and in accordance with the legislation – covers the 2016-2019 period and the analysis was complemented by an assessment of forecast errors over a longer period of time. Given that most foreign ex post evaluation studies cover a longer period of time, we have also prepared an evaluation and comparison of forecast differences for the 2005-2019 period. In this analysis, due to the limited availability of data, we assessed a smaller number of variables and at the same time captured only one forecast in each year, since the Draft Budgetary Plan has only been in existence since October 2013. Due to changes in the Stability Programme preparation dates in the years prior to 2010, we do not only assess the forecast differences of the spring forecasts.[17]

Table 2.2 : The number of forecasts of macroeconomic and fiscal variables included in the evaluation of forecast differences in the 2016-2019 period

2016-2019	IMAD	MoF	EC	OECD	IMF*	BoS
GDP, real growth in %	16	/	16	16	16	16
GDP, nominal level	16	/	16	16	16	/
Private consumption, nominal level	16	/	16	15	/	/
Gross operating surplus/mixed income, nom. level	16	/	/	/	/	/
Compensation of employees, nominal level	16	/	16	15	/	/
Inflation**, annual average in %	16	/	16	16	16	16
General government balance, % of GDP	/	16	16	16	16	/
General government revenue, % of GDP	/	16	16	16	16	/
General government expenditure, % of GDP	/	16	16	16	16	/
General government gross debt, % of GDP	/	16	16	16	/	/

Notes: "/" denotes that the institution has not prepared the forecast of a related variable in the given period. *In the forecast of public finance aggregates, IMF uses the GFS methodology, which is different to the ESA methodlogy used by other institutions. ** In the period observed, IMAD and IMF have forecast prices in terms of Consumer Price Index (CPI), while other institutions have forecast Harmonised Index of Consumer Prices (HICP).
Source: IMAD, MoF, EC, OECD, IMF, BoS.

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[15] See Box 2.2 in Fiscal Council (2019c) for more information on revisions of fiscal aggregates.

[16] The latter does not necessarily mean that revisions of individual smaller aggregates are not important and do not have a significant impact on the assessment of the performance of the forecast if compared with the latest available data on realisation. The revisions of SORS releases on the other macroeconomic aggregates discussed in this analysis are otherwise larger than those for real GDP growth. Annex 7.4 also shows a comparison of the forecasts of the aggregates under consideration with the latest available data.

[17] The forecast horizon may also change as a result. Annex 7.1 lists all publications used in our analysis of forecast errors.

In addition to the macroeconomic variables included in their forecast performance assessments by IMAD and the Bank of Slovenia,[18] the assessment of forecasts include some other variables that are relevant for the preparation of fiscal forecasts. In addition to assessing the forecast differences of real GDP and the average rate of inflation, the analysis included an assessment of differences in forecasts of nominal GDP, nominal private consumption and nominal compensation for employees and gross operating surplus. According to the MoF, the abovementioned aggregates are also the most important for forecasting government aggregates.[19] As regards the general government aggregates, the assessment primarily includes the forecast balance, revenue, expenditure and gross debt. Although we have taken into account a relatively narrow set of variables in the forecast assessment, institutions that regularly publish forecasts for Slovenia do not predict all variables (see Table 2.2). In addition to IMAD or the MoF, only the European Commission publishes forecasts for all the abovementioned variables[20] and for the entire abovementioned two periods. Although the OECD forecasts all the aggregates listed, forecasts for all variables are not available for the whole period.

The ex post assessment of the forecast focuses on the differences from the forecasts, but caution should be exercised in interpreting them, as the differences are not necessarily merely the result of errors in the preparation of forecasts. Indeed, macroeconomic forecasts are largely based on exogenous assumptions[21] that can have a significant impact on the deviation of the forecast. This impact may be particularly pronounced in small open economies. Another important feature of the macro-economic aggregates of small open economies, such as the Slovenian economy, is that their fluctuations tend to be relatively greater than those in larger economies, which also affect forecasts changes and their deviations (see also Chapter 6). Forecast differences may also be affected by possible changes in economic policies between the forecasting period and the end of the forecasting period and the revision of the data releases.

2.2 Statistical indicators used in the analysis of forecast differences

In the ex post assessment of macroeconomic and fiscal forecast differences, the Fiscal Council uses a set of standard statistical indicators. Slovenian and EU legislation do not prescribe the type and scope of indicators to be used in such analyses. The evaluation thus includes statistical indicators represented in similar analyses produced by other institutions.[22]

The statistical indicators used to analyse forecast differences can be divided into two groups. The first group contains the standard indicators used to measure the statistical characteristics of forecast differences over the last four years, as required by the legislation, and additionally over a longer period of time. The standard indicators include mean error, mean absolute error and the root mean square error. The second group contains indicators that measure the statistical characteristics of forecast difference indicators of the first group and thus allow for more detailed insight into the characteristics of the differences. These indicators are mainly based on a regression analysis and are therefore suitable for analysing forecast differences over longer periods of time. Forecast differences

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[18] IMAD and the Bank of Slovenia regularly publish performance assessments of their forecasts, covering only real GDP and inflation forecasts. For more information, see e.g. IMAD (2019) and the Bank of Slovenia (2019).

[19] The MoF (2019).

[20] The exception is gross operating surplus/diversified income, as IMAD published a forecast of the total aggregate in the 2016-2019 period, while the European Commission published a forecast of gross operating surplus of the total economy.

[21] E.g. assumptions on the evolution of foreign demand, crude oil prices, commodities, etc.

[22] See the analyses cited in footnote 13.

can be evaluated in an unbiased manner only on the basis of analyses of the statistical characteristics of forecast difference indicators over a longer period of time. This is the approach used by most other institutions assessing the characteristics of forecast differences.[23]

2.2.1 Standard indicators

The forecast difference in our analysis is defined as the difference between the forecast and outturn of a specific variable. When the forecast value is higher than the outturn value, it is over-estimated, while when the forecast value is lower than the realised value, it is under-estimated. Using the formula, we record the forecast differences for the current and next year as:

$$e_{t,t} = y_{t,t} - y_t$$

$$e_{t+1,t} = y_{t+1,t} - y_{t+1} \, ,$$

Where y_t and y_{t+1} are the outturns of a given variable,[24] $y_{t,t}$ and $y_{t+1,t}$ are the forecasts of this variable for the years t and t+1, produced in year t. Values $e_{t,t}$ and $e_{t+1,t}$ thus represent a forecast difference for the year t in the forecast produced in the same year (t) and the forecast difference for the year t+1 in the forecast produced in the year t.

Mean error

With this indicator, we measure the forecast bias over a given period. The forecast bias indicates whether forecast differences are systematically under- or over-estimated over the observed period. Mean error (ME) of the forecast for the current and subsequent year over a given period of time (T; in the case of an analysis of errors of the shorter period for the years 2016-2019, T=4) is determined on the basis of the formulas:

$$ME = \frac{1}{T} \sum_{t=1}^{T} e_{t,t}$$

$$ME = \frac{1}{T} \sum_{t=1}^{T} e_{t+1,t}$$

The main drawback of the mean error is that positive and negative forecast differences can cancel each other, which allows this indicator to show low values even in case of high forecast differences of various directions.

Mean absolute error

This indicator measures the accuracy of the forecast and, taking into account the absolute values of the forecast differences, eliminates the deficiency of the mean error, which can display low values with equally high forecast differences of different signs. The value of the mean absolute error (MAE)

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[23] See e.g. studies cited in footnote 13. In their assessments of forecast errors, some institutions or authors, to increase the sample, use all available forecasts made in the same year, e.g. Schuster (2018), while some use a panel analysis combining multi-country forecasts (e.g. Fioramanti et al. (2016)) or Chabin et al. (2020) in analyses of EC forecast errors). IMAD and the Bank of Slovenia, in their analysis of forecast errors, show the statistical indicators of the first set of indicators from our analysis.

[24] In the analysis we distinguish between the first and the last publication of the data on the realised value of the variable.

indicator of the forecast for the current and the following year over a given period of time (in our case T=4) is determined by the formulas:

$$MAE = \frac{1}{T} \sum_{t=1}^{T} |e_{t,t}|$$

$$MAE = \frac{1}{T} \sum_{t=1}^{T} |e_{t+1,t}|$$

Root mean squared error

This indicator – similarly to the mean absolute error indicator – eliminates the underlying disadvantage of the mean error indicator. Instead of absolute values, it takes into account the squared forecast differences. Thus, not all forecast differences are equivalent in the calculation of the average, as in comparison to the mean absolute error indicator (MAE), the more significant forecast differences are given more weight. Due to this property, this indicator is usually the one most commonly used in forecast performance analyses, although, for example, it does not show the direction of the differences. The root mean squared error (RMSE) indicator formulas for current and next year's forecasts are written as:

$$RMSE = \sqrt{\frac{1}{T} \sum_{t=1}^{T} e_{t,t}^2}$$

$$RMSE = \sqrt{\frac{1}{T} \sum_{t=1}^{T} e_{t+1,t}^2}$$

2.2.2 Statistical characteristics of standard indicators

Forecast bias

Forecast bias can be determined by calculating the mean error indicator, as well as by analysing the time series of forecast differences. This method makes sense when analysing forecast differences over a longer period of time, and in addition to the mean error of the forecast, forecast differences are also defined in the form of regression residuals (ε in the equations below), which, if unbiased, are normally distributed. For this purpose, the forecast difference for the current and next year is explained by the constant α. The latter indicates the mean difference of the forecast and, in the case of unbiased forecast, it is equal to 0:

$$e_{t,t} = \alpha + \varepsilon_{t,t}$$

$$e_{t+1,t} = \alpha + \varepsilon_{t+1,t}$$

Forecast difference persistence

Differences are defined as persistent if the same type (direction) is repeated over a longer period of time. Forecast difference persistence is checked by testing for autocorrelation. If the differences are

repeated in the same direction (persistence of over- or under-estimate successively over time), this is known as positive autocorrelation, while if forecast differences are compensated each time with a difference in the opposite direction (an under-estimate in one year is replaced by an over-estimate in the following year and vice versa), this is known as negative autocorrelation. If forecast differences are not persistent, the value of the autocorrelation coefficient measured by the Ljung-Box test (Q)[25] equals 0:

$$Q = n(n + 2) \sum_{k=1}^{h} \frac{\rho_k^2}{n-k} ,$$

where n is the length of the time series, autocorrelation at lag k and h is the number of lags tested.

Direction of forecast

In addition to determining how far from the forecast the is the outturn, we can also check whether the projected and actual values move in the same direction. Thus, instead of analysing point distances, we focus on checking the "story" of the forecast, where the predicted movements should at least go in the same direction as the actual movements, making such an indicator qualitative rather than quantitative. The change in the forecast direction is determined on the basis of the actual data available at the time of the preparation of the forecast. To indicate a change in the forecast for the current year, for example, we use the difference between the forecast and the realisation of the variable in the previous year, and to indicate a change in the forecast for the next year, the difference between the forecast for the year ahead prepared in autumn, and the forecast for the current year, prepared in spring is applied. The adequacy of the forecast direction was analysed on the basis of the Pesaran-Timmermann test[26]. This is a nonparametric test determining the ability of forecasts to explain the change in direction of the forecast aggregates based on the findings in Table 2.3.

Table 2.3: Parameters of Pesaran-Timmermann test

	forecast: decrease	forecast: increase
actual: decrease	**correct** forecast	**incorrect** forecast
actual: increase	**incorrect** forecast	**correct** forecast

Source: Fioramanti et al. (2016).

[25] Ljung and Box (1978).
[26] Pesaran and Timmermann (1992).

Box 2.1: Review of good practices in assessing forecast differences in some other countries

The EU Council Directive (2011/85/EU) stipulates that macroeconomic and budgetary forecasts must be regularly, impartially and comprehensively assessed, including ex post, on the basis of objective criteria. The way in which this provision is put into practice in individual Member States depends to a large extent on the national institutional frameworks that determine the tasks of the ministries of finance and independent fiscal institutions. In the text below, we present the methods of assessing forecasts in Austria, Ireland and the United Kingdom. The institutional frameworks in these countries vary and, partially in connection with this, the approaches to the ex post evaluation of forecasts also vary. In all three countries, in addition to the four-year period prescribed by the directive, errors in forecasts over a longer period are also analysed due to the consensus that a period of four years is too short to reach statistically properly supported conclusions on the potential systematic bias of the forecast.

Austria

In Austria, macroeconomic forecasts, which serve as the basis for fiscal forecasts, are prepared by the independent Austrian Institute of Economic Research (WIFO). The official fiscal forecasts are prepared by the Ministry of Finance and, independently of this, by the Austrian Fiscal Council. The forecast performance assessment of the three abovementioned institutions was prepared by the Fiscal Council secretariat.[1] The analysis also compared the forecasts of the three institutions with the forecast of the EC. The forecasts were compared with both the first and the latest available data on realisation. The specificity of this study is that it analyses not only general macroeconomic and fiscal aggregates but also the forecasts of key components that influence the calculation of the structural balance. In addition, based on the findings on deviations from the forecast of actual realisation, concrete recommendations are made to the Fiscal Council on assessing compliance with fiscal rules and improving the methodology or the approach used in the preparation of fiscal forecasts.

Ireland

In Ireland, official macroeconomic and fiscal forecasts are prepared by the Ministry of Finance. The ministry entrusted the analysis of the forecast performance to independent experts who compared the official forecasts with those of domestic (public and private) and international institutions.[2] In doing so, they limited themselves to analysing the differences between forecasts and realisation and did not verify the (in)adequacy of the methodology used in the official forecasts. The analysis focuses primarily on the 2013-2016 period and also analysed the performance of the macroeconomic forecasts in the 1996-2016 period. A specific feature of the Irish case is that the analysis also includes an assessment of the deviations of technical assumptions, which, in a small open economy, can have a significant impact on the difference between the realisation and forecast.

United Kingdom

In the United Kingdom, official macroeconomic and fiscal forecasts are prepared by the Ministry of Finance while the Fiscal Council prepares its own comprehensive forecasts to assess fiscal policy compliance with fiscal rules. The specificity of the Fiscal Council's forecasts is that they place considerable emphasis on forecasting the impact of the policy measures taken on macroeconomic and fiscal aggregates. The Fiscal Council publishes annual forecast assessments[3] where a clear distinction is drawn between the differences between the realisation and forecasts and errors arising from the forecasting methodology used. The latter are analysed in more detail and ways in which it intends to remove them are presented.

[1] An analysis of the four-year period of 2014-2017 (Hauth et al., 2018) and an analysis of the longer 2005-2017 period (Schuster, 2018) were prepared.

[2] Power (2018).

[3] For the latest available document, see the Office for Budget Responsibility (OBR, 2019).

3. Macroeconomic and fiscal developments in the 2016-2019 period

It is reasonable to position the analysis of forecast deviations in the macroeconomic and fiscal situation of the period considered. In the 2016-2019 period the macroeconomic and fiscal situation was on average significantly more favourable than in the previous four years, and at the same time it was among the most stable in the whole period after 2000 (see Figures 3.1 and 3.2). The recovery of economic activity, which started in 2014, stabilised at the beginning of the period, followed by faster growth in 2017 and 2018, with some signs of overheating, which started to slow down at the end of the period. From a fiscal perspective, the initial part of the analysed period was marked by consolidation after the general government balance deteriorated in recent years and gross government debt increased significantly. In particular, due to favourable economic conditions, a nominal government surplus was recorded in 2018 and 2019; however, according to current assessments, fiscal policy was somewhat pro-cyclically expansionary.[27] Furthermore, the debt-to-GDP ratio gradually declined over four years but was, nevertheless, three times higher at the end of the period than before the crisis.

Economic growth stood at 3.6% on average in the 2016-2019 period, much more than in the previous four years and above the long-term average. At the beginning of the period, the growth of external trade, stimulated by the improvement of the situation of the main trading partners, was the main contributor to the recovery. The improvement of conditions in the export-oriented part of the economy was reflected in the gradual strengthening of domestic consumption aggregates. Significant growth in employment contributed to a higher increase of compensation of employees and, consequently, to private consumption, while the improvement in corporate business results was reflected in the growth of gross operating surplus and consequently contributed to the growth of investment activity. At least in 2016 and 2017 there were no price and cost pressures. In the second half of 2018 and last year, positive impulses from abroad began to weaken. With lower growth in world trade, economic growth in Slovenia began to slow down. At the same time, private consumption growth continued to grow, in particular as a result of the continued high growth of compensation for employees. This was based, to a lesser extent than in the first years of the period analysed, on employment growth, which

Figure 3.1: Real GDP growth - standard deviation
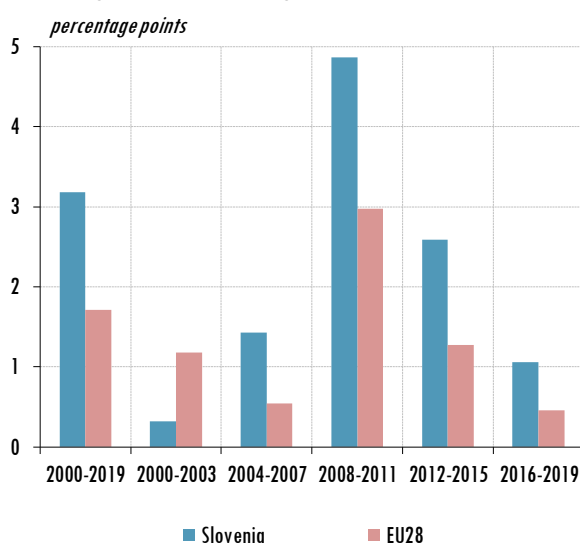
percentage points

Figure 3.2: General governement balance - standard deviation

percentage points of GDP

Source: Eurostat, FC calculations.
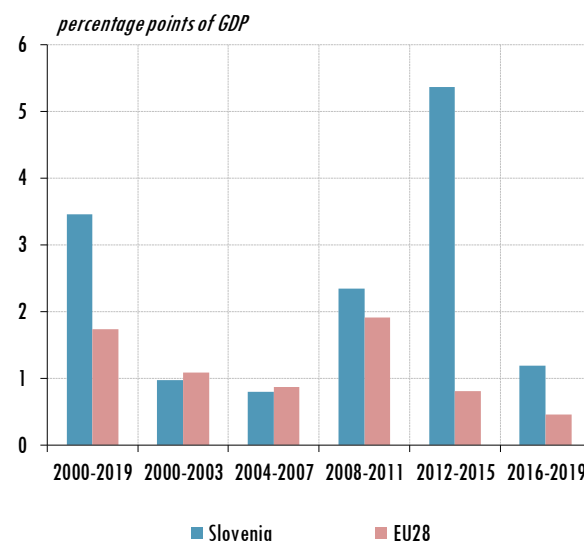
Source: Eurostat, FC calculations.

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[27] See Fiscal Council (2020a and 2020b).

Figure 3.3: Nominal GDP growth and general government balance
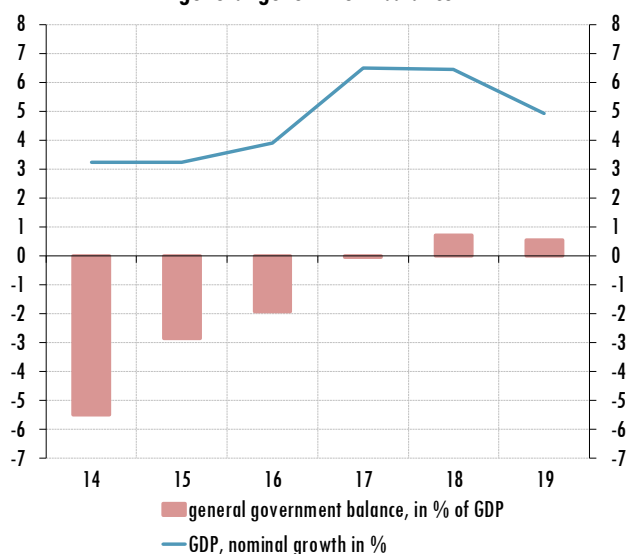
Source: SORS, FC calculations.

Figure 3.4: Important macroeconomic and fiscal aggregates in various periods

period averages in %, except where noted
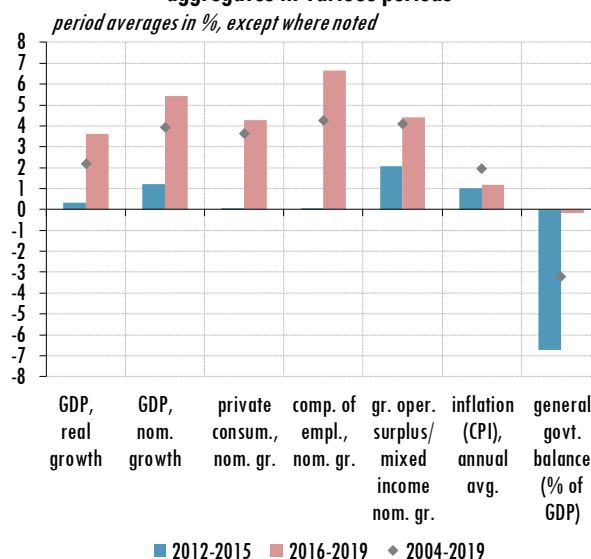
Sources: SORS, Eurostat, FC calculations.

also began to moderate due to the limited availability of labour. Stronger growth of compensation per employee has thus contributed more to the growth of compensation of employees. Inflation remained at a similar level as in previous years, slightly below 2%, but it was mainly due to domestic factors increasingly linked to cost pressures.

The public finance indicators have improved over the past four years mainly under the influence of economic growth and the improvement of the labour market situation, and at least in the initial two years of the period analysed, as a result of restricting expenditure growth. The nominal balance of the general government shifted from a 2% deficit-to-GDP ratio in 2016 to a surplus of 0.5% of GDP in 2019. Revenue growth, which stood at 4.5% on average over the past four years, was mainly driven by a higher revenue from social contributions and taxes, however, the growth of the latter slowed down last year. Other categories of revenue, following a fall in 2016 resulting from a

Figure 3.5: General government revenue in various periods
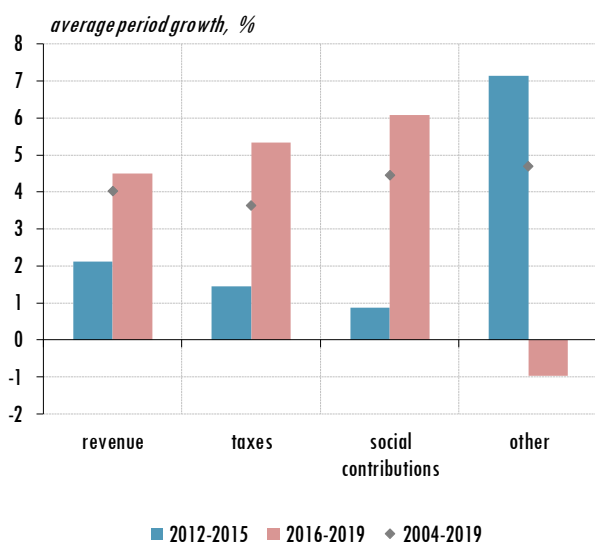
Source: SORS, FC calculations.

Figure 3.6: General government expenditure in various periods
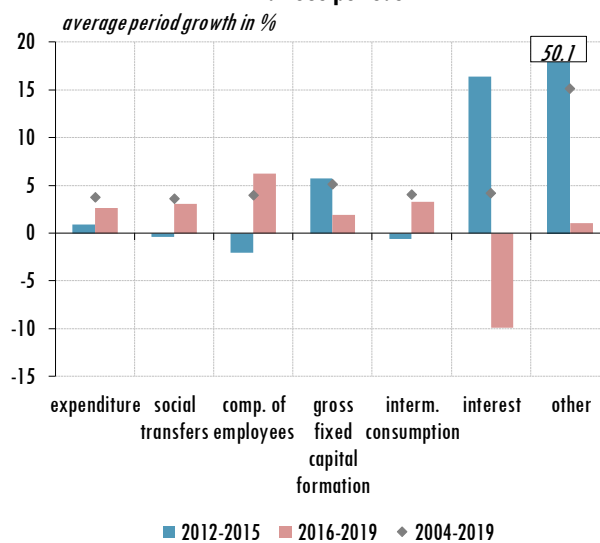
Source: SORS, FC calculations.

drop in the drawing on EU funds during the transition to the new financial perspective, contributed approximately a tenth of the total revenue growth in the last three years. Over the course of four years, lower interest expenditure, which decreased by about a tenth per year, contributed to the containment of expenditure growth and thus to the improvement of the balance. Among the other major categories of expenditure, compensation of employees increased throughout the period, and their average annual growth was well above the long-term average. Expenditure on social transfers started to increase in 2017 with the beginning of the easing of the measures adopted during the crisis and, despite favourable economic conditions, their growth last year was the highest after the beginning of the financial crisis. On average, investment expenditure growth over the last four years has fallen behind the long-term average due to the significant drop in 2016 at the time of the transition to the new EU financial perspective, although the average of the last two years stood at almost 20%. The general government gross debt-to-GDP ratio declined significantly to around 65% of GDP over the past four years and remained at a similar level in nominal terms (approximately EUR 32bn).

4. Assessment of macroeconomic and fiscal forecast differences for the 2016-2019 period

A more detailed assessment of forecast deviations for this period focuses on the assessment of autumn forecasts for the following year. In the four-year period analysed, all state budgets, as key public finance documents, and the Draft Budgetary Plans aligned with them, were prepared in the autumn of the previous year. The exception is the 2019 forecast, when the proposal for a revised budget was prepared in January 2019; however, this document was also based on the autumn forecast of IMAD of September 2018.

Figure 4.1: ME - GDP and inflation
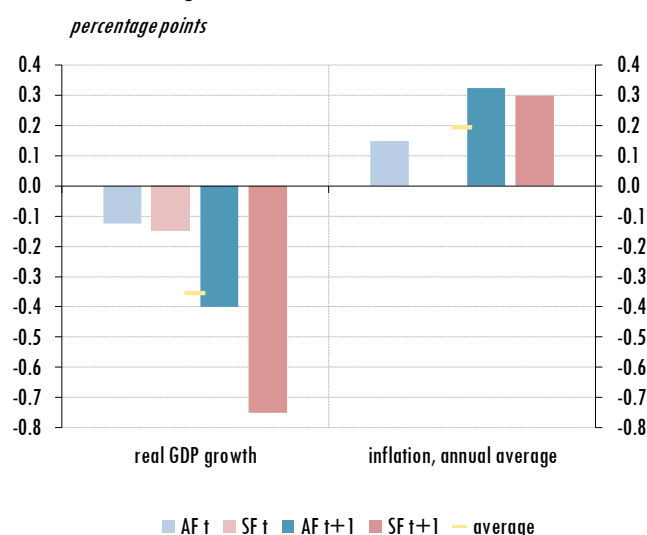
Source: SORS, IMAD, FC calculations.

Figure 4.2: ME - nominal macroeconomic bases
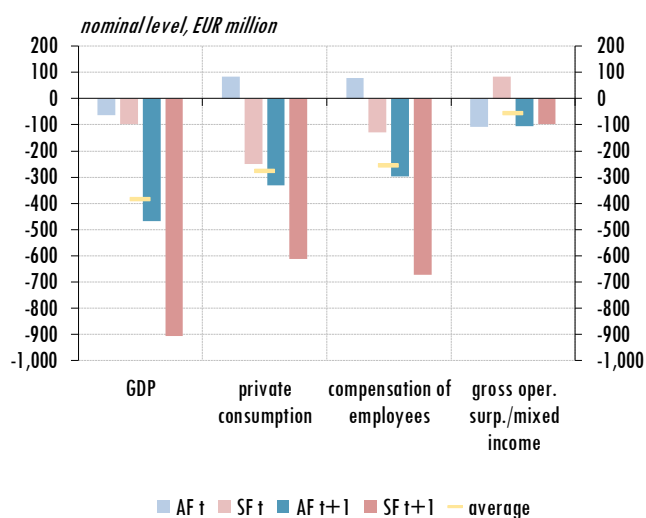
Source: SORS, IMAD, FC calculations.

Figure 4.3: RMSE - GDP and inflation
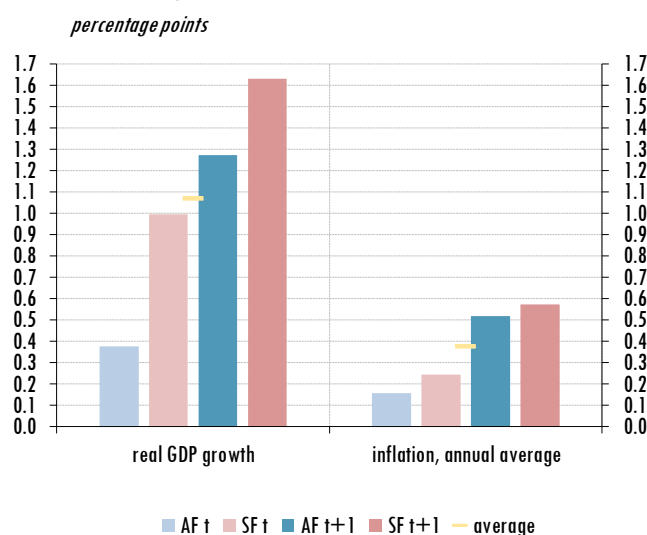
Source: SORS, IMAD, FC calculations.

Figure 4.4: RMSE - nominal macroeconomic bases
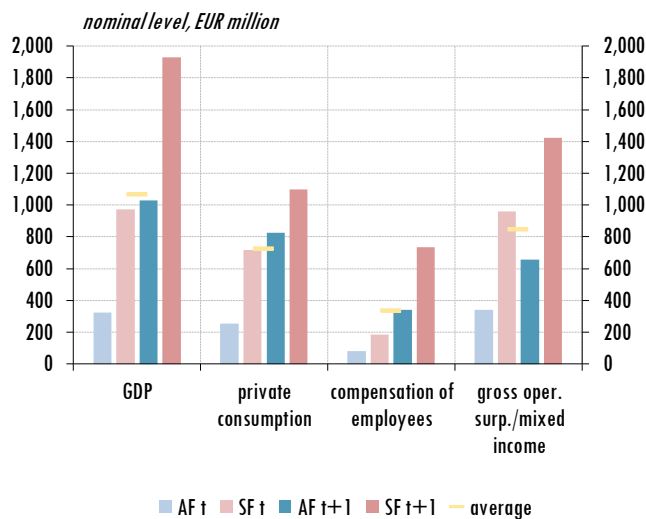
Source: SORS, IMAD, FC calculations.

Notes: ME — mean error, RMSE — root mean squared error, AF t: IMAD autumn forecast in year t for year t, SF t: IMAD spring forecast in year t for year t, AF t+1: IMAD autumn forecast in year t for year t+1, SF t+1: IMAD spring forecast in year t for year t+1.

Forecasts deviations in the 2016-2019 period generally decrease with a shorter forecast horizon.[28] This applies to macroeconomic aggregates and government revenue forecasts or components thereof. Considering their time of preparation, no significant differences in forecast errors can be detected in most expenditure components, with the exception of total government expenditure. This also indicates, among other things, the greater possibility of controlling expenditure developments compared to revenue.

The autumn forecasts for the vast majority of macroeconomic aggregates considered for the following year were on average underestimated in the period analysed. This applies to both real GDP growth forecasts and forecasts for nominal levels of GDP, private consumption, compensation of employees and gross operating surplus. The exception was merely an overestimated forecast of inflation. The underestimation was particularly pronounced in the forecast for 2017. On average in the period analysed, the underestimation of most aggregates was probably related, in particular, to two reasons, i.e. favourable economic activity in the international environment and the intensity of the labour market recovery in Slovenia. The actual situation in the international environment was better than that anticipated in technical assumptions at the time of the forecasts made by IMAD on the basis of forecasts by international institutions for GDP growth or imports of major trading partners. Another factor was a higher actual employment growth than forecasted and, consequently, also a higher compensation of employees and private consumption. In the period analysed, employment growth measured by number of people was relatively high, while employment growth measured by number of hours lagged behind. Demographic trends probably also influenced the employment forecast deviation. In Slovenia, the number of working-age people decreased significantly in the last decade, but at the same time the net inflow of labour from abroad was relatively high, especially in the second part of the period.

Overall government revenue forecasts and most of their categories were also underestimated, with the significant exception of other revenues, including the EU funds. In the autumn forecasts for the following year, the share of revenue-to-GDP was underestimated on average by 0.4% of GDP. The underestimation for most of the economic cycle-related revenue categories is likely to be partly linked to the macroeconomic base underestimation. The elasticities used by the MoF in the preparation of government revenue forecasts are not public and therefore it is not possible to assess the extent to which the revenue forecasts actually reflect the macroeconomic aggregates forecasts produced by IMAD.[29] The deviation of forecasts was the highest for current taxes on income and wealth and social contributions, which, in our view, is mainly due to the deviation in the forecasts of macroeconomic bases. On the other hand, the forecasts of taxes on production and imports (including VAT) were overestimated, although the private consumption forecasts quoted by MoF as the macroeconomic basis for this category of income forecast were underestimated[30]. The average of the property income underestimation is, according to our estimate, partly related to the relatively high dividend of the NLB in 2018, the payment of which was uncertain due to the prior approval required from the ECB. In part, higher property income is likely to have been influenced by a better than projected macroeconomic realisation. Other revenue forecasts, including revenue from the sale of goods and services, other current transfers and other capital revenue were overestimated in the period analysed. In particular, this is

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[28] A similar finding was made in the Fiscal Council (2018).

[29] The creation of key revenue category forecasts using macroeconomic bases from IMAD forecasts and elasticity used by the EC in the calculation of the structural balance (see Price et al., 2014) indicates that the deviation (measured by RMSE) for the forecasts of all three cyclically-related revenue categories in the 2016-2019 period would be lower than in the MoF forecast. For the total revenue forecast, the deviation of such forecast would be greater than in the case of the MoF forecasts. We associate this with the structure of revenue, which is, to a significant extent, also represented by revenue unrelated to the economic cycle.

[30] The MoF (2019, p. 4).

Slika 4.5: ME - general government revenue

percentage points of GDP
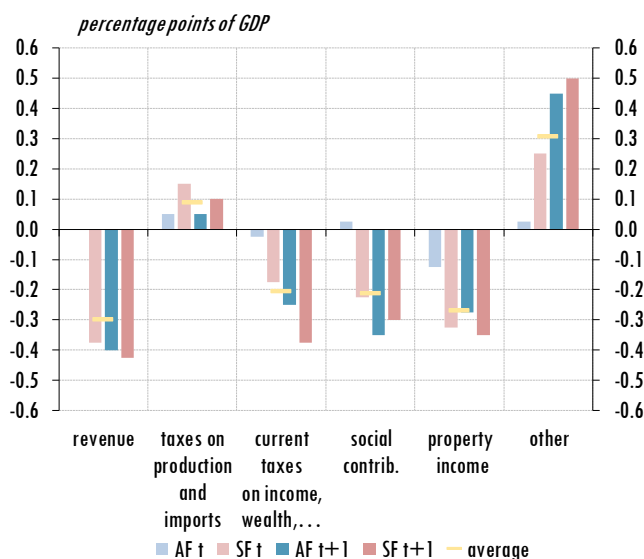
Sources: SORS, MoF, FC calculations.

Figure 4.6: ME - general government expenditure

percentage points of GDP
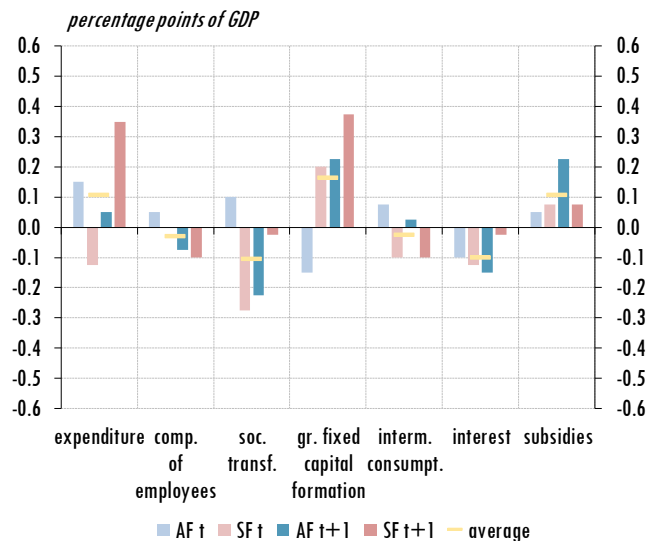
Sources: SORS, MoF, FC calculations.

Figure 4.7:RMSE - general government revenue

percentage points of GDP
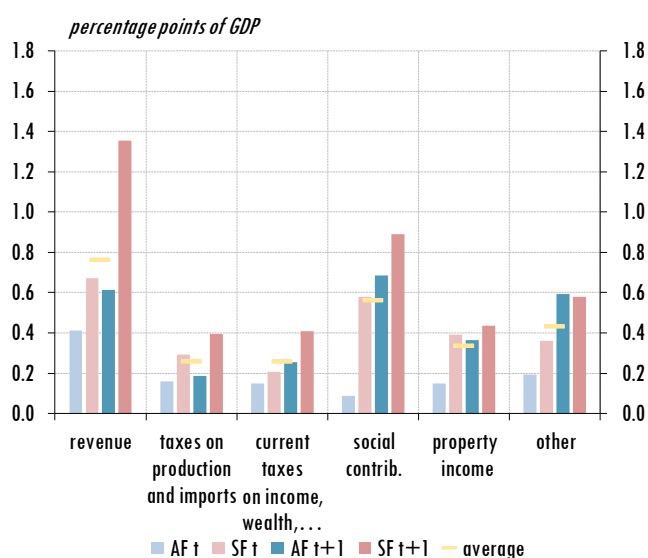
Sources: SORS, MoF, FC calculations.

Slika 4.8: RMSE - general government expenditure
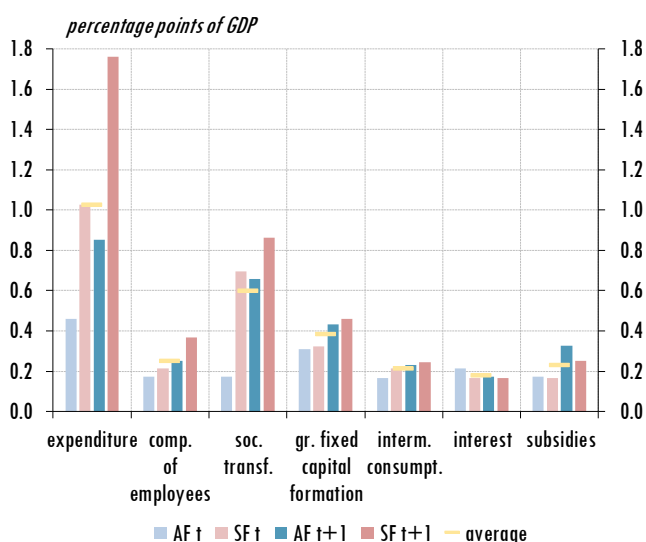
percentage points of GDP

Sources: SORS, MoF, FC calculations.

Notes: ME – mean error, RMSE – root mean squared error, AF t: MoF (DBP) autumn forecast in year t for year t, SF t: MoF (SP) spring forecast in year t for year t, AF t+1: MoF (DBP) autumn forecast in year t for year t+1, SF t+1: MoF (SP) spring forecast in year t for year t+1.

linked to unrealistic forecasts of the revenue from the EU funds, as the Fiscal Council regularly pointed out in the context of past assessments of budgetary documents.[31] Deviations of other revenue forecasts also stand out in relative terms (given the size of each aggregate in GDP and also its variability measured by standard deviation).

On average, in the period analysed, the overall government expenditure was overestimated while relative errors were the highest in the forecasts of investments and subsidies. On average, in the 2016-2019 period, in particular, investment expenditure and subsidy forecasts were overesti-

[31] See Fiscal Council (2019a and 2019b).

mated, while forecasts of expenditure on compensation of employees, social transfers, interest payments and, to a lesser extent, intermediate consumption expenditure were underestimated. Variations in the forecasts of individual categories of expenditure may be significantly affected by measures taken after the forecasts were drawn up. In the period analysed, following the adoption of individual budgetary documents, measures were adopted mainly in connection with social transfers resulting in their growth, which was higher than expected at the time of the forecast preparation. To a lesser extent, this also applies to expenditure for the compensation of employees. Moreover, it is also likely that, despite the revenue underestimation, the pursuit of objectives related to the general government balance has led to a reduction in flexible categories of expenditure relative to the initial forecasts, in this connection, mainly to the reduction in investment expenditure. In addition, in our assessment, the overestimation of the investment and subsidies expenditure is also significantly linked to the overestimation of revenue from EU funds, which finance an important part of these two categories of expenditure.

Given that forecast of revenue was underestimated and of expenditure overestimated, the nominal balance forecasts in the period analysed were underestimated on average. In the autumn forecasts for the following year, nominal balance was, on average, underestimated by about 0.5% of GDP or around EUR 200 million. Derogation was the highest in the forecast for 2017, when, according to current assessments, the greatest structural effort in the period under assessment was achieved. When assessing the balance forecast, it should be noted that it is not a purely typical forecast, but, together with the general government's expenditure, it is also the economic policy objective within the institutional framework of fiscal rules currently in force. Thus, the MoF as the forecast producer has, to a certain extent, the possibility of having an impact on the actual realisation.

In the period analysed, the forecast deviation of the structural balance was to a larger extent due to the nominal balance forecast deviation than to the change in the assessment of the output gap.

Figure 4.9: ME - structural and cyclical balance

percentage points of GDP
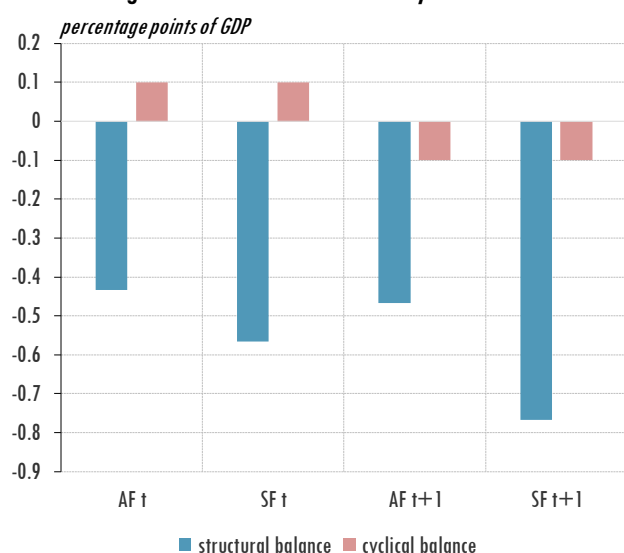
Figure 4.10: MAE - structural and cyclical balance

percentage points of GDP

Sources: SORS, MoF, FC calculations.
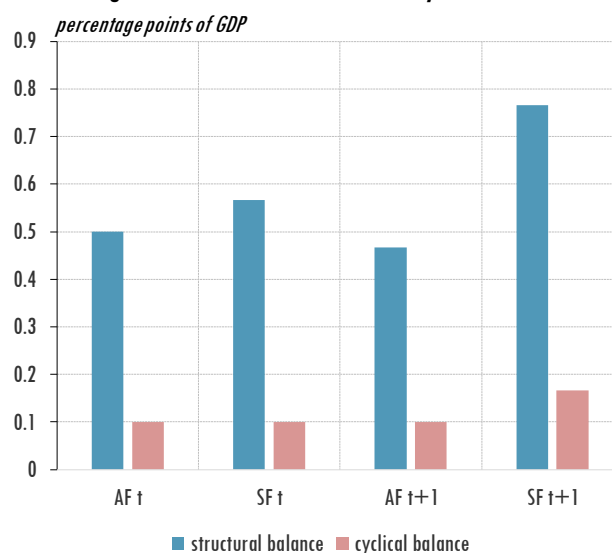
Sources: SORS, MoF, FC calculations.

Notes: ME – mean error, MAE – mean absolute error, RMSE – root mean squared error, AF t: MoF (DBP) autumn forecast in year t for year t, SF t: MoF (SP) spring forecast in year t for year t, AF t+1: MoF (DBP) autumn forecast in year t for year t+1, SF t+1: MoF (SP) spring forecast in year t for year t+1.

We compared the deviation of the forecast of the cyclical balance of the general government as a direct or exclusive reflection of the assessment of the output gap and the structural balance forecast. In doing so, we compared the forecasts in the same way as with all other assessments, namely with the first realisation. In the case of the assessment of the output gap, it is available in the spring following the year for which the forecast is made. This assessment is also made available to the Fiscal Council when preparing an assessment of fiscal policy compliance in the previous year[32] in accordance with the FRA. The period analysed does not include the year 2019 for which the assessments of the output gap, as expected, have changed significantly in the wake of the pandemic outbreak and significant deterioration of the economic situation and forecast in spring this year. However, in the 2016-2018 period, in which no pronounced economic shocks occurred, the mean absolute error of the structural balance forecast by all institutions[33] was at least twice the error of the cyclical balance forecast. In this context, it is also necessary to draw attention to the impact of a rapid cycle reversal on the past assessments of the output gap. In the abovementioned years, the one-off factors, which are otherwise to be eliminated in the calculation, played no apparent role in defining the structural balance. This shows that, in the absence of economic shocks affecting a significant change in economic activity forecasts, which also alter the assessment of the output gap for the previous years (as was actually the case in the past with the fast cycle reversals), the structural balance forecast error results largely from the forecast error of the revenue and expenditure or the nominal balance of the general government sector rather than from a change in the assessment of the output gap.

A comparison of deviations in the macroeconomic forecasts of all institutions preparing forecasts for Slovenia shows that these forecasts were on average underestimated in the 2016-2019 period with the smallest errors detected in IMAD and the EC forecasts. A comparison of forecasts with other institutions enables us, in a neutral way, to assess the forecasts of domestic institutions, or in the case of IMAD, the macroeconomic forecasts that influence economic policy making in Slovenia. In the period analysed, on average, all institutions underestimated in their forecasts both real GDP growth and other analysed nominal macroeconomic aggregates relevant to the preparation of the fiscal projections. Not all institutions make forecasts for all the aggregates analysed (see Table 2.2). We compared the autumn forecasts for the following year again in detail to realistically position the forecasts of IMAD. In this comparison, the deviation in the forecasts for real GDP growth and nominal level of compensation of employees was the lowest in IMAD forecasts, whereas in the forecasts for nominal GDP level and private consumption forecasts it was the lowest in the EC forecasts. The forecasts of the other three institutions (Bank of Slovenia, OECD, IMF) tended to diverge more in view of the limited number of projected aggregates (see Table 4.1). In view of the above, it is worth recalling that we compare the forecasts based on the same available data on the national accounts statistics as a rule, but in different time frames, where IMAD produces forecasts first (see explanatory notes in Chapter 2.1). If the macroeconomic forecasts available at the time of preparation of the budget documents were to be compared, the IMAD forecast would be prepared the latest and its deviation in this comparison is, therefore, also for this reason, smaller than that of the other institutions.[34]

On average, in the period analysed, fiscal projections of all institutions were also underestimated, with the smallest underestimation by the MoF. Revenue and the nominal balance of the general

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[32] On the basis of point four of paragraph two and point three of paragraph three of Article 7 of the FRA, the Fiscal Council must provide an assessment of compliance of the implemented budgets of the general government with the fiscal rules by 30 June of the current year for the preceding year.

[33] The MoF, EC, OECD and IMF. In assessing the forecasts of each institution, we took into account their own calculation of the structural balance as the first realisation with which we compared the forecast. These vary between institutions according to the assessment of the output gap applied.

[34] See the table in Annex 7.5.

Table 4.1: Statistical measures of forecast differences of autumn forecast of key macroeconomic and fiscal aggregates for the next year

AF t+1	ME						MAE						RMSE					
	IMAD	MoF	EC	OECD	IMF	BoS	IMAD	MoF	EC	OECD	IMF	BoS	IMAD	MoF	EC	OECD	IMF	BoS
GDP, real growth in %	-0.40	...	-0.65	-0.55	-1.23	-0.60	1.05	...	1.10	1.15	1.73	1.10	1.27	...	1.34	1.47	1.98	1.39
GDP, nominal level	-468	...	-389	-480	-940	...	804	...	688	953	1,257	...	1,028	...	923	1,201	1,513	...
Private consumption, nominal level	-331	...	-263	-551	...	...	560	...	596	844	...	...	826	...	811	1,041	...	...
Gross oper. surplus/mixed income, nom. level	-104	...	...	...	...	...	513	...	...	...	...	...	656	...	...	...	...	...
Compensation of employees, nominal level	-298	...	-710	-549	...	...	298	...	710	549	...	...	342	...	749	643	...	...
Inflation, annual average in %	0.33	...	0.28	0.03	0.23	0.25	0.38	...	0.53	0.58	0.43	0.60	0.52	...	0.62	0.61	0.49	0.70
General government balance, % of GDP	...	-0.48	-0.85	-0.75	-1.90	...	...	0.53	0.85	0.75	1.90	...	...	0.70	1.10	0.90	2.17	...
General government revenue, % of GDP	...	-0.40	-0.78	-0.35	-1.45	...	...	0.40	0.78	0.70	2.25	...	...	0.61	1.06	0.79	2.70	...
General government expenditure, % of GDP	...	0.05	0.05	0.38	0.53	...	...	0.65	1.00	0.88	2.53	...	...	0.85	1.28	0.99	2.82	...
General government gross debt, % of GDP	...	1.80	2.53	4.40	3.93	...	...	1.85	2.53	4.40	3.93	...	...	2.50	3.15	6.52	4.41	...

Source: SORS, IMAD, MoF, EC, OECD, IMF, BoS, FC calculations.

government sector was underestimated by all the institutions that produced forecasts while the level of expenditure was slightly overestimated. The smallest deviations were in the MoF forecasts followed by the OECD and then the EC, and the largest deviations were detected in the IMF forecasts. Furthermore, all institutions overestimated the general government gross debt-to-GDP ratio, where the deviation was again the lowest in the MoF forecasts, followed by the EC forecasts and then the OECD forecasts.

A comparison of forecast deviations in relation to the first realisation or the latest available data for some categories indicates the important role of statistical data revisions. According to common practice, statistical offices correct their previous publications when they obtain additional data. Substantial revisions can have a significant impact on the accuracy of the forecasts and thus on the ex post evaluation of these forecasts. For macroeconomic aggregates, the comparison of forecasts with the first and last available data on realisation shows that the impact of the revision of the official statistical data is pronounced at the nominal level of private consumption and, to a certain extent, also at the level of compensation of employees. This indicates, at least in the case of the abovementioned aggregates, the need to improve the quality of the first published official statistics. Among fiscal aggregates, the impact of the revision by SORS on the nominal balance does not significantly change the forecast performance assessment. The impact of revisions is somewhat higher in individual categories of revenue and expenditure. In the period analysed, the impact of the revision on the forecast performance assessment was significant in terms of social security revenue and social transfers. It was mainly linked to the revision of the booking of social transfers in kind.[35]

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[35] For more information, see https://www.stat.si/StatWeb/en/News/Index/8399.

Box 4.1: Forecast differences of fiscal indicators expressed as a share of GDP

The findings on forecast differences of fiscal indicators expressed as a percentage of GDP may be linked to both nominal fiscal variable forecast differences and to GDP forecast differences. There-fore, caution should be exercised when interpreting forecast differences of the fiscal indicators thus expressed. The main sources of our analysis (Stability Programme, Draft Budgetary Plan), express the fiscal indicators as share of GDP. Forecast differences of indicators expressed as a share of GDP are, like in Hauth et al. (2018; Box 1, p. 7-8), divided into the numerator's contribution (nominal fiscal vari-able forecast difference) and the denominator contribution (GDP forecast difference). When interpret-ing such a breakdown, account must be taken of the different meanings of the numerator and denomi-nator signs: the positive value of the numerator's contribution reflects the over-estimation of the nomi-nal fiscal variables while the positive value of the denominator contribution reflects the GDP under-estimation.

The calculations show that the forecast differences of fiscal indicators expressed in terms of GDP are more closely related to forecast differences of nominal fiscal variables and, to a lesser extent, to the GDP forecast differences. In the 2016-2019 period, this conclusion applies to the spring and autumn forecasts of the general government indicators in the Stability Programme and the Draft Budg-etary Plan for the current and the following years, as well as to the comparison of the forecasts with the latest and the first outturn. While the contribution of the GDP forecast difference is negligible in the case of the forecast difference of balance-to-GDP ratio, the absolute contribution of the revenue or expenditure forecast difference is on average about twice the contribution of GDP forecast differ-ence. In view of the fiscal indicator forecast differences expressed as a share of GDP, the GDP fore-

Table: Contributions of forecast differences of numerator and denominator to the forecast differences of fiscal indicators

latest outturn

contribution	variable	SP t+1	DBP t+1	SP t	DBP t	average	2016	2017	2018	2019	average
total	balance	-0.8	-0.5	-0.2	-0.2	-0.4	-0.3	-1.1	-0.4	0.2	-0.4
numerator		-0.8	-0.4	-0.2	-0.2	-0.4	-0.3	-1.1	-0.3	0.2	-0.4
denominator		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	revenue	-1.1	-1.1	-1.1	-0.7	-1.0	-1.1	-0.6	-1.2	-1.1	-1.0
numerator		-2.1	-1.6	-1.3	-0.8	-1.4	-1.7	-2.0	-1.6	-0.4	-1.4
denominator		1.0	0.5	0.2	0.1	0.4	0.7	1.4	0.4	-0.7	0.4
total	expenditure	-0.4	-0.7	-0.9	-0.6	-0.6	-0.9	0.4	-0.9	-1.2	-0.6
numerator		-1.4	-1.2	-1.1	-0.7	-1.1	-1.6	-1.0	-1.3	-0.5	-1.1
denominator		1.0	0.5	0.2	0.1	0.5	0.7	1.4	0.4	-0.7	0.5

first outturn

contribution	variable	SP t+1	DBP t+1	SP t	DBP t	average	2016	2017	2018	2019	average
total	balance	-0.8	-0.5	-0.3	-0.2	-0.4	-0.4	-1.1	-0.4	0.2	-0.4
numerator		-0.8	-0.5	-0.2	-0.2	-0.4	-0.4	-1.1	-0.3	0.2	-0.4
denominator		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	revenue	-0.4	-0.4	-0.4	0.0	-0.3	-0.4	0.3	0.0	-1.1	-0.3
numerator		-1.4	-0.9	-0.5	-0.1	-0.7	-0.4	-1.4	-0.6	-0.4	-0.7
denominator		0.9	0.5	0.1	0.1	0.4	0.0	1.7	0.6	-0.7	0.4
total	expenditure	0.4	0.1	-0.1	0.2	0.1	-0.1	1.4	0.4	-1.2	0.1
numerator		-0.6	-0.4	-0.3	0.1	-0.3	-0.1	-0.3	-0.3	-0.5	-0.3
denominator		1.0	0.5	0.2	0.1	0.4	0.0	1.7	0.6	-0.7	0.4

Source: SORS, IMAD, MoF, FC calculations.

cast difference in the period analysed therefore compensated on average for half of the contribution of the fiscal variables forecast difference. An exception to this is the expenditure forecast difference for the next year relative to the first outturn, where the contribution of the GDP forecast difference in absolute terms is slightly higher. At the same time, it can be concluded that in the 2005-2019 period the relationship between the contribution of the revenue forecast difference and the contribution of the GDP forecast difference was as expected negative (taking into account the numerator and denominator contribution signs mentioned above) as government revenue depends on GDP developments. However, there is also a negative – but slightly weaker – link between the contribution of the expenditure forecast difference and the contribution of the GDP forecast difference, which may indicate the implementation of a pro-cyclical fiscal policy in the period considered.

5. Assessment of macroeconomic and fiscal forecast differences for the 2005-2019 period

In addition to the statutory given period of the last four years, we also analysed the forecast differences over a longer period, following the example of other institutions that prepare ex post assessments of macroeconomic and fiscal forecasts. We chose the period of 2005-2019, which is the longest period for which the forecasts of macroeconomic and fiscal aggregates by various institutions were available. We compared forecasts from the Stability Programmes by the MoF and forecasts by IMAD, which were the basis for the abovementioned fiscal projections, and comparable forecasts by the EC, which is the only international institution that has forecasts available for the whole of the abovementioned period, with the first outturn. We compared a narrower set of variables than in the assessments of forecast differences over the shorter period in Chapter 4, namely forecasts of the real and nominal GDP growth and of the share of the general government balance, revenue and expenditure to GDP. In the analysis of the 2005-2019 period we used various statistical tests, which are also used by the EC.[36] Notwithstanding the extension of the period of analysis from four to fifteen years, it is necessary to be aware of the relatively short time series and thus the limitations regarding the interpretation of results. Account should also be taken of the fact that the Stability Programmes were published in different months at the beginning of the abovementioned period.

The statistical indicators, usually used to evaluate the forecast differences, show that on average in the 2005–2019 period for which data are available, the quality of IMAD and of the MoF forecasts was comparable to the quality of the EC forecasts. In the abovementioned period, the mean error indicator indicates the over-estimation of GDP growth, the nominal GDP growth and the share of general government financial balance to GDP ratio forecast, while the mean error indicator indicates the under-estimate of general government revenue and expenditure forecast. The biggest forecast differences were seen in forecasts for nominal GDP growth and a share of general government expenditure in GDP, and resulted from forecast differences in individual years, which is also indicated by high RMSE. The mean absolute error of the forecast for nominal GDP growth for the current and next year was about a third higher than the mean absolute error of the real GDP growth forecast, which may indicate some shortcomings in the GDP deflator forecasts. The RMSE regarding a

Figure 5.1: Forecasts and outturn of y-o-y real GDP growth

Figure 5.2: Forecasts and outturn of general government balance

Legend: ▲ EC t ▲ IMAD t ■ EC t+1 ■ IMAD t+1 ── last outturn ── first outturn
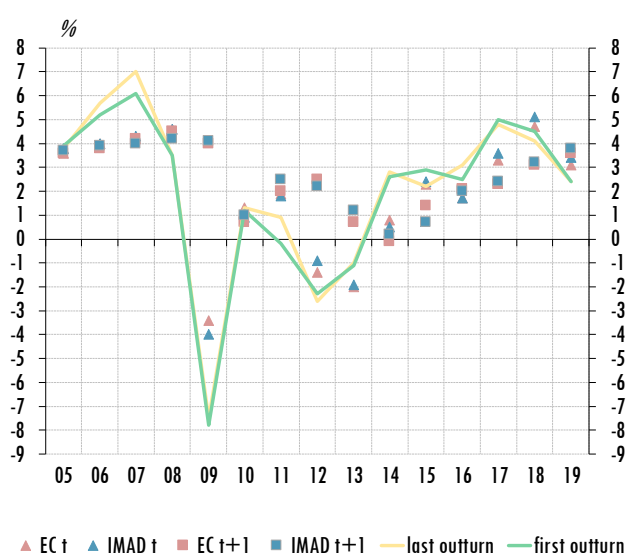
Sources: SORS, EC, IMAD, FC calculations.
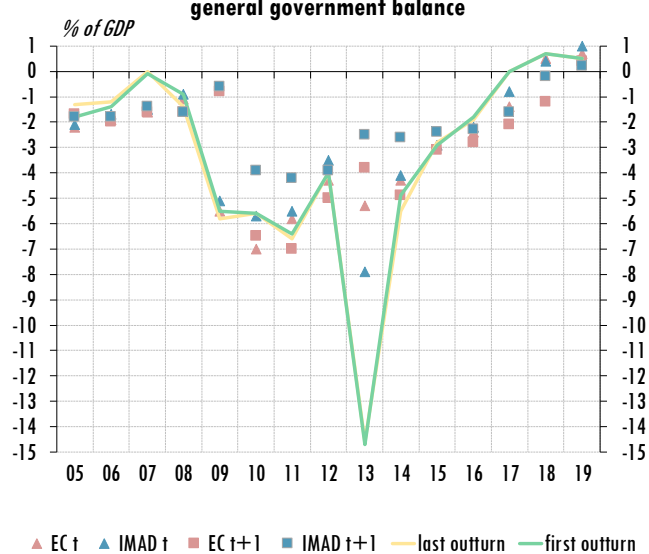
Sources: SORS, EC, MoF, FC calculations.

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[36] E.g. Fioramanti et al. (2016).

Table 5.1: Statistical forecast measures - first outurn 2005-2019

		ME			MAE			RMSE		
		t	t+1	t+2	t	t+1	t+2	t	t+1	t+2
GDP, real growth in %	IMAD	0.06	0.71	1.08	1.26	2.42	2.67	1.54	3.67	3.94
	EC	0.02	0.67		1.25	2.37		1.62	3.63	
	naïve forecast	0.67	0.53	0.49	2.30	3.09	3.64	3.44	4.35	4.55
	based on average	1.43	1.61	1.92	2.51	2.76	2.94	3.92	4.15	4.34
GDP, nominal growth in %	IMAD	0.21	0.95	1.61	1.51	3.12	3.60	1.88	4.42	4.79
	EC	0.28	1.19		1.41	2.75		1.79	4.17	
	naïve forecast	0.99	1.03	0.94	2.85	3.81	4.20	4.41	5.00	5.30
	based on average	5.20	5.44	5.92	5.27	5.49	5.93	6.78	7.15	7.67
general government balance, % of GDP	MoF	0.40	1.20	1.69	0.89	1.96	2.38	1.85	3.55	3.84
	EC	0.29	0.34		1.15	1.75		2.53	3.22	
	naïve forecast	0.00	-0.17	-0.31	2.69	3.21	3.94	4.19	4.48	5.16
	based on average	0.01	0.12	0.30	2.98	3.21	3.36	3.90	4.09	4.28
general government expenditure, % of GDP	MoF	-0.61	-1.68	-2.55	1.24	2.72	3.67	1.91	4.22	5.07
	EC	-0.61	-1.21		1.61	2.57		2.73	3.95	
	naïve forecast	0.12	0.35	0.67	3.41	4.09	4.87	4.53	5.07	6.09
	based on average	-0.42	-0.41	-0.48	3.62	3.89	4.04	4.53	4.77	4.97
general government revenue, % of GDP	MoF	-0.20	-0.47	-0.85	0.67	1.15	1.56	0.89	1.39	1.81
	EC	-0.31	-0.85		0.75	1.35		0.99	1.66	
	naïve forecast	0.13	0.19	0.37	0.89	1.23	1.46	1.11	1.49	1.70
	based on average	-0.40	-0.27	-0.18	0.96	1.01	1.18	1.18	1.27	1.37

Source: IMAD, MoF, EC, SORS, FC calculations. In the naïve forecast, the last known outturn of the related variable is taken as a forecast, while in "based on average" an average of outturns available when preparing the forecast is applied as a forecast.

forecast of a share of expenditure in GDP exceeded the RMSE of the forecast of a share of general government's revenue in GDP by two to three times, which may indicate the inability to control the expenditure, the occurrence of unforeseen events, or events that should be taken into account to a greater extent in budgetary planning. The mentioned forecast differences of both domestic institutions measured by ME, MAE and RMSE do not deviate significantly from comparable EC forecast differences and are mainly more accurate than those resulting from the simple approach to forecasts (e.g. naïve forecast[37] or forecast based on the average of past realisation). The latter finding, in particular as regards the comparison based on mean error indicator, applies to a much lesser extent to longer horizons of forecasts of general government aggregates. Nevertheless, if a naïve forecast or forecast based on the average of past realisation is taken into account, forecast differences in individual years would be significant, suggested by high – and, in terms of the quality, unfavourable – RMSE values of the abovementioned forecasts.[38] The accuracy of forecasts decreased by extending the forecast horizon, since the values of all statistical indicators (ME, MAE, RMSE) for both macroeconomic and fiscal aggregates increased by prolonging the forecast period. This was already demonstrated by the analysis of the Fiscal Council (2018), while a deterioration in accuracy as the horizon is extended is also a feature of the EC forecasts.

The distribution of forecast differences suggests a bias in IMAD and MoF forecasts for shorter and longer forecast horizons, both mostly in the direction of under-estimation, while deviations are similar to those of the EC forecasts. Although the distribution of forecast differences for the current

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[37] A naïve forecast takes the last known outturn of a variable as the predicted value.

[38] The construction of the RMSE indicator is such that this indicator "punishes" major forecast errors more strictly (see Chapter 2.2.1).

Figure 5.3: Histogram of deviations of forecasts of real GDP (IMAD)

number of forecasts (SP t and t+1)

difference between growth forecast and outturn in p.p.

■ 2005-2015   ■ 2016-2019
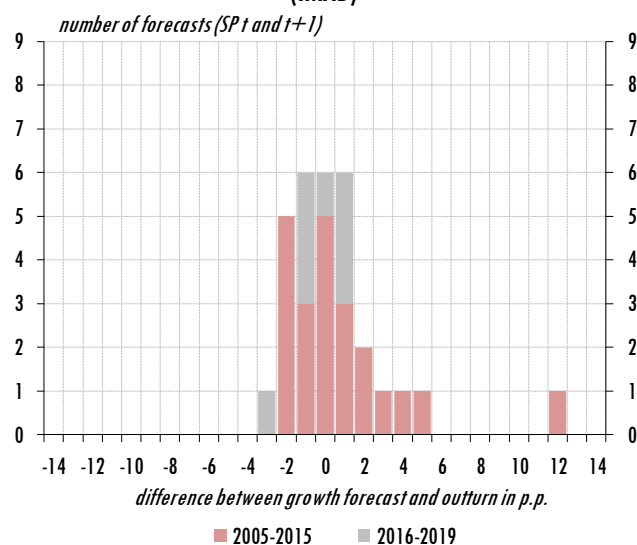
Sources: SORS, IMAD, FC calculations.

Figure 5.4: Histogram of deviations of forecasts of real GDP (EC)

number of forecasts (SP t and t+1)

difference between growth forecast and outturn in p.p.

■ 2005-2015   ■ 2016-2019
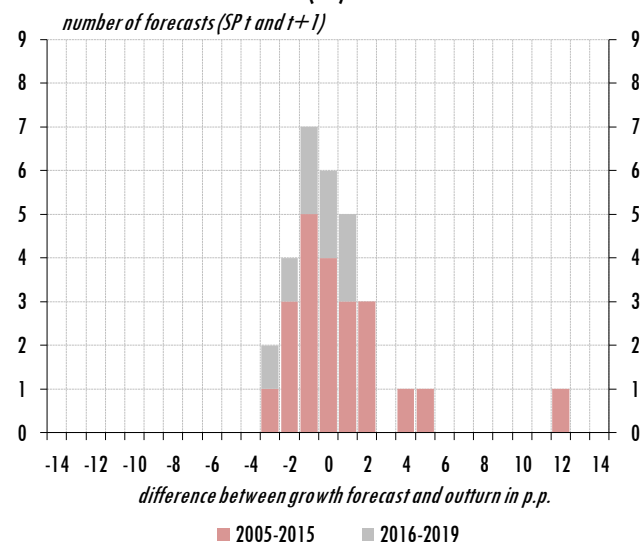
Sources: SORS, EC, FC calculations.

Figure 5.5: Histogram of deviations of forecasts of general government balance (MoF)

number of forecasts (SP t and t+1)

difference between ratio forecast and outturn in p.p. of GDP

■ 2005-2015   ■ 2016-2019
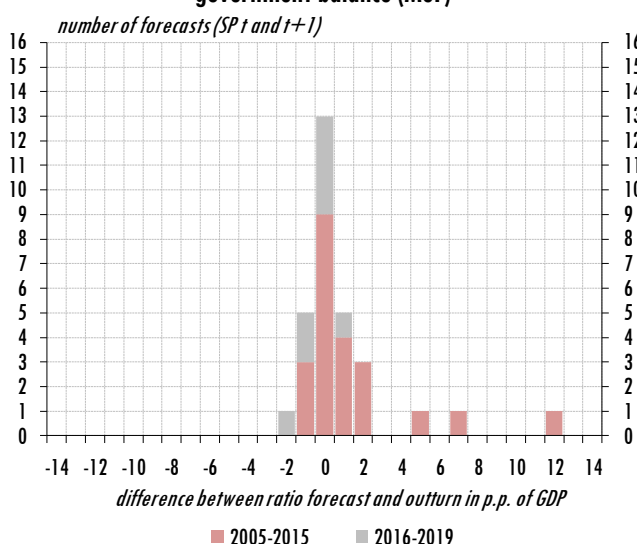
Sources: SORS, MoF, FC calculations.

Figure 5.6: Histogram of deviations of forecasts of general government balance (EC)

number of forecasts (SP t and t+1)

difference between ratio forecast and outturn in p.p. of GDP

■ 2005-2015   ■ 2016-2019
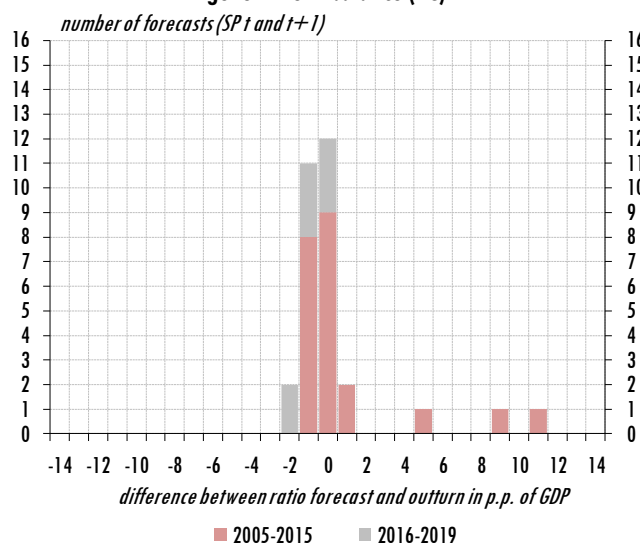
Sources: SORS, EC, FC calculations.

and next year, as shown in the histograms[39], is not entirely symmetric, the deviations from symmetry and from the principle of unbiasedness are not significant. The distribution of forecast differences over the last four years (grey fields in the histograms) also deviates, but not considerably, from the average deviation over a longer forecast period, an important difference is only in the absence of outliers or major forecast differences. Forecast differences, sometimes also of large extent, are relatively common, but the distribution of outliers over a longer period suggests that the largest forecast differences occur when economic activity growth strongly swings downwards or when major shocks (mainly one-off) appear on the side of government expenditure. There have been no such fluctuations or shocks in the last four years. The asymmetry of the distribution is mainly reflected in

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[39] Histograms presenting forecast difference distributions separately for both forecast time horizons (current and next year) and for an extended set of variables can be found in Annex 7.7.

errors in the forecasts for the next year.[40] The distribution of forecast differences in the economic activity forecast shows that it was largely under-estimated, however, the average of forecast differences due to one (in the case of real GDP growth forecast) or two (in the nominal GDP forecast) obvious outliers on the side of over-estimation remained close to zero. The distribution of forecast differences of the general government aggregates also deviates from the symmetric distribution, while closest to symmetry is the distribution of the forecast differences of the share of general government revenue in GDP. In the meantime, in the case of forecast differences of the share of government expenditure in GDP, a number of outliers is perceived on the side of the under-estimation, which is also reflected in the relatively high values of the RMSE forecast of this aggregate. The reported forecast differences of the share of expenditure in GDP are also directly reflected in the outliers of the over-estimation of the general government balance to GDP ratio. Similar findings are also found with regard to the distribution of EC forecast differences. In addition to all of the above findings, it should be noted that distributions of deviations also indicate a relatively large number of forecasts when forecast differences, even if not considered outliers, were quite large.

Calculations of the values of statistical indicators (in our case ME, MAE and RMSE) were supplemented by a regression analysis, which also enables an evaluation of the statistical characteristics of individual indicators. In our analysis, we assume that the bias of forecast difference assessment is statistically significant if the corresponding p-statistic is below 0.05. This is also the limit that is usually used in statistical analyses as an appropriate measure of significance.[41] In this case, the zero hypothesis of the existence of a bias in forecast difference can be rejected with 95% confidence.

Table 5.2: Results of a test of bias in the forecast differences

		t	t+1
GDP, real growth in %	IMAD	**0.06**	**0.71**
		0.89	*0.47*
	EC	**0.02**	**0.67**
		0.96	*0.50*
GDP, nominal growth in %	IMAD	**0.21**	**0.95**
		0.68	*0.43*
	EC	**0.28**	**1.19**
		0.56	*0.28*
general government balance, % of GDP	MoF	**0.42**	**1.21**
		0.40	*0.20*
	EC	**0.29**	**0.34**
		0.68	*0.70*
general government expenditure, % of GDP	MoF	**-0.61**	**-1.68**
		0.23	*0.13*
	EC	**-0.61**	**-1.21**
		0.40	*0.25*
general government revenue, % of GDP	MoF	**-0.20**	**-0.47**
		0.40	*0.20*
	EC	**-0.31**	**-0.85**
		0.23	*0.04**

*Source: IMAD, MoF, EC, SORS, FC calculations. Lower values (in italics) represent p-statistics. * marks the rejection of the null hypoteshis of unbiased forecast with at least 95% degree of confidence.*

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[40] The OECD findings in Turner (2017) are similar.

[41] E.g. Greene (1993, p. 265).

The regression analysis of the forecast differences of the macroeconomic and fiscal aggregates does not indicate a statistically significant presence of bias of forecast differences over a longer period. The basic quality of the forecasts is reflected in their unbiased character, meaning that the outturn does not differ significantly and persistently in the same direction from the forecast, or that the forecast differences are uniformly under- and over-estimated. Similarly to an analysis based on mean error value, the regression assessments of the analysed variables do not indicate a pronounced bias of forecast differences. The coefficients of all tests regarding bias of forecast difference are statistically insignificant. This applies to IMAD and MoF forecast differences. Similar findings can also be found in the parallel regression analysis of the EC forecast differences. In addition, the order of magnitude of forecast differences of both domestic institutions is comparable to that of other institutions.

The forecast difference bias may also be due to the state of the economic cycle. Some analyses (Fortin et. al, 2020, for Austria and Sinclair et. al, 2009, for the USA) show that GDP growth forecasts in the period of the economic cycle expansion are on average under-estimated and over-estimated during the recession period. In the two abovementioned analyses, this conclusion is based on the inclusion of the economic cycle variable in the equation, which determines the bias of the forecasts of both macroeconomic and fiscal variables. Such an analysis cannot currently be carried out with adequate statistical certainty for Slovenia, because the time series of economic cycle forecasts in real-time at our disposal are not long enough and because only one complete economic cycle can be determined in the period analysed, whereas a regression analysis would require the inclusion of lags of explanatory variables along short time series of forecasts of macroeconomic and fiscal variables. A simple analysis in the Fiscal Council (2018) suggests that economic activity growth is under-estimated at a time of expansion and over-estimated at a time when GDP growth is slowing down or falling. Accordingly, the analysis in the Fiscal Council (2019c) showed that general government deficit forecasts were the most under-estimated in the crisis years when expenditure was under-estimated and revenue over-estimated, although nominal revenue and expenditure forecasts deviated in the same direction in more than 70% of the cases.

If forecast differences occur in the same direction, or if in a series of consecutive periods, we predict too high or too low values of a variable relative to the outturn, this is known as the error persistence. Error persistence also includes the type of forecast errors where under-estimation (over-estimation) replaces over-estimation (under-estimation) in the next period. This characteristic is measured statistically with an autocorrelation test. A positive and statistically significant autocorrelation coefficient indicates that forecast differences in the same direction are repeated, while the negative autocorrelation coefficient indicates that forecasters, as a rule, tend to compensate for the forecast differences in one direction with an excessive prediction in the other direction. The autocorrelation assessment is taken as statistically significant when the p-value of the autocorrelation test is less than 0.05.

The regression analysis does not suggest that the persistence of forecast differences in IMAD forecasts in terms of macroeconomic aggregates and forecast differences in MoF forecasts in terms of fiscal aggregates are statistically significant. The statistical significance of autocorrelation coefficients is low, as the values of all probability tests of error persistence are higher than 0.05. Therefore, the zero hypothesis that there is an autocorrelation of the forecast differences of the analysed variables can be rejected. Most autocorrelation coefficients have a positive sign indicating that the forecast differences are skewed in the same direction. Similar findings regarding the absence of any autocorrelation also apply to the EC forecast differences.

Table 5.3: Results of a test of persistence in forecast differences

		Lag 1		Lag 2		Lag 3	
		t	t+1	t	t+1	t	t+1
GDP, real growth in %	IMAD	**0.24**	**0.13**	**-0.14**	**-0.05**	**0.03**	**0.09**
		0.31	*0.57*	*0.50*	*0.83*	*0.71*	*0.91*
	EC	**0.29**	**0.11**	**-0.04**	**-0.10**	**-0.02**	**0.13**
		0.21	*0.63*	*0.46*	*0.81*	*0.66*	*0.86*
GDP, nominal growth in %	IMAD	**0.03**	**0.15**	**-0.43**	**-0.07**	**0.17**	**0.13**
		0.91	*0.51*	*0.17*	*0.77*	*0.25*	*0.83*
	EC	**0.19**	**0.10**	**-0.21**	**-0.15**	**0.01**	**0.15**
		0.43	*0.67*	*0.47*	*0.73*	*0.68*	*0.77*
general government balance, % of GDP	MoF	**0.15**	**0.11**	**0.06**	**0.05**	**-0.16**	**-0.13**
		0.52	*0.63*	*0.79*	*0.87*	*0.80*	*0.89*
	EC	**0.03**	**-0.07**	**0.05**	**-0.11**	**-0.21**	**-0.20**
		0.90	*0.77*	*0.97*	*0.85*	*0.80*	*0.77*
general government expenditure, % of GDP	MoF	**-0.08**	**0.08**	**0.02**	**0.05**	**-0.11**	**-0.11**
		0.75	*0.72*	*0.95*	*0.92*	*0.95*	*0.93*
	EC	**-0.02**	**-0.03**	**0.04**	**-0.15**	**-0.16**	**-0.19**
		0.93	*0.91*	*0.98*	*0.79*	*0.90*	*0.75*
general government revenue, % of GDP	MoF	**0.14**	**0.14**	**-0.15**	**-0.18**	**0.13**	**-0.08**
		0.54	*0.55*	*0.68*	*0.61*	*0.77*	*0.78*
	EC	**0.09**	**0.09**	**-0.44**	**-0.32**	**0.00**	**-0.32**
		0.70	*0.69*	*0.14*	*0.34*	*0.26*	*0.23*

Source: IMAD, MoF, EC, SORS, FC calculations. Lags refer to the number of lags, for which the test of persistence of forecast differences is presented (values of h in Chapter 2.2.2). Lower values (in italics) represent p-statistics.

Table 5.4: Forecast differences in the same direction in four consecutive years

Institution		IMAD				MoF						EC								
Variable		GDPR		GDPN		R		E		BALANCE		GDPR		GDPN		R		E		BALANCE	
Year	threshold	t	t+1	t	t+1	t	t+1	t	t+1	t	t+1	t	t+1	t	t+1	t	t+1	t	t+1	t	t+1
no. of runs	0	1	1	0	2	1	1	1	1	1	2	2	1	2	1	1	1	1	1	1	1
	σ/2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	σ	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
no. of runs of overestimated forecasts	0	0	0	0	1	0	0	0	0	1	1	1	0	1	1	0	0	0	0	0	0
	σ/2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	σ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
no. of runs of underestimated forecasts	0	1	1	0	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1
	σ/2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	σ	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
longest run of overestimated forecasts in years	0	2	3	2	5	2	2	2	3	4	7	5	3	5	5	2	2	2	3	2	1
	σ/2	1	3	1	3	2	2	0	1	1	2	1	3	1	3	1	2	1	2	1	1
	σ	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	2	0	0	1	1
longest run of underestimated forecasts in years	0	5	5	2	5	5	5	6	8	3	4	5	5	5	3	5	8	5	7	4	5
	σ/2	1	2	1	1	2	5	1	3	0	0	1	1	1	1	2	7	1	1	0	1
	σ	0	0	0	1	1	4	1	1	0	0	0	0	0	0	1	4	1	1	0	0

Source: IMAD, MoF, EC, SORS, FC calculations. Notes: GDPR: real GDP growth in %, GDPN: nominal GDP growth in %, BALANCE: general government balance in % of GDP, R: general government revenue in % of GDP, E: general government expenditure in % of GDP. 0 marks the number of runs in which forecast differences persisted in the same direction for at least four consecutive years, σ/2 marks the number of runs in which the forecast differences in the size of half of standard deviation persisted in the same direction for at least four consecutive years, while σ marks the number of runs in which the forecast differences in the size of one standard deviation persisted in the same direction for at least four consecutive years.

The frequency of occurrence of successive forecast differences in the same direction that persisted for four or more years in the 2005-2019 period did not differ in IMAD and MoF forecasts from the frequency of occurrence of successive deviations in the same direction in the EC forecasts, with the exception of the general government balance forecast. The persistence of forecast differences can also be analysed directly following the definition of the EU Council Directive (2011/85/EU), according to which it is necessary to verify the bias of forecasts in any four consecutive years of the observation period. Such analysis is complementary to the regression analysis of the persistence of forecast differences. Regarding nominal GDP growth forecasts, sequential forecast differences in the same direction in IMAD forecasts were more frequent in the forecasts for the next year and, in the EC forecasts, were more frequent in the forecasts for the current year. Regarding the forecasts of the general government balance to GDP ratio, sequential forecast differences in the MoF forecasts in the same direction were more frequent than those in the EC forecasts, both in the forecasts for the current and for the next year. In both of the abovementioned variables, consecutive forecast differences were evenly divided into over- and under-estimations. Taking into account only forecast differences in the amount of a half or a full standard deviation of the forecast,[42] the period of consecutive forecast differences over a period of four or more years persisted only in the case of under-estimation of the share of the general government revenue in GDP for the next year, which is the same as in the EC forecast. The maximum period of consecutive error over-estimation was recorded in the MoF forecast for the share of the general government balance in GDP in the next year, with a length of seven years. Moreover, among all the observed variables, the length of this period deviated the most (by 6 years) from the length of consecutive forecast differences in the EC forecast. Regarding the under-estimation, the maximum persistence period of forecast differences was eight years in the MoF forecast for the share of general government expenditure for the next year, and in the EC forecast for the share of government revenue in GDP for the next year.

The final regression test examined whether the forecast direction of macroeconomic and fiscal aggregates was adequate or whether their growth rate and decline in growth was correctly predicted. In this case, we do not check the accuracy of the forecast, but rather the "story" of the forecast. The assessment is statistically significant if the corresponding p-statistic of the Pesaran-Timmermann test is less than 0.05. In this case, the null hypothesis of the improper direction of the forecast can be rejected with 95% confidence.

Although the results of the Pesaran-Timmermann test also largely indicate a statistically significant correct direction of forecast of the variables under consideration, the forecasts of certain aggregates, in particular at a longer horizon of prediction, indicate deviations. An analysis of the direction forecast and the direction of outturn shows a relatively accurate forecasting of the direction of the main macroeconomic and fiscal aggregates, in particular for the current year. However, in analysing the direction of forecasts for the next year, where the forecast for the current year is used as a basis for comparison, major discrepancies appear. Deviations from an acceptable statistical significance that points to the appropriate direction of the forecast are namely detected in the forecasts of nominal GDP growth and the general government revenue and expenditure share in GDP for the next year. Such performance could also indicate a strategy for delaying fiscal consolidation. In fact, in all Stability Programmes (15) taken into account in our analysis, the MoF forecast a contraction in the share of expenditure in GDP for the next year, which in fact turned out to decrease in ten cases. The increase in the revenue share for the following year was forecast in four Stability Programmes and materialised six times. As a result, the share of the general government

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[42] The same tolerance limit is also adopted in Schuster (2018).

Table 5.5: Results of Pesaran-Timmermann test

		t	t+1
GDP, real growth in %	IMAD	**1.86**	**2.52**
		0.03*	*0.01**
	EC	**2.41**	**2.26**
		0.01*	*0.01**
GDP, nominal growth in %	IMAD	**2.94**	**0.79**
		0.00*	*0.22*
	EC	**2.40**	**1.52**
		0.01*	*0.06*
general government balance, % of GDP	MoF	**1.78**	**1.93**
		0.04*	*0.03**
	EC	**2.67**	**2.89**
		0.00*	*0.00**
general government expenditure, % of GDP	MoF	**2.14**	**0.00**
		0.02*	*0.50*
	EC	**2.31**	**-0.76**
		0.01*	*0.78*
general government revenue, % of GDP	MoF	**1.78**	**-0.12**
		0.04*	*0.55*
	EC	**1.09**	**0.00**
		0.14	*0.50*

Source: IMAD, MoF, EC, SORS, FC calculations. Lower values (in italics) represent p-statistics.* marks the rejection of the null hypoteshis that the direction of forecast is not correct with at least 95% degree of confidence.

Table 5.6: The accuracy of the forecast direction

	IMAD		IMAD		MoF		MoF		MoF	
	GDPR		GDPN		E		R		BALANCE	
	forecast: decrease	forecast: increase	forecast: decrease	forecast: increase	forecast: decrease	forecast: increase	forecast: decrease	forecast: increase	forecast: decrease	forecast: increase
outturn: decrease	6	2	7	1	9	1	7	2	4	2
outturn: increase	2	5	1	6	2	3	2	4	2	7

	forecast: decrease	forecast: increase	forecast: decrease	forecast: increase	forecast: decrease	forecast: increase	forecast: decrease	forecast: increase	forecast: decrease	forecast: increase
outturn: decrease	5	3	5	3	10	0	6	3	2	4
outturn: increase	1	6	3	4	5	0	5	1	0	9

Source: IMAD, MoF, EC, SORS, FC calculations. Notes: GDPR: real GDP growth in %, GDPN: nominal GDP growth in %, BALANCE: general government balance in % of GDP, R: general government revenue in % of GDP, E: general government expenditure in % of GDP.

balance in GDP actually improved in nine cases rather than in thirteen, as forecast in the Stability Programmes. However, the additional analysis shows that similar statistical deviations in the forecasts of predominantly the same variables are also characteristic of the EC forecasts.

6. Comparison of the EC forecast deviations for all EU Member States

Interpretations of the assessment of forecast deviations for an individual country should also be placed in the context of the assessment of forecast deviations for other countries. Such comparison may enable the identification of common country characteristics that could affect forecast deviations such as the size and openness of an individual national economy or fluctuation of key variables. This part compares the forecast deviations for EU Member States, as it is a single economic area where countries carry out a large part of international trade between themselves and are otherwise linked and under similar influences (e.g. geopolitical conditions). Moreover, the evolution of key variables in all Member States is increasingly influenced by uniform policies or operating rules, which is particularly the case for fiscal policy in recent years. Comprehensive deviation assessments of its forecasts are also carried out on a regular basis by the EC, which published the results of its analyses in 2012, 2016 and 2020.[43]

We compared the spring forecasts of the EC for all the EU Member States in the 2004-2019 period. The decision to compare EC forecasts is mainly linked to the fact that the forecasts for all Member States are made at the same time and based on a single set of exogenous assumptions. We compared the spring forecasts for real GDP growth and the share of general government balance in GDP in the current and next year.[44] The assessment of the forecast performance was based on the mean absolute error (MAE) considering the first available data on realisation, available in spring of the year t+1.[45] The forecasts were compared with the latest available data with the same statistical method and, at the same time, the extent of data revisions between the first and the last data available on realisation in a certain year was checked.

Figure 6.1: Real GDP - EU28 countries	Figure 6.2: General government balance - EU28 countries
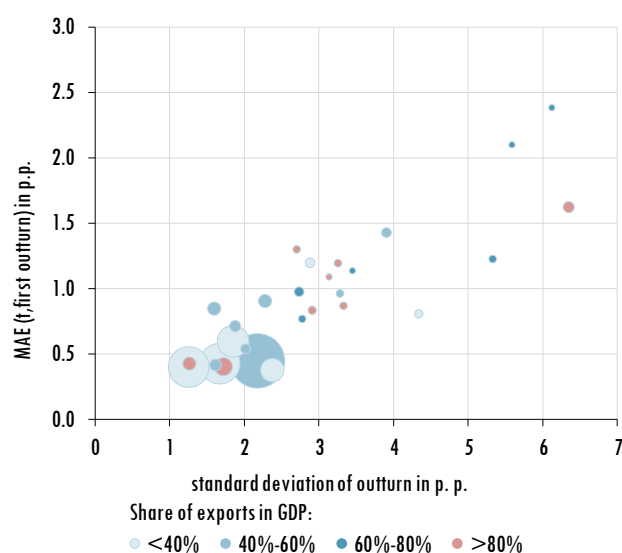
Figure 6.1: Real GDP - EU28 countries

Share of exports in GDP:
<40%   40%-60%   60%-80%   >80%

Note: The size of a circle reflects the size of an economy.
Source: Eurostat, EC forecasts, FC calculations.

Figure 6.2: General government balance - EU28 countries
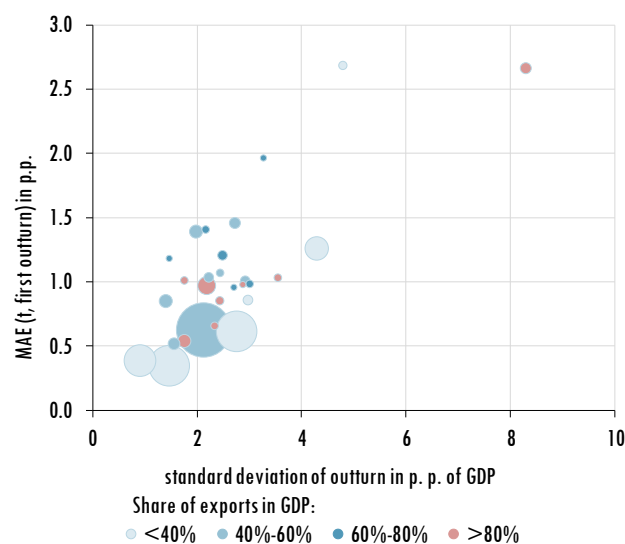
Share of exports in GDP:
<40%   40%-60%   60%-80%   >80%

Note: The size of a circle reflects the size of an economy.
Source: Eurostat, EC forecasts, FC calculations.

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[43] See Cabanillas and Terzi (2012), Fioramanti et al. (2016) and Chabin et al. (2020).

[44] In Chapter 4, the emphasis was placed on the analysis of autumn forecasts due to the importance of budgetary planning. This part compares the accuracy of the EC spring forecasts for EU countries.

[45] In its forecast deviation assessments, the EC also compared forecasts for the private consumption deflator. The key difference to our comparison is that the EC has made an assessment of the forecast deviations for the current year on the basis of the spring forecast and the assessment of forecast deviations for the next year on the basis of the autumn forecast.

The basic findings of the forecast comparison for EU Member States are that the error range is significant, errors are generally smaller in larger countries, and their accuracy improves as the horizon shortens. The range of the MAE in EC forecasts for real GDP growth is between 0.4 and 2.4 for the current year and between 0.9 and 3.9 for the next year. The range of the MAE for the share of general government balance in GDP is between 0.4 and 2.7 for the current year and between 0.8 and 3.5 for the next year. The data show that there is a strong correlation between fluctuations of an individual variable, measured by the standard deviation in the period analysed, and the forecast

Table 6.1: Mean absolute error of EC spring forecast with relation to the first available outturn in the 2004-2019 period for EU-28 countries

Real growth GDP in %			General government balance in % of GDP		
	forecast for current year	forecast for next year		forecast for current year	forecast for next year
ES	0.37	1.16	FR	0.35	0.84
FR	0.40	0.90	IT	0.39	0.77
NL	0.40	1.24	AT	0.52	0.87
AT	0.41	1.27	BE	0.54	1.10
BE	0.42	1.00	UK	0.62	1.43
UK	0.43	1.05	DE	0.63	1.33
DE	0.45	1.38	SK	0.66	1.00
PT	0.54	1.27	SE	0.85	1.60
IT	0.60	1.47	HU	0.85	1.55
DK	0.71	1.29	FI	0.85	1.79
BG	0.77	1.49	LV	0.96	2.44
EL	0.80	2.46	NL	0.97	1.73
HU	0.83	1.89	MT	0.98	1.50
PL	0.84	1.43	LT	0.98	1.74
SK	0.87	2.02	PT	1.01	1.90
SE	0.90	1.55	LU	1.01	1.92
HR	0.96	2.09	**SI**	**1.03**	**1.79**
CZ	0.97	1.98	RO	1.03	1.39
MT	1.09	1.90	HR	1.07	1.47
CY	1.14	1.63	EE	1.18	1.85
FI	1.19	2.05	CZ	1.20	1.69
SI	**1.19**	**2.20**	ES	1.26	2.09
LT	1.22	2.80	PL	1.39	1.25
LU	1.30	2.16	BG	1.41	2.11
RO	1.43	2.12	DK	1.46	2.12
IE	1.62	2.72	CY	1.96	2.64
EE	2.10	3.93	IE	2.66	3.46
LV	2.38	3.91	EL	2.68	2.88

Source: EC, FC calculations. Notes: Countries ranked according to the MAE of forecast for the current year. In the calculation of MAE the same number of forecasts is taken into account for all countries.

Table 6.2: Rank of EC forecast for Slovenia among EU-28 according to MAE for the 2004-2019 period

	Rank of EC forecasts for Slovenia according to MAE				Revision between first and latest available data
	Forecast for current year compared to first available data	Forecast for current year compared to latest available data	Forecast for next year compared to first available data	Forecast for next year compared to latest available data	
Real GDP growth	22	17	23	17	5
General government balance	17	15	18	19	2

Source: EC, FC calculations.

error. Errors in real GDP growth forecasts and the general government balance tend to be lower in larger countries, where fluctuations of both variables are generally smaller. As expected, forecasts for the current year are more accurate than forecasts for the next year for almost all Member States.

Regarding most Member States, deviations in the EC forecast measured by MAE are greater when the forecast is compared to the latest data than when the forecast is compared to the first available data. At the time of the forecast preparation, forecasters have at their disposal statistical data and other information that can change over time. This conclusion is partly confirmed by a relatively strong correlation between the MAE change in assessing the forecast against the first and the last available realisation data and the scope of the statistical revision of the two variables. In connection with the abovementioned correlation strength, Ireland, Malta, Greece and Cyprus stand out regarding the real GDP growth forecasts, Greece and Luxembourg regarding the general government balance and Portugal and Hungary regarding the current year forecasts. In terms of this correlation strength, among the Member States Slovenia is located in the lower half of the countries regarding the real GDP growth forecast and ranks around the middle of the countries regarding the forecast of the share of the general government financial balance in GDP.

The EC forecasts for Slovenia, considering their accuracy measured by MAE, are in the lower half of the EC forecasts for Member States, which is somewhat more the case for real GDP growth forecasts than for the general government financial balance forecasts (see Table 6.2). The findings of lower forecast accuracy regarding small open economies, where these variables fluctuate more significantly, hold true also in the interpretation of the deviation assessment of the EC forecast for Slovenia. In the 2004-2019 period, a standard deviation of the real GDP growth in Slovenia was the ninth highest among EU Member States, while of the share of the general government balance in GDP was the fourth highest. The ranking of the forecast performance for Slovenia among EU Member States is usually somewhat improved when comparing the forecast with the latest available data on realisation. In addition, revisions of data for the real GDP growth and the general government balance in Slovenia in the 2004-2019 period were among the smallest in the EU. In interpreting the comparison, account should also be taken of the findings of Chapter 5, where the indicators of the forecasts for real GDP growth and the general government balance prepared by the EC for Slovenia did not differ significantly from the forecasts by IMAD or the MoF over a long period.

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7. Annexes

7.1 Documents included in the analysis 2005-2019

	SLO		EC
	IMAD	MoF	
2004*	SF04	May.04	SF04
2005*	AF04	Jan.05	AF04
2006*	AF05	Dec.05	AF05
2007	AF06	Dec.06	AF06
2008	AF07	Dec.07	AF07
2009	SF09	Apr.09	SF09
2010	AF09	Jan.10	AF09
2011	SF11	Apr.11	SF11
2012	SF12	Apr.12	SF12
2013	SF13	May.13	SF13
2014	SF14	Apr.14	SF14
2015	SF15	Apr.15	SF15
2016	SF16	Apr.16	SF16
2017	SF17	Apr.17	SF17
2018	SF18	Apr.18	SF18
2019	SF19	Apr.19	SF19

*Source: IMAD, EC, MoF: Stability Programme except *Convergence Programme.*

7.2 An overview of IMAD/MoF forecasts 2015-2019

	SF15	AF15	SF16	AF16	SF17	AF17	SF18	AF18	SF19	AF19	*first outturn*	*last outturn*
GDP, real growth in %												
2015	2.4	2.7									*2.9*	*2.2*
2016	2.0	2.3	1.7	2.3							*2.5*	*3.1*
2017			2.4	2.9	3.6	4.4					*5.0*	*4.8*
2018					3.2	3.9	5.1	4.4			*4.5*	*4.1*
2019							3.8	3.7	3.4	2.8	*2.4*	*2.4*
	SF15	AF15	SF16	AF16	SF17	AF17	SF18	AF18	SF19	AF19	*first outturn*	*last outturn*
GDP, nominal level												
2015	38,558	38,520									*38,543*	*38,853*
2016	39,474	39,920	39,598	40,004							*39,769*	*40,367*
2017			40,613	41,416	41,626	42,761					*43,278*	*42,987*
2018					43,675	45,265	46,588	45,742			*45,948*	*45,755*
2019							49,611	48,529	48,797	48,242	*48,007*	*48,007*
	SF15	AF15	SF16	AF16	SF17	AF17	SF18	AF18	SF19	AF19	*first outturn*	*last outturn*
Private consumption, nominal level												
2015	19,879	20,141									*19,999*	*20,985*
2016	20,389	20,778	20,305	20,541							*20,574*	*21,760*
2017			20,867	21,234	21,664	22,647					*22,844*	*22,577*
2018					22,569	23,614	24,081	23,466			*23,360*	*23,746*
2019							25,326	24,653	24,550	25,279	*24,823*	*24,823*
	SF15	AF15	SF16	AF16	SF17	AF17	SF18	AF18	SF19	AF19	*first outturn*	*last outturn*
Government consumption, nominal level												
2015	7,147	7,142									*7,150*	*7,313*
2016	7,215	7,375	7,436	7,513							*7,530*	*7,713*
2017			7,596	7,767	7,857	7,881					*7,908*	*7,923*
2018					8,146	8,214	8,298	8,234			*8,189*	*8,394*
2019							8,758	8,687	8,711	8,925	*8,846*	*8,846*
	SF15	AF15	SF16	AF16	SF17	AF17	SF18	AF18	SF19	AF19	*first outturn*	*last outturn*
Compensation of employees, nominal level												
2015	18,607	18,789									*18,774*	*18,935*
2016	19,089	19,525	19,400	19,798							*19,740*	*19,954*
2017			20,039	20,590	21,004	21,200					*21,112*	*21,243*
2018					22,088	22,426	22,729	22,875			*22,803*	*22,813*
2019							24,253	24,426	24,513	24,601	*24,504*	*24,504*
	SF15	AF15	SF16	AF16	SF17	AF17	SF18	AF18	SF19	AF19	*first outturn*	*last outturn*
Inflation, annual average in %												
2015	-0.2	-0.4									*-0.5*	*-0.5*
2016	1.0	0.8	-0.3	0.1							*-0.1*	*0.0*
2017			1.3	1.4	1.8	1.5					*1.4*	*1.4*
2018					1.6	1.6	1.5	1.8			*1.7*	*1.7*
2019							1.9	2.1	1.6	1.8	*1.6*	*1.6*

	SF15	AF15	SF16	AF16	SF17	AF17	SF18	AF18	SF19	AF19	first outturn	last outturn
Employment, growth in %												
2015	0.8	1.5									*1.4*	*1.3*
2016	0.6	1.1	0.9	1.9							*2.0*	*1.8*
2017			0.9	1.4	2.2	2.7					*2.8*	*3.0*
2018					1.5	1.7	2.4	2.8			*3.0*	*3.2*
2019							1.5	1.5	2.0	2.5	*2.4*	*2.4*
	SF15	AF15	SF16	AF16	SF17	AF17	SF18	AF18	SF19	AF19	*first outturn*	*last outturn*
Gross wages per employee, nominal growth in %												
2015	0.9	0.9									*0.7*	*1.0*
2016	1.8	2.2	1.7	1.9							*1.8*	*1.8*
2017			2.0	2.2	3.3	2.7					*2.7*	*2.7*
2018					3.3	3.6	4.0	3.5			*3.4*	*3.4*
2019							4.5	4.9	5.0	4.6	*4.3*	*4.3*
	SF15	AF15	SF16	AF16	SF17	AF17	SF18	AF18	SF19	AF19	*first outturn*	*last outturn*
Wages and salaries, nominal level												
2015	15,992	16,543									*16,106*	*16,224*
2016	16,408	17,199	16,651	16,964							*16,905*	*17,156*
2017			17,201	17,644	17,976	18,191					*18,120*	*18,268*
2018					18,904	19,242	19,478	19,608			*19,543*	*19,604*
2019							20,785	20,939	21,002	21,141	*21,034*	*21,034*
	SF15	AF15	SF16	AF16	SF17	AF17	SF18	AF18	SF19	AF19	*first outturn*	*last outturn*
Gross operating surplus/mixed income, nominal level												
2015	14,758	14,474									*14,503*	*14,646*
2016	15,016	14,839	14,888	14,903							*14,648*	*15,005*
2017			15,140	15,411	15,020	15,972					*16,543*	*16,122*
2018					15,846	17,122	18,070	16,984			*17,224*	*17,028*
2019							19,417	18,017	18,166	17,512	*17,390*	*17,390*

	SF15	AF15	SF16	AF16	SF17	AF17	SF18	AF18	SF19	AF19	*first outcome*	*last outcome*
General government balance, in % of GDP												
2015	-2.9	-2.9									*-2.9*	*-2.8*
2016	-2.3	-2.2	-2.2	-2.2							*-1.8*	*-1.9*
2017			-1.6	-1.3	-0.8	-0.8					*0.0*	*0.0*
2018					-0.2	0.4	0.4	0.8			*0.7*	*0.7*
2019							0.2	0.6	1.0	0.8	*0.5*	*0.5*
	SF15	AF15	SF16	AF16	SF17	AF17	SF18	AF18	SF19	AF19	*first outcome*	*last outcome*
General government revenue, in % of GDP												
2015	44.7	44.8									*45.1*	*45.9*
2016	43.1	43.4	43.5	42.9							*43.6*	*44.3*
2017			43.8	43.0	43.5	43.2					*43.1*	*44.0*
2018					43.7	43.0	42.3	43.4			*43.1*	*44.3*
2019							41.7	43.0	43.2	44.5	*44.2*	*44.2*
	SF15	AF15	SF16	AF16	SF17	AF17	SF18	AF18	SF19	AF19	*first outcome*	*last outcome*
General government expenditure, in % of GDP												
2015	47.6	47.7									*48.0*	*48.7*
2016	45.3	45.5	45.7	45.1							*45.5*	*46.3*
2017			45.4	44.3	44.4	43.9					*43.1*	*44.1*
2018					43.9	42.6	41.9	42.6			*42.4*	*43.6*
2019							41.5	42.5	42.2	43.7	*43.7*	*43.7*
	SF15	AF15	SF16	AF16	SF17	AF17	SF18	AF18	SF19	AF19	*first outcome*	*last outcome*
General government gross debt, in % of GDP												
2015	81.6	84.1									*83.2*	*82.6*
2016	78.7	80.8	80.2	80.2							*79.7*	*78.7*
2017			78.2	78.2	77.0	75.2					*73.6*	*74.1*
2018					74.3	71.7	69.3	70.3			*70.1*	*70.4*
2019							65.2	66.0	65.4	66.3	*66.1*	*66.1*

Source: IMAD, MoF, SORS, FC calculations.

7.3 Statistical indicators 2016-2019

	no. obs.	Average			SF t+1			AF t+1			SF t			AF t		
		ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE
GDP, real growth																
IMAD	16	-0.36	0.94	1.07	-0.75	1.45	1.63	-0.40	1.05	1.27	-0.15	0.95	0.99	-0.13	0.33	0.38
EC	16	-0.51	0.91	1.06	-0.83	1.43	1.65	-0.65	1.10	1.34	-0.40	0.85	1.01	-0.15	0.25	0.25
OECD	16	-0.38	0.99	1.15	-0.80	1.55	1.72	-0.55	1.15	1.47	-0.18	0.93	0.96	0.00	0.35	0.44
IMF	16	-0.84	1.26	1.49	-1.33	1.73	2.02	-1.23	1.73	1.98	-0.65	1.15	1.40	-0.18	0.43	0.57
BoS	16	-0.46	0.91	1.06	-0.78	1.53	1.65	-0.60	1.10	1.39	-0.30	0.75	0.90	-0.18	0.28	0.28
Average		*-0.51*	*1.00*	*1.17*	*-0.90*	*1.54*	*1.73*	*-0.69*	*1.23*	*1.49*	*-0.34*	*0.93*	*1.05*	*-0.13*	*0.33*	*0.38*

	no. obs.	Average			SF t+1			AF t+1			SF t			AF t		
		ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE
GDP, nominal level																
IMAD	16	-384	906	1,065	-907	1,709	1,932	-468	804	1,028	-98	814	974	-63	298	324
EC	16	-316	747	898	-728	1,441	1,612	-389	688	923	-171	679	866	25	181	190
OECD	16	-383	854	992	-958	1,609	1,836	-480	953	1,201	-177	663	698	83	189	232
IMF	16	-805	1,025	1,307	-1,575	1,751	2,124	-940	1,257	1,513	-631	715	1,178	-72	378	415
BoS	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Average		*-472*	*883*	*1,065*	*-1,042*	*1,628*	*1,876*	*-569*	*925*	*1,166*	*-269*	*718*	*929*	*-7*	*261*	*290*

	no. obs.	Average			SF t+1			AF t+1			SF t			AF t		
		ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE
Private consumption, nominal level																
IMAD	16	-277	558	724	-612	864	1,098	-331	560	826	-250	610	717	83	198	254
EC	16	-213	563	694	-370	889	1,028	-263	596	811	-228	669	802	9	99	136
OECD	15	-254	705	862	-334	1,084	1,389	-551	844	1,041	-151	715	796	20	178	224
IMF	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
BoS	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Average		*-248*	*609*	*760*	*-439*	*946*	*1,172*	*-382*	*667*	*893*	*-210*	*665*	*772*	*37*	*158*	*205*

	no. obs.	Average			SF t+1			AF t+1			SF t			AF t		
		ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE
Gross operating surplus/mixed income, nominal level																
IMAD	16	-56	738	846	-97	1,294	1,424	-104	513	656	85	846	961	-109	297	341
EC	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
OECD	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
IMF	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
BoS	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Average		*-56*	*738*	*846*	*-97*	*1294*	*1424*	*-104*	*513*	*656*	*85*	*846*	*961*	*-109*	*297*	*341*

	no. obs.	Average			SF t+1			AF t+1			SF t			AF t		
		ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE
Compensation of employees, nominal level																
IMAD	16	-255	295	334	-672	672	733	-298	298	342	-128	133	182	79	79	80
EC	16	-518	518	558	-872	872	927	-710	710	749	-300	300	348	-193	193	207
OECD	15	-464	492	556	-937	937	1,031	-549	549	643	-359	359	384	-9	122	164
IMF	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
BoS	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Average		*-412*	*435*	*482*	*-827*	*827*	*897*	*-519*	*519*	*578*	*-262*	*264*	*305*	*-41*	*131*	*150*

	no. obs.	Average			SF t+1			AF t+1			SF t			AF t		
		ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE
Inflation, average																
IMAD	16	0.19	0.28	0.37	0.30	0.40	0.57	0.33	0.38	0.52	0.00	0.20	0.24	0.15	0.15	0.16
EC	16	0.23	0.32	0.45	0.53	0.58	0.96	0.28	0.53	0.62	0.00	0.05	0.07	0.13	0.13	0.17
OECD	16	0.20	0.54	0.57	0.55	1.00	1.01	0.03	0.58	0.61	0.20	0.50	0.58	0.03	0.08	0.09
IMF	16	0.17	0.32	0.35	0.28	0.48	0.51	0.23	0.43	0.49	0.03	0.13	0.15	0.15	0.25	0.26
BoS	16	0.16	0.33	0.40	0.33	0.58	0.72	0.25	0.60	0.70	0.05	0.05	0.07	0.03	0.08	0.09
Average		*0.19*	*0.36*	*0.43*	*0.40*	*0.61*	*0.76*	*0.22*	*0.50*	*0.59*	*0.06*	*0.19*	*0.22*	*0.10*	*0.14*	*0.15*

	no. obs.	Average			SF t+1			AF t+1			SF t			AF t		
		ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE
General government balance, in % of GDP																
MoF	16	-0.44	0.56	0.67	-0.83	0.83	0.96	-0.48	0.53	0.70	-0.25	0.50	0.53	-0.20	0.40	0.47
EC	16	-0.76	0.78	0.97	-1.28	1.28	1.50	-0.85	0.85	1.10	-0.50	0.60	0.77	-0.40	0.40	0.51
OECD	16	-0.59	0.64	0.76	-0.95	0.95	1.12	-0.75	0.75	0.90	-0.38	0.48	0.57	-0.28	0.38	0.44
IMF	16	-1.18	1.18	1.33	-1.70	1.70	1.83	-1.90	1.90	2.17	-0.68	0.68	0.79	-0.43	0.43	0.53
BoS	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
Average		*-0.74*	*0.79*	*0.93*	*-1.19*	*1.19*	*1.35*	*-0.99*	*1.01*	*1.22*	*-0.45*	*0.56*	*0.67*	*-0.33*	*0.40*	*0.49*
	no. obs.	Average			SF t+1			AF t+1			SF t			AF t		
		ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE
General government revenue, in % of GDP																
MoF	16	-0.30	0.60	0.76	-0.43	1.08	1.36	-0.40	0.40	0.61	-0.38	0.58	0.67	0.00	0.35	0.41
EC	16	-0.56	0.61	0.83	-0.68	0.73	1.21	-0.78	0.78	1.06	-0.43	0.58	0.67	-0.35	0.35	0.37
OECD	16	0.11	0.94	1.11	0.60	1.65	1.91	-0.35	0.70	0.79	0.23	1.23	1.49	-0.05	0.20	0.26
IMF	16	-0.89	1.92	2.34	-0.60	2.05	2.59	-1.45	2.25	2.70	-0.58	1.78	2.04	-0.95	1.60	2.04
BoS	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
Average		*-0.41*	*1.02*	*1.26*	*-0.28*	*1.38*	*1.76*	*-0.74*	*1.03*	*1.29*	*-0.29*	*1.04*	*1.22*	*-0.34*	*0.63*	*0.77*
	no. obs.	Average			SF t+1			AF t+1			SF t			AF t		
		ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE
General government expenditure, in % of GDP																
MoF	16	0.11	0.86	1.03	0.35	1.55	1.76	0.05	0.65	0.85	-0.13	0.88	1.03	0.15	0.35	0.46
EC	16	0.17	0.94	1.10	0.55	1.65	1.75	0.05	1.00	1.28	0.03	0.93	1.09	0.05	0.20	0.27
OECD	16	0.68	1.28	1.49	1.53	2.43	2.79	0.38	0.88	0.99	0.58	1.53	1.80	0.23	0.28	0.38
IMF	16	0.34	2.23	2.50	1.18	3.08	3.13	0.53	2.53	2.82	0.15	1.90	2.23	-0.48	1.43	1.83
BoS	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
Average		*0.32*	*1.33*	*1.53*	*0.90*	*2.18*	*2.36*	*0.25*	*1.26*	*1.49*	*0.16*	*1.31*	*1.54*	*-0.01*	*0.56*	*0.74*
	no. obs.	Average			SF t+1			AF t+1			SF t			AF t		
		ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE
General government gross debt, in % of GDP																
MoF	16	1.19	1.63	2.08	1.73	2.68	3.19	1.80	1.85	2.50	0.60	1.35	1.80	0.63	0.63	0.85
EC	16	1.79	2.04	2.60	2.70	3.20	3.66	2.53	2.53	3.15	0.93	1.43	2.15	1.00	1.00	1.45
OECD	16	3.58	3.69	4.90	5.85	5.85	7.12	4.40	4.40	6.52	1.88	2.28	3.05	2.20	2.25	2.92
IMF	16	2.86	3.08	3.40	5.38	5.38	5.90	3.93	3.93	4.41	1.58	2.28	2.42	0.55	0.75	0.85
BoS	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
Average		*2.35*	*2.61*	*3.25*	*3.91*	*4.28*	*4.97*	*3.16*	*3.18*	*4.14*	*1.24*	*1.83*	*2.36*	*1.09*	*1.16*	*1.52*

	no. obs.	Average			SF t+1			AF t+1			SF t			AF t		
		ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE
Taxes on production and imports, in % of GDP																
MoF	16	0.09	0.23	0.26	0.10	0.35	0.39	0.05	0.15	0.19	0.15	0.25	0.29	0.05	0.15	0.16
EC	16	0.08	0.21	0.26	0.15	0.30	0.34	0.05	0.15	0.22	0.13	0.28	0.34	0.00	0.10	0.12
OECD	15	0.12	0.25	0.27	0.27	0.40	0.43	-0.05	0.25	0.26	0.18	0.23	0.25	0.08	0.13	0.15
Average		*0.10*	*0.23*	*0.26*	*0.17*	*0.35*	*0.39*	*0.02*	*0.18*	*0.23*	*0.15*	*0.25*	*0.29*	*0.04*	*0.13*	*0.14*
Current taxes on income, wealth, etc., in % of GDP																
MoF	16	-0.21	0.23	0.26	-0.38	0.38	0.41	-0.25	0.25	0.25	-0.18	0.18	0.21	-0.03	0.13	0.15
EC	16	-0.23	0.24	0.28	-0.30	0.30	0.37	-0.33	0.33	0.35	-0.13	0.18	0.19	-0.18	0.18	0.22
OECD	15	-0.11	0.22	0.25	-0.23	0.30	0.33	-0.08	0.33	0.34	-0.10	0.10	0.14	-0.05	0.15	0.17
Average		*-0.18*	*0.23*	*0.26*	*-0.30*	*0.33*	*0.37*	*-0.22*	*0.30*	*0.32*	*-0.13*	*0.15*	*0.18*	*-0.08*	*0.15*	*0.18*
Social contributions, in % of GDP																
MoF	16	-0.21	0.43	0.56	-0.30	0.65	0.89	-0.35	0.50	0.69	-0.23	0.48	0.58	0.03	0.08	0.09
EC	16	-0.41	0.43	0.60	-0.60	0.60	0.80	-0.55	0.55	0.82	-0.35	0.40	0.57	-0.15	0.15	0.19
OECD	15	-0.25	0.53	0.66	-0.13	0.93	1.05	-0.50	0.50	0.66	-0.30	0.60	0.84	-0.05	0.10	0.10
Average		*-0.29*	*0.46*	*0.61*	*-0.34*	*0.73*	*0.91*	*-0.47*	*0.52*	*0.72*	*-0.29*	*0.49*	*0.66*	*-0.06*	*0.11*	*0.12*
Porperty income, in % of GDP																
MoF	16	-0.27	0.27	0.34	-0.35	0.35	0.44	-0.28	0.28	0.36	-0.33	0.33	0.39	-0.13	0.13	0.15
EC	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
OECD	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Average		*-0.27*	*0.27*	*0.34*	*-0.35*	*0.35*	*0.44*	*-0.28*	*0.28*	*0.36*	*-0.33*	*0.33*	*0.39*	*-0.13*	*0.13*	*0.15*
Other revenue, in % of GDP																
MoF	16	0.31	0.34	0.43	0.50	0.50	0.58	0.45	0.45	0.59	0.25	0.25	0.36	0.03	0.18	0.19
EC	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
OECD	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Average		*0.31*	*0.34*	*0.43*	*0.50*	*0.50*	*0.58*	*0.45*	*0.45*	*0.59*	*0.25*	*0.25*	*0.36*	*0.03*	*0.18*	*0.19*

	no. obs.	Average			SF t+1			AF t+1			SF t			AF t		
		ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE
Gross fixed capital formation, in % of GDP																
MoF	16	0.16	0.33	0.38	0.38	0.38	0.46	0.23	0.43	0.43	0.20	0.30	0.32	-0.15	0.20	0.31
EC	16	0.03	0.34	0.40	0.28	0.58	0.66	0.00	0.30	0.35	-0.03	0.23	0.28	-0.15	0.25	0.30
OECD	15	0.48	0.67	1.00	0.93	0.93	1.51	0.43	0.63	0.88	0.75	0.85	1.28	-0.18	0.28	0.34
Average		*0.22*	*0.44*	*0.59*	*0.53*	*0.63*	*0.88*	*0.22*	*0.45*	*0.56*	*0.31*	*0.46*	*0.63*	*-0.16*	*0.24*	*0.32*
Interest ,in % of GDP																
MoF	16	-0.10	0.14	0.18	-0.03	0.13	0.17	-0.15	0.15	0.17	-0.13	0.13	0.17	-0.10	0.15	0.21
EC	16	-0.01	0.21	0.28	0.15	0.30	0.43	-0.08	0.13	0.17	0.00	0.25	0.32	-0.10	0.15	0.21
OECD	15	0.09	0.19	0.27	0.27	0.27	0.41	0.15	0.15	0.19	0.03	0.23	0.29	-0.08	0.13	0.21
Average		*0.00*	*0.18*	*0.24*	*0.13*	*0.23*	*0.33*	*-0.03*	*0.14*	*0.18*	*-0.03*	*0.20*	*0.26*	*-0.09*	*0.14*	*0.21*
Compensation of employees, in % of GDP																
MoF	16	-0.03	0.23	0.25	-0.10	0.35	0.37	-0.08	0.23	0.25	0.00	0.20	0.21	0.05	0.15	0.17
Social transfers, in % of GDP																
MoF	16	-0.11	0.49	0.60	-0.03	0.73	0.86	-0.23	0.53	0.66	-0.28	0.58	0.69	0.10	0.15	0.17
Intermediate consumption, in % of GDP																
MoF	16	-0.03	0.16	0.21	-0.10	0.20	0.24	0.03	0.18	0.23	-0.10	0.15	0.21	0.08	0.13	0.17
Subsidies, in % of GDP																
MoF	16	0.11	0.19	0.23	0.08	0.23	0.25	0.23	0.28	0.33	0.08	0.13	0.17	0.05	0.15	0.17

	no. obs.	Average			SF t+1			AF t+1			SF t			AF t		
		ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE	ME	MAE	RMSE
Structural ablance, in % of GDP																
MoF	12	-0.56	0.58	0.69	-0.77	0.77	0.93	-0.47	0.47	0.60	-0.57	0.57	0.59	-0.43	0.50	0.62
EC	12	-1.03	1.03	1.11	-1.70	1.70	1.76	-1.13	1.13	1.20	-0.80	0.80	0.86	-0.50	0.50	0.62
OECD	12	-0.93	0.93	1.07	-0.97	0.97	1.03	-1.23	1.23	1.42	-0.77	0.77	0.95	-0.77	0.77	0.89
IMF	12	-1.52	1.53	1.62	-2.17	2.17	2.18	-2.43	2.43	2.48	-0.90	0.90	1.03	-0.57	0.63	0.78
Average		*-1.01*	*1.02*	*1.12*	*-1.40*	*1.40*	*1.48*	*-1.32*	*1.32*	*1.42*	*-0.76*	*0.76*	*0.86*	*-0.57*	*0.60*	*0.73*
Cyclical balance, in % of GDP																
MoF	12	0.00	0.12	0.14	-0.10	0.17	0.19	-0.10	0.10	0.13	0.10	0.10	0.13	0.10	0.10	0.13
EC	12	0.07	0.22	0.24	0.03	0.23	0.24	0.07	0.27	0.29	0.17	0.23	0.30	0.00	0.13	0.14
OECD	12	0.13	0.48	0.60	-0.27	0.47	0.56	0.30	0.63	0.84	0.20	0.47	0.57	0.27	0.33	0.42
IMF	12	0.02	0.27	0.30	-0.10	0.37	0.39	-0.17	0.23	0.26	0.03	0.17	0.17	0.30	0.30	0.37
Average		*0.05*	*0.27*	*0.32*	*-0.11*	*0.31*	*0.34*	*0.02*	*0.31*	*0.38*	*0.13*	*0.24*	*0.29*	*0.17*	*0.22*	*0.27*
Cyclically adjusted balance, in % of GDP																
MoF	12	-0.64	0.64	0.78	-0.90	0.90	1.03	-0.57	0.57	0.72	-0.67	0.67	0.77	-0.43	0.43	0.60
EC	12	-1.05	1.05	1.16	-1.63	1.63	1.72	-1.17	1.17	1.25	-0.87	0.87	0.98	-0.53	0.53	0.70
OECD	12	-0.93	0.93	1.07	-0.97	0.97	1.03	-1.23	1.23	1.42	-0.77	0.77	0.95	-0.77	0.77	0.89
IMF	12	-1.52	1.52	1.61	-2.00	2.00	2.02	-2.23	2.23	2.39	-1.00	1.00	1.05	-0.83	0.83	0.96
Average		*-1.04*	*1.04*	*1.15*	*-1.37*	*1.37*	*1.45*	*-1.30*	*1.30*	*1.45*	*-0.83*	*0.83*	*0.94*	*-0.64*	*0.64*	*0.79*

Source: SORS, IMAD, MoF, EC, OECD, IMF, BoS, FC calculations.

7.4 Forecasts and outturns 2016-2019

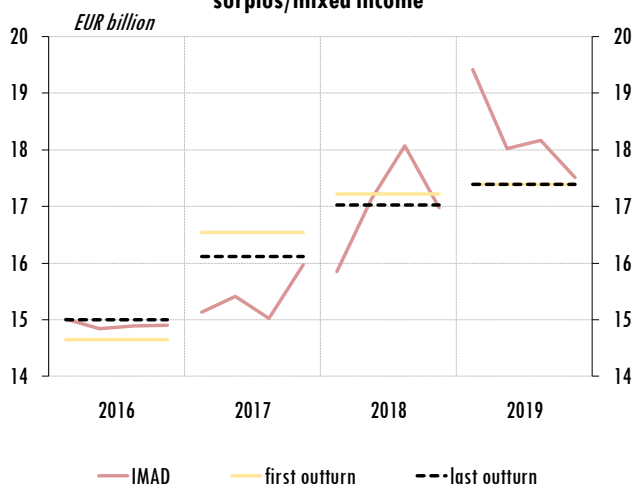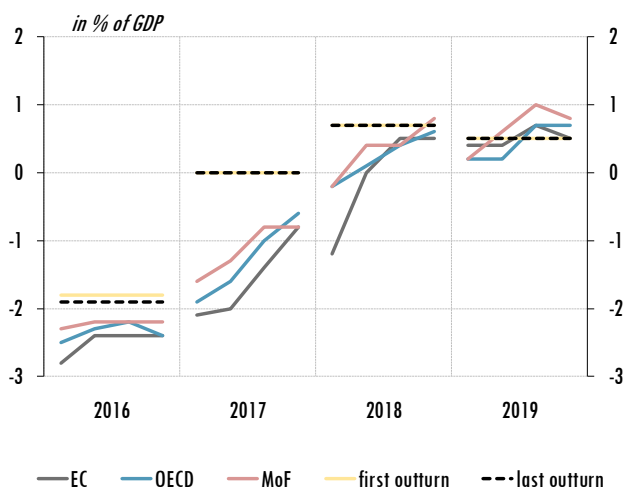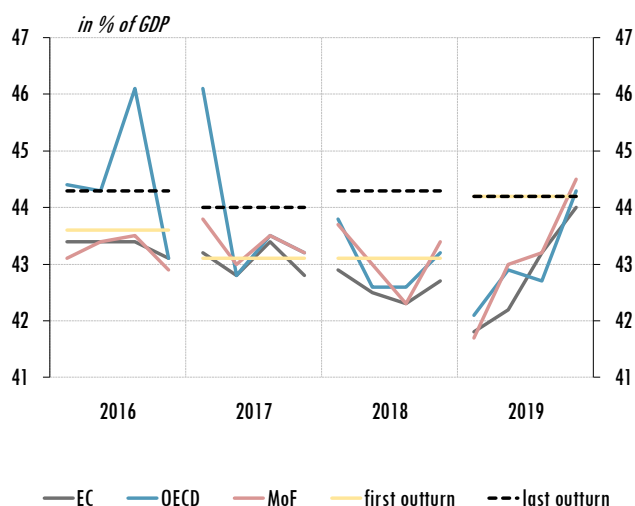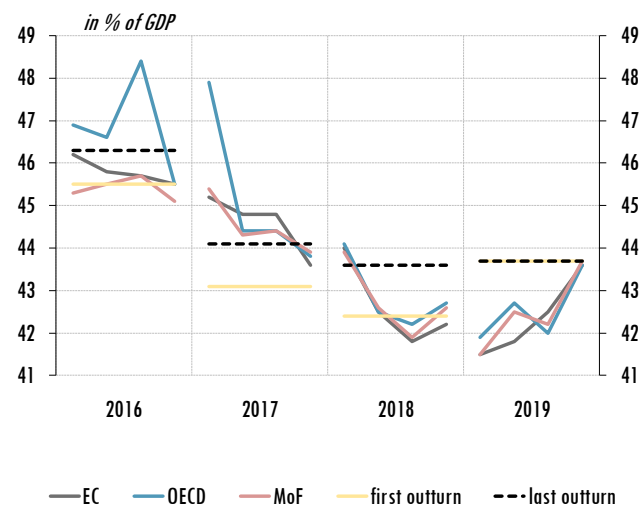**Forecasts and outturn of y-o-y real GDP growth**
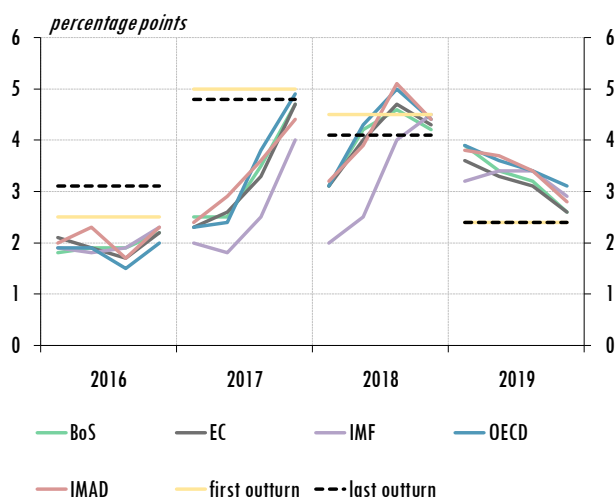
Note: Forecasts are shown in the following order:
spring t+1, autumn t+1, spring t, autumn t.
Source: SORS, BoS, EC, IMF, OECD, IMAD, FC calculations.

Forecasts and outturn of nominal GDP level
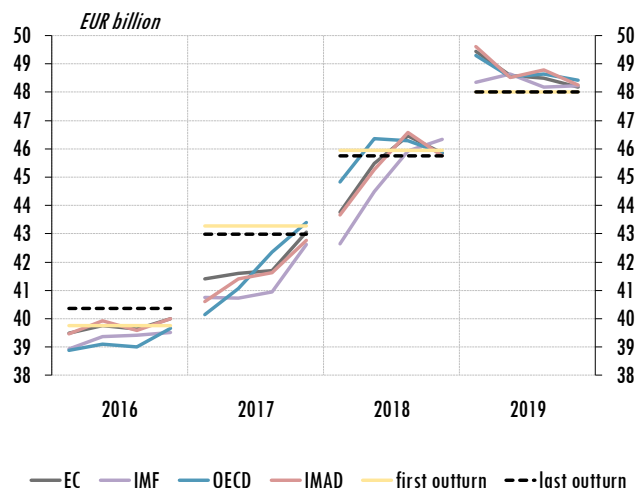
Note: Forecasts are shown in the following order:
spring t+1, autumn t+1, spring t, autumn t.
Source: SORS, EC, IMF, OECD, IMAD, FC calculations.

Forecasts and outturn of compensation of employees
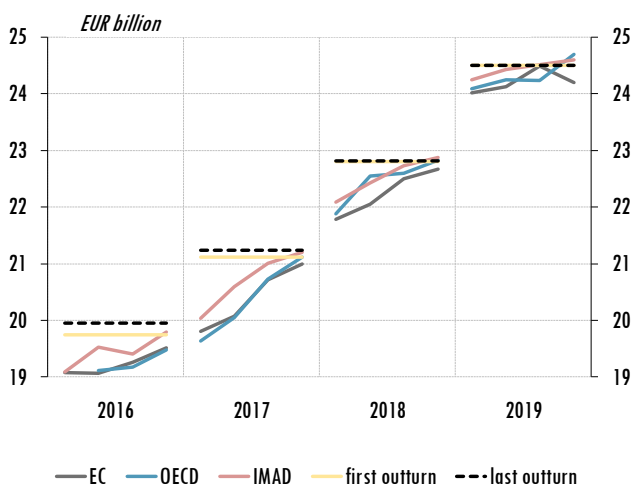
Note: Forecasts are shown in the following order:
spring t+1, autumn t+1, spring t, autumn t.
Source: SORS, EC, OECD, IMAD, FC calculations.

Forecasts and outturn of private consumption
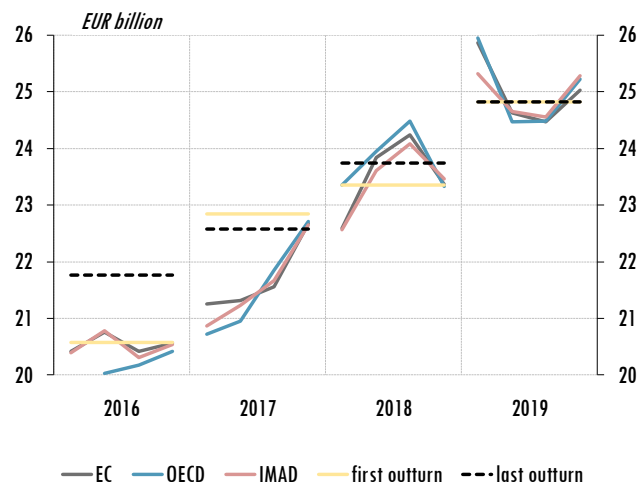
Note: Forecasts are shown in the following order:
spring t+1, autumn t+1, spring t, autumn t.
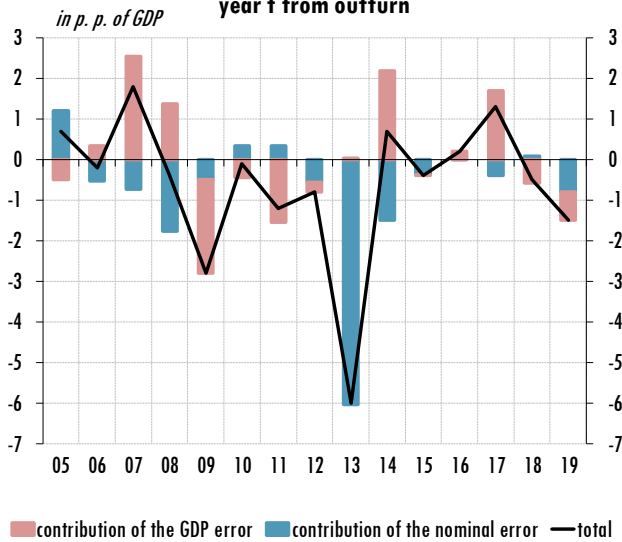*Source: SORS, EC, OECD, IMAD, FC calculations.*

Forecasts and outturn of gross operating surplus/mixed income

Note: Forecasts are shown in the following order:
spring t+1, autumn t+1, spring t, autumn t.
Source: SORS, IMAD, FC calculations.

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Forecasts and outturn of general government balance

in % of GDP

EC — OECD — MoF — first outturn — – – last outturn

Note: Forecasts are shown in the following order:
spring t+1, autumn t+1, spring t, autumn t.
Source: SORS, EC, OECD, MoF, FC calculations.

Forecasts and outturn of gross consolidated government debt
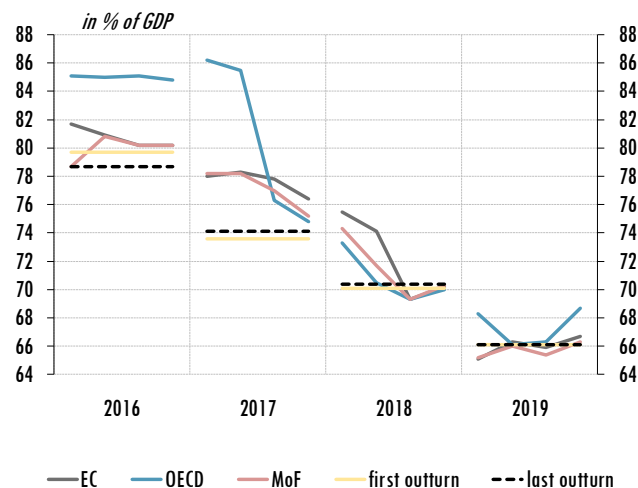
in % of GDP

EC — OECD — MoF — first outturn — – – last outturn

Note: Forecasts are shown in the following order:
spring t+1, autumn t+1, spring t, autumn t.
Source: SORS, EC, OECD, MoF, FC calculations.

Forecasts and outturn of general government revenue

in % of GDP

EC — OECD — MoF — first outturn — – – last outturn

Note: Forecasts are shown in the following order:
spring t+1, autumn t+1, spring t, autumn t.
Source: SORS, EC, OECD, MoF, FC calculations.

Forecasts and outturn of general government expenditure

in % of GDP

EC — OECD — MoF — first outturn — – – last outturn

Note: Forecasts are shown in the following order:
spring t+1, autumn t+1, spring t, autumn t.
Source: SORS, EC, OECD, MoF, FC calculations.

7.5 Statistical measures of autumn forecast differences of key macroeconomic aggregates for the next year, taking into account forecasts, available at the time of drafting the budgetary documents

	ME					MAE					RMSE				
	IMAD	EC	OECD	IMF	BoS	IMAD	EC	OECD	IMF	BoS	IMAD	EC	OECD	IMF	BoS
GDP, real growth in %	-0.40	-0.83	-0.80	-1.33	-0.78	1.05	1.43	1.55	1.73	1.53	1.27	1.65	1.72	2.02	1.65
GDP, nominal level	-468	-728	-958	-1,575	...	804	1,441	1,609	1,751	...	1,028	1,612	1,836	2,124	...
Private consumption, nominal level	-331	-370	-334	...	...	560	889	1,084	...	...	826	1,028	1,389	...	...
Gross oper. surplus/mixed income, nom. level	-104	...	...	...	...	513	...	...	...	...	656	...	...	...	...
Compensation of employees, nominal level	-298	-872	-937	...	...	298	872	937	...	...	342	927	1,031	...	...
Inflation, annual average in %	0.33	0.53	0.55	0.28	0.33	0.38	0.58	1.00	0.48	0.58	0.52	0.96	1.01	0.51	0.72

Source: SORS, IMAD, EC, OECD, IMF, BoS, FC calculations.

7.6 Contributions to forecast differences of expenditure and revenue as a share in GDP

General government expenditure - deviation of SP forecasts for year t from outturn

in p. p. of GDP

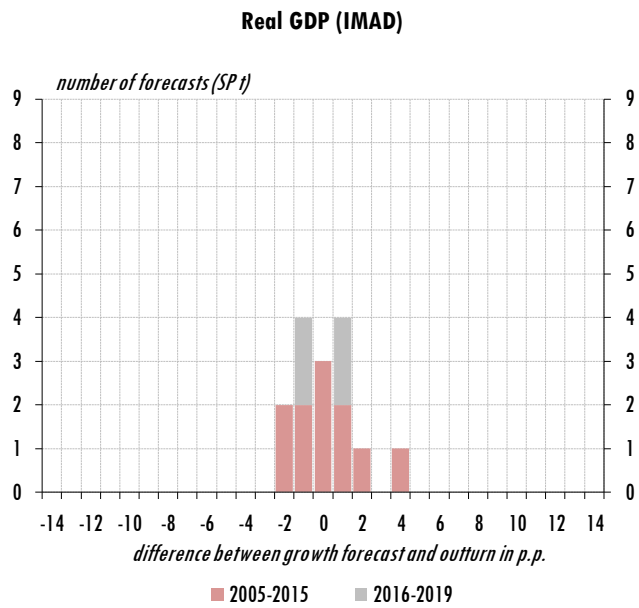■ contribution of the GDP error ■ contribution of the nominal error —total

Source: SORS, MoF and IMAD forecasts, FC calcualtions.

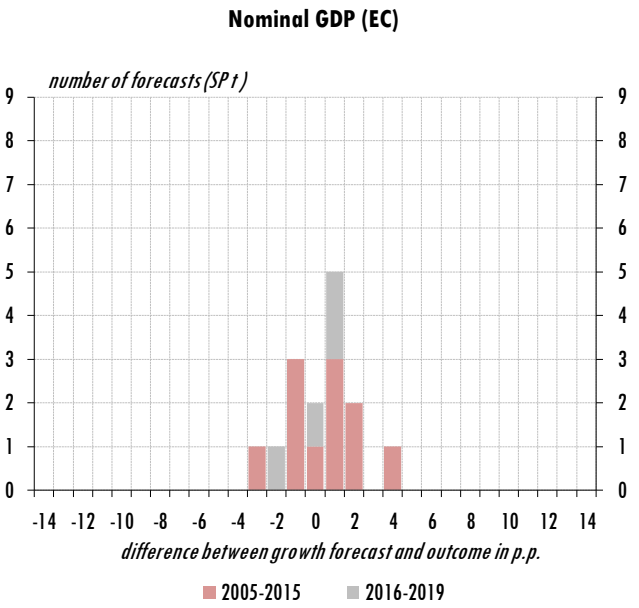**General government revenue - deviation of SP forecasts for year t from outturn**

in p. p. of GDP

■ contribution of the GDP error ■ contribution of the nominal error —total

Source: SORS, MoF and IMAD forecasts, FC calcualtions.

General government expenditure - deviation of SP forecasts for year t+1 from outturn

in p. p. of GDP

■ contribution of the GDP error ■ contribution of the nominal error —total

Source: SORS, MoF and IMAD forecasts, FC calcualtions.

General government revenue - deviation of SP forecasts for year t+1 from outturn

in p. p. of GDP

■ contribution of the GDP error ■ contribution of the nominal error —total
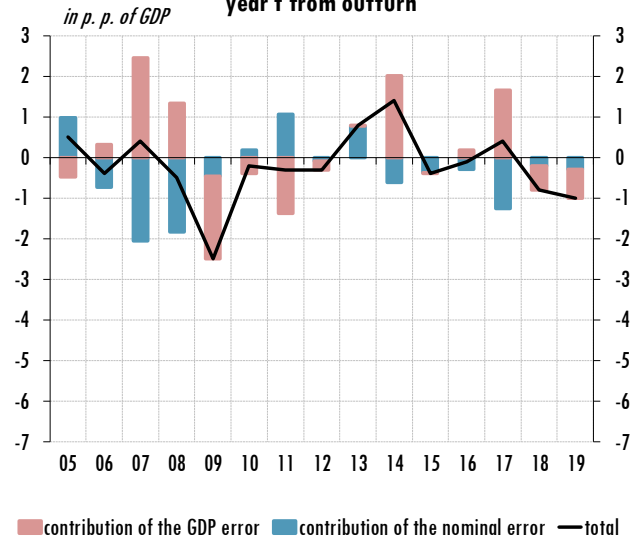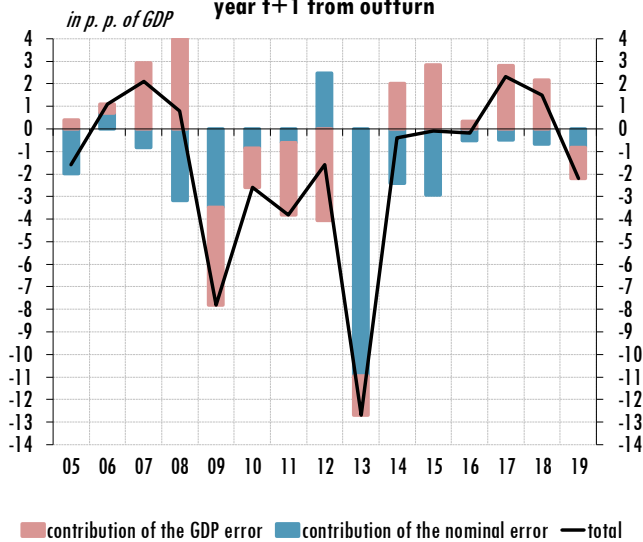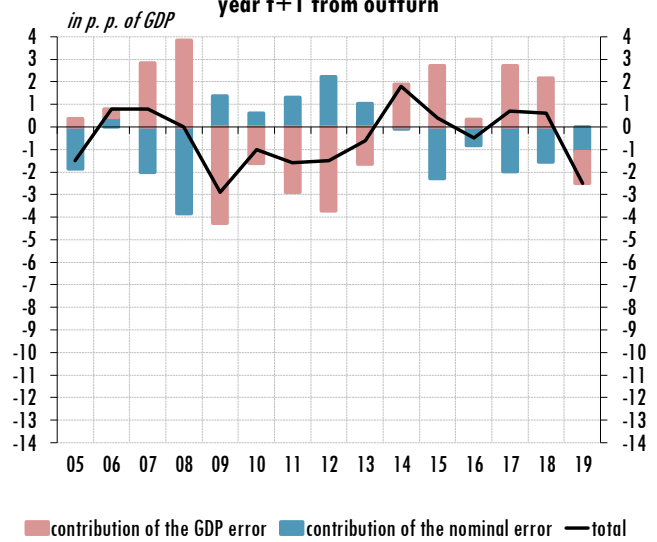
Source: SORS, MoF and IMAD forecasts, FC calcualtions.

7.7 Distributions of differences between forecasts and first outturns

Real GDP (IMAD)

Source: SORS, IMAD, FC calculations.

Nominal GDP (EC)

Source: SORS, EC, FC calculations.

Real GDP (IMAD)

Source: SORS, IMAD, FC calculations.
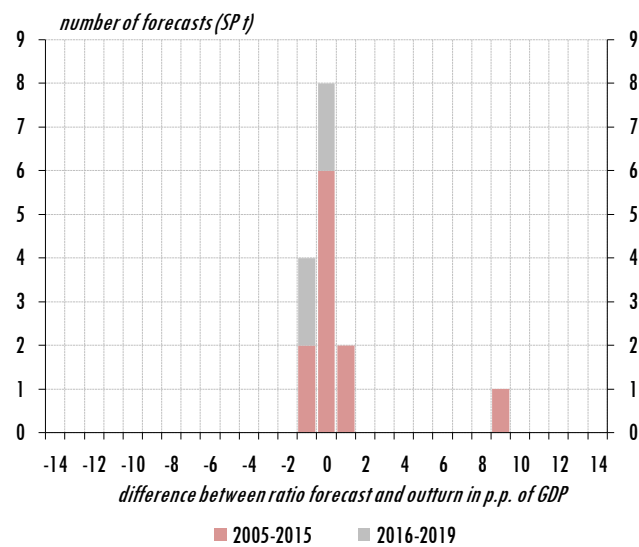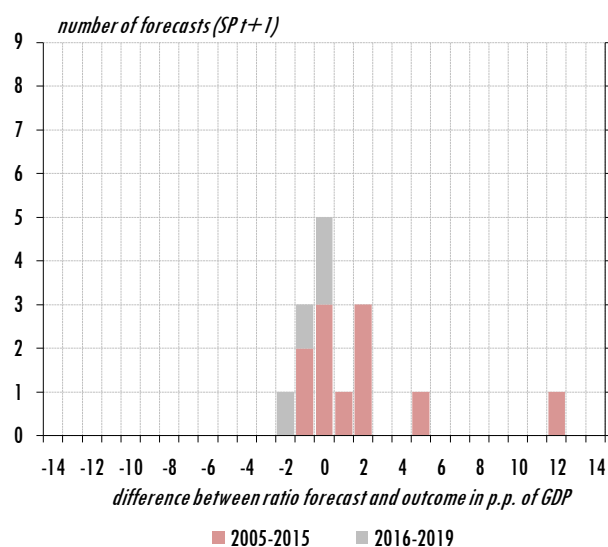
Real GDP (EC)
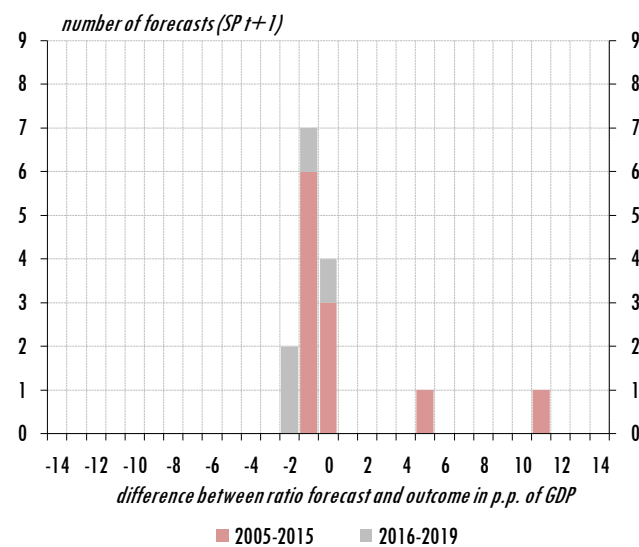

Source: SORS, EC, FC calculations.

Balance (MoF)

Source: SORS, MoF, FC calculations.

Balance (EC)

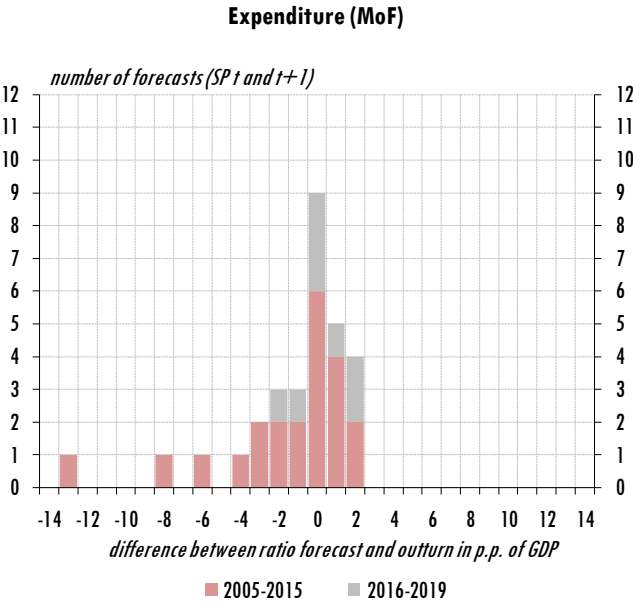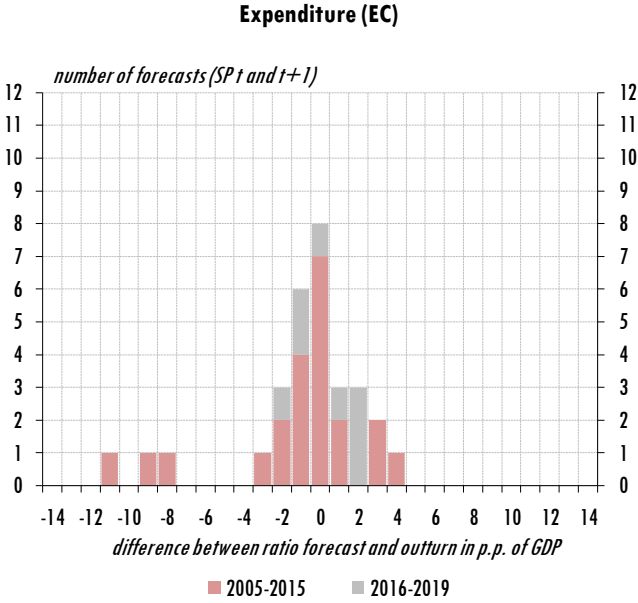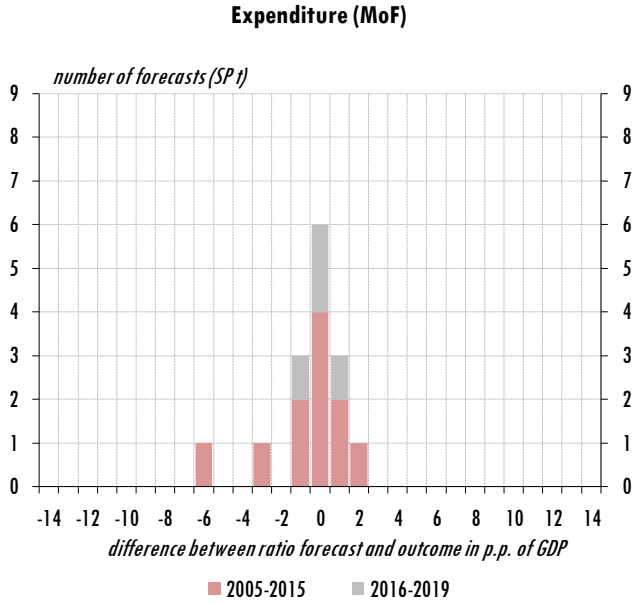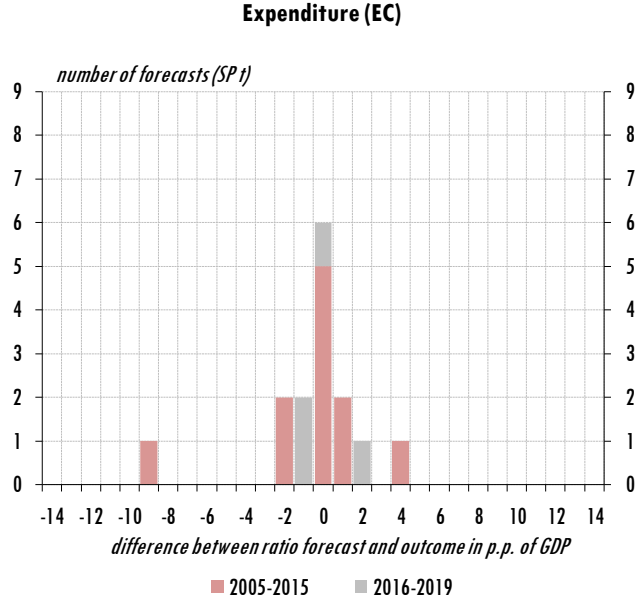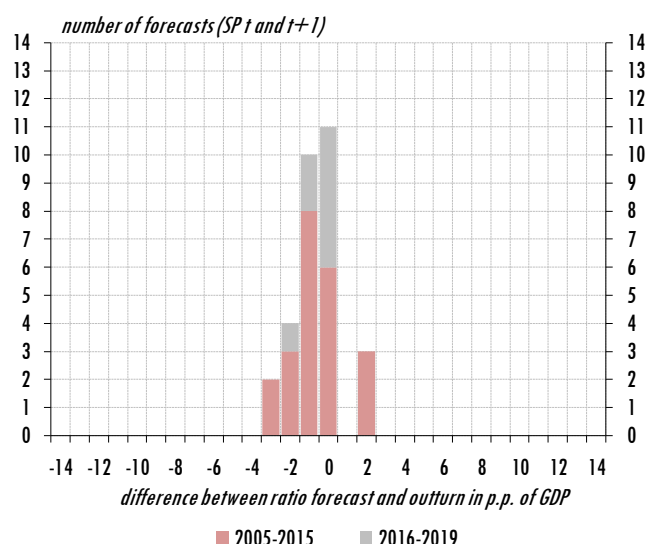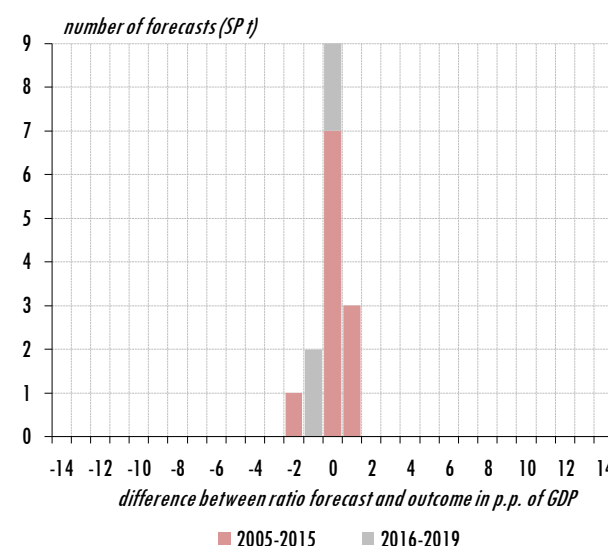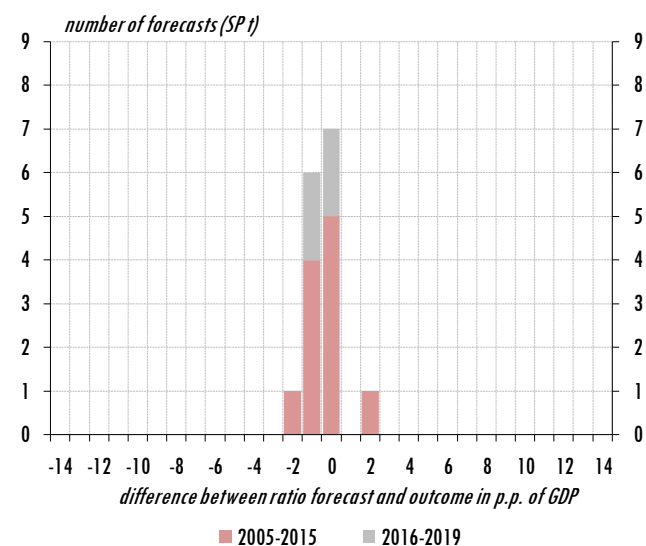Source: SORS, EC, FC calculations.

Balance (MoF)

Source: SORS, MoF, FC calculations.

Balance (EC)

Source: SORS, EC, FC calculations.

Expenditure (MoF)

number of forecasts (SP t and t+1)

difference between ratio forecast and outturn in p.p. of GDP

■ 2005-2015   ■ 2016-2019

Source: SORS, MoF, FC calculations.

Expenditure (EC)

number of forecasts (SP t and t+1)

difference between ratio forecast and outturn in p.p. of GDP

■ 2005-2015   ■ 2016-2019

Source: SORS, EC, FC calculations.

Expenditure (MoF)

number of forecasts (SP t)

difference between ratio forecast and outcome in p.p. of GDP

■ 2005-2015   ■ 2016-2019

Source: SORS, MoF, FC calculations.

Expenditure (EC)

number of forecasts (SP t)

difference between ratio forecast and outcome in p.p. of GDP

■ 2005-2015   ■ 2016-2019

Source: SORS, EC, FC calculations.

Expenditure (MoF)

number of forecasts (SP t+1)

difference between ratio forecast and outcome in p.p. of GDP

■ 2005-2015   ■ 2016-2019

Source: SORS, MoF, FC calculations.

Expenditure (EC)

number of forecasts (SP t+1)

difference between ratio forecast and outcome in p.p. of GDP

■ 2005-2015   ■ 2016-2019

Source: SORS, EC, FC calculations.

Revenue (MoF)

number of forecasts (SP t and t+1)

difference between ratio forecast and outturn in p.p. of GDP

■ 2005-2015 ■ 2016-2019

Source: SORS, MoF, FC calculations.

Revenue (EC)

number of forecasts (SP t and t+1)

difference between ratio forecast and outturn in p.p. of GDP

■ 2005-2015 ■ 2016-2019

Source: SORS, EC, FC calculations.

Revenue (MoF)

number of forecasts (SP t)

difference between ratio forecast and outcome in p.p. of GDP

■ 2005-2015 ■ 2016-2019

Source: SORS, MoF, FC calculations.

Revenue (EC)

number of forecasts (SP t)

difference between ratio forecast and outcome in p.p. of GDP

■ 2005-2015 ■ 2016-2019

Source: SORS, EC, FC calculations.

Revenue (MoF)

number of forecasts (SP t+1)

difference between ratio forecast and outcome in p.p. of GDP

■ 2005-2015 ■ 2016-2019

Source: SORS, MoF, FC calculations.

Revenue (EC)

number of forecasts (SP t+1)

difference between ratio forecast and outcome in p.p. of GDP

■ 2005-2015 ■ 2016-2019

Source: SORS, EC, FC calculations.

Nominal GDP (IMAD)

number of forecasts (SP t and t+1)

difference between growth forecast and outturn in p.p.

■ 2005-2015   ■ 2016-2019

Source: SORS, IMAD, FC calculations.

Nominal GDP (EC)

number of forecasts (SP t and t+1)

difference between growth forecast and outturn in p.p.

■ 2005-2015   ■ 2016-2019

Source: SORS, EC, FC calculations.

Nominal GDP (IMAD)

number of forecasts (SP t)

difference between growth forecast and outcome in p.p.

■ 2005-2015   ■ 2016-2019

Source: SORS, IMAD, FC calculations.

Nominal GDP (EC)

number of forecasts (SP t)

difference between growth forecast and outcome in p.p.

■ 2005-2015   ■ 2016-2019

Source: SORS, EC, FC calculations.

Nominal GDP (IMAD)

number of forecasts (SP t +1)

difference between growth forecast and outcome in p.p.

■ 2005-2015   ■ 2016-2019

Source: SORS, IMAD, FC calculations.

Nominal GDP (EC)

number of forecasts (SP t +1)

difference between growth forecast and outcome in p.p.

■ 2005-2015   ■ 2016-2019

Source: SORS, EC, FC calculations.