ASSESSMENT OF THE

ANNUAL REPORT 2023

MALTA FISCAL ADVISORY COUNCIL

Address:

Level -1,

New Street in

Regional Road,

Msida, Malta

Telephone:

+356 22479200

Website:

www.mfac.org.mt

Email:

info@mfac.org.mt

This Assessment was published on 13 August 2024.

The cut-off date for information published in this Assessment is 08 July 2024.

13 August 2024

The Hon Mr Clyde Caruana B.Com. (Hons) Economics, M.A. Economics
Minister for Finance
30, Maison Demandols,
South Street,
Valletta. VLT 2000

Dear Minister,

ASSESSMENT OF THE ANNUAL REPORT 2023

The Malta Fiscal Advisory Council is hereby presenting its assessment of the Annual Report 2023, in terms of the Fiscal Responsibility Act. The cut-off date for this report is 8th July 2024.

The Malta Fiscal Advisory Council (MFAC) notes that the Maltese economy sustained its robust performance in 2023, achieving stronger growth than was forecasted. With inflation at a high level, even though energy prices remained fixed, nominal GDP growth reached double-digits. The better-than-expected GDP outturn had a positive impact on the main fiscal ratios. Specifically, the deficit ratio improved by 0.6pp compared to the previous year, even though in absolute terms the deficit remained close to 2022 levels. The deficit, at 4.9%, remained above the 3% of GDP benchmark. While the level of debt increased, the debt ratio maintained a buffer of almost 10pp below the 60% of GDP reference value.

With the EU's general escape clause terminated at the end of 2023, and fiscal rules reapplying from 2024, fiscal policy should aim for a gradual and sustainable reduction of the budget deficit. The MFAC emphasises that the national budgetary process should shift towards limiting expenditure growth in line with the targets that are eventually going to be specified in the Medium-Term Fiscal Structural Plan for Malta. In this context, priority should be given to productive public expenditure that promotes medium to long-term growth, whilst ensuring efficiency and effectiveness in public spending.

Following this Assessment of the Annual Report 2023, the Council recommends the following:

- The economy's growth should continue to be export-led, with less dependence on domestic drivers, especially private consumption. This requires further efforts to ensure a strong competitive position, through labour productivity increases, in particular by addressing skills gaps.

- Considering recent research carried out by the MFAC and the update provided in this report, it is recommended that firms channel excess profits into productive investment and towards enhancing labour productivity. This will not only enhance competitiveness, but also strengthen the country's capacity for sustainable economic growth.

- Recent research by the MFAC showed that the persistent underestimation of economic growth by MFIN may be partly explained by the upward revisions carried out by the NSO. It is recommended that the MFIN takes into account such statistical data tendencies in its forecasting process and address any forecast biases, adhering to Council Directive 2011/85/EU – Article 4(6).

- Government should avoid inflating government spending, to ensure adherence with the benchmark fiscal expenditure path. Whilst efforts at restraining government expenditure should be explored, productive capital expenditure that promotes medium to long-term growth should not be curtailed. Rather, the Council encourages the Government to preserve nationally financed public investment and improve its efficiency and effectiveness. The effective absorption of RRF grants and other EU funds, in particular to foster the green and digital transitions, should also be ensured.

- Fiscal consolidation should ensure that the required fiscal effort is achieved. Indeed, the structural adjustment must be more than the 0.4pp of GDP recorded in 2023, given that in an Excessive Deficit Procedure, a country must realise a minimum annual effort of 0.5pp. The Government should also consider targeting a

larger effort than the minimum required, particularly whilst in a high economic growth environment, in order to build fiscal buffers.

- Although GDP growth was significantly higher than the forecasts for 2023, government revenue was not as responsive. The elasticity of both direct and indirect taxes to GDP growth was at low levels when compared to the previous 10 years. The government ought to explore the reasons for such occurrences and take any necessary actions.

- Maintain the buffer achieved below the 60% debt benchmark and monitor the various components contributing to changes in debt, particularly interest expenditure and the level of stock-flow adjustment. The latter exhibits considerable volatility and over the past years has turned out rather different than forecasted.

- The MFAC reiterates its recommendation to prepare an adequate exit strategy in relation to the fixed-energy-price policy, adopting a more targeted approach and enhancing incentives for energy savings.

Finally, the Council expresses its sincere gratitude to the staff at the Ministry for Finance for the ongoing fruitful collaboration and assistance.

Yours sincerely,

Dr Moira Catania
Chairperson of the Malta Fiscal Advisory Council

INTRODUCTION

1. **Article 13(3)(e) of the Fiscal Responsibility Act mandates the Malta Fiscal Advisory Council (MFAC) to "***analyse and issue an opinion and any recommendations pursuant to the Government's publication of the half-yearly and the annual report on the execution of the budget.***"** In June 2024, the Ministry for Finance (MFIN) published the Annual Report for 2023, in line with Article 41 of the Fiscal Responsibility Act, 2014 (Cap. 534). The Annual Report provides a detailed overview of the macroeconomic and fiscal outcomes. It uses two distinct methodologies for the fiscal outcomes: a cash basis and an ESA (European System of Accounts) basis aligned with the European Union (EU) statistical guidelines. The report identifies and explains any deviations from the previous estimates published in the Medium-Term Fiscal Strategy 2022 – 2025 (MTFS 22-25) issued in June 2022 and the Draft Budgetary Plan 2023 (DBP 23) issued in October 2022. It also assesses the Ministry's adherence to the principles and numerical fiscal rules outlined in the Fiscal Responsibility Act.

2. **At the end of 2023, the general escape clause of the Stability and Growth Pact (SGP), which allowed a temporary deviation from standard budgetary requirements, was deactivated. 2024 also marks a transition period to the new EU fiscal framework, with the resumption of country-specific, quantified fiscal policy recommendations.** On 30 April 2024, the Council adopted three legislative pieces to reform the EU's economic and fiscal governance. This new framework aims to ensure public debt sustainability and foster sustainable and inclusive growth through gradual fiscal consolidation, reforms and investments. It also promotes national ownership and provides for a greater medium-term focus with more effective and coherent enforcement through the development of National Medium-Term Fiscal Structural Plans. Member States commit to a multi-year public net expenditure path in their plans and explain how they will address the main challenges identified in the European Semester's country-specific recommendations.

CONTEXT

3. **The international economic environment has remained weak, marked by a fragile short-term economic outlook.** Economic activity within the Euro Area (EA-20) persisted at a sluggish pace, recording a modest real GDP growth rate of 0.5% in 2023. Indeed, the second half of the year witnessed negative growth rates, amid tight financing conditions, subdued confidence and competitiveness issues. Moreover, external factors, notably the escalating geopolitical tensions stemming from the conflict in Ukraine and developments

in Gaza, have further compounded uncertainties which have had adverse ramifications on trade dynamics, investor confidence, and the overall economic sentiment, thereby amplifying the subdued economic performance witnessed throughout 2023. Underlying headline inflation in the EA-20 gradually declined in 2023 but remained elevated relative to historical standards (5.4%), while core inflation was even higher at 6.2%. However, data from the last quarter of 2023 and the first half of 2024 show a decline in headline inflation rates within the EA-20 dropping below 3.0%. Core inflation in the EA-20 also decreased but fell below 3.0% only in the second quarter of 2024.

4. **In 2023, the Maltese economy sustained its robust performance, recording the highest real GDP growth rate in the EU-27 (5.7%), significantly surpassing the EU average of 0.5%.** GDP figures thus continue to show substantial positive growth, following the contraction experienced during the pandemic. The real GDP growth rate achieved by the Maltese economy in 2023 exceeded the Government's projections in both the MTFS 22-25 and the DBP 23, which had anticipated growth rates of 3.9% and 3.5%, respectively. The economy's growth was mainly propelled by the external side of the economy, contributing 7.1 pp to real GDP growth due to a robust increase in exports of services. On the other hand, the base effect produced in 2022, as a result of significant increases in investment of machinery and equipment, caused a negative contribution from the domestic sector of 1.6 percentage points in 2023.

2023 Real GDP growth in the EU[1]
(percent)

Contributions to GDP growth
(percentage points, year-on-year growth)
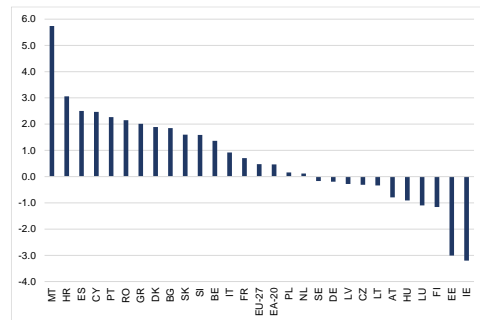
Source: Eurostat and MFAC staff calculations
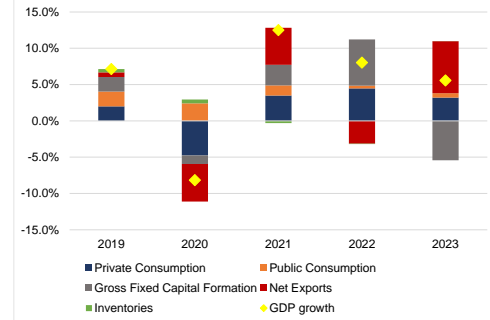
Source: MFAC staff calculations

5. **Despite positive economic growth trends, deficit levels remain above the 3% benchmark.** Based on data validated by Eurostat on 22 April 2024, the deficit-to-GDP ratio for 2023 was recorded at 4.9%. Consequently, the European Commission has commenced procedures to initiate a deficit-based

---

[1] List of Country Acronyms: AT- Austria, BE-Belgium, BG- Bulgaria, HR-Croatia, CY-Cyprus, CZ-Czechia, DK-Denmark , EE-Estonia, FI-Finland, FR-France, DE-Germany, GR-Greece, HU-Hungary, IE-Ireland, IT-Italy, LV-Latvia, LT- Lithuania, LU-Luxembourg, MT-Malta, NL-Netherlands, PL-Poland, PT-Portugal, RO-Romania, SK-Slovakia, SI-Slovenia, ES-Spain, SE- Sweden.

excessive deficit procedure. On 19 June 2024, the Commission adopted a report under Article 126(3) of the Treaty of the Function of the European Union (TFEU) which assessed Malta's budgetary situation, noting that its general government deficit in 2023 exceeded the 3.0% GDP reference value and was not close to this benchmark; that the deficit is expected to continue to exceed 3.0% of GDP also in 2025 and that this excess is not due to exceptional factors. Following this assessment, which concluded that the budget deficit criterion is not fulfilled, and considering the Economic and Financial Committee's opinion, the Commission in July proposed that the European Council adopt a Decision under Article 126(6), establishing the existence of an excessive deficit in Malta. On the other hand, it is positive to note that the government debt-to-GDP ratio remains significantly below the 60.0% threshold at 50.4%, buoyed mainly by the positive economic performance of the Maltese economy.

MACRO ASSESSMENT

6. **The macroeconomic projections in the MTFS 22-25 and the DBP 23 underestimated growth performance.**[2] According to the latest NSO news release, economic growth in nominal terms for 2023 (11.3%) exceeded the Government of Malta's expectations in both the MTFS 22-25 and the DBP 23 by +5.5 percentage points and +4.0 percentage points, respectively.[3] This was primarily attributable to stronger external demand (8.3 pp). Indeed, this contrasts with the expected contributions to economic growth in both the MTFS 22-25 and the DBP 23, which had anticipated the domestic economy to be the main propellor of growth, with only marginal contributions from the external economy.

   The actual data turnout for private consumption indicates a growth rate of 13.9%, which implies a more than twofold increase from the growth projected in the MTFS 22-25 (4.6%) and a +6.0pp difference from the DBP 23 (7.9%). Actual data for growth in public consumption (6.7%) shows that this component was also underestimated in both vintages (MTFS 22-25 projection: 3.5%; DBP 23 projection: -0.2%). Gross fixed capital formation surprised on the downside (-16.7%) in 2023 due to the base effect created by the unforeseen one-off investment that occurred in machinery and equipment in 2022.[4] Indeed, the

---

[2] The annual report published by MFIN mainly includes macroeconomic data in nominal terms. For this reason, the macroeconomic assessment of this report focuses on nominal growth of GDP and its components.

[3] The following assessment takes into account the latest GDP release published by NSO NR099/2024 which can be accessed here.

[4] The unforeseen one-off investment that occurred in machinery and equipment in 2022 was included in the data after the publication of the MTFS 22-25 and the DBP 23.

MTFS 22-25 had indicated a growth rate in investment of 7.7%, while the DBP 23 had revised upwards this growth rate to 10.3%.

On the other hand, external demand significantly exceeded expectations, with exports growing by 11.6%, surpassing the MTFS 22-25 forecast of 4.9% and the DBP 23 estimate of 5.7%. This was mainly the result of robust export growth in tourism, transport, professional services and remote gaming. Concomitantly, the higher than expected domestic and external demand also led to a higher-than-projected increase in imports of 7.2% (MTFS 22-25 projection: 4.3%; DBP 23 projection: 4.9%). Overall, the current account stood at a positive balance of 0.9% of GDP for 2023.

Current Account
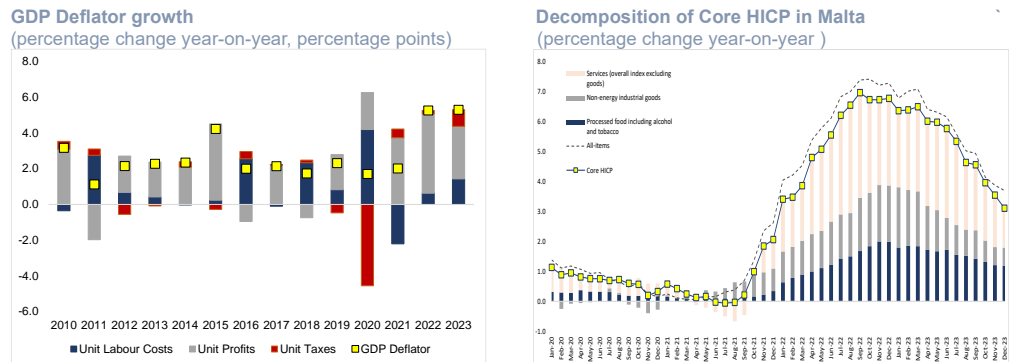(Percentage of GDP)

Source: Eurostat
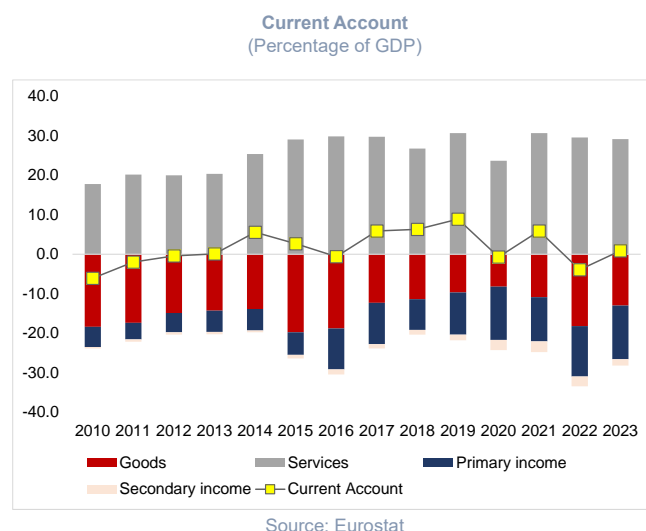
7. **In 2023, actual employment growth significantly exceeded expectations registering a growth of 6.7%.** Indeed, both the MTFS 22-25 (2.1%) and the DBP 23 (3.4%) had anticipated a much lower growth for employment in 2023. Similarly, the wage bill was also higher than anticipated (actual growth: 9.3%; MTFS 22-25: 6.7%; DBP 23: 5.1%). Also, in line with these developments, gross operating surplus surpassed expectations, achieving a growth rate of 11.7% in 2023.[4] At the same time, the unemployment rate remained historically low at 3.1%, aligning with the DBP 23 forecast and only slightly lower than the MTFS 22-25 projection of 3.4%. This is indicative of a tight labour market within the Maltese economy, which is highly characterised by skills shortages.

8. **Headline inflation in 2023 was higher than projected at 5.6%, as inflationary pressures persisted more than anticipated.** Indeed, the MTFS 22-25 had projected an inflation rate of 2.2%, while the DBP 23 had projected an inflation rate of 3.7%. Government energy support measures and

---

[4] For a more detailed analysis of historical labour market developments in Malta, refer to the thematic chapter published in the MFAC Annual Report 2023.

commodity price and security measures, introduced in 2020 to counteract elevated international energy prices, due to pandemic related disruptions and the Russia–Ukraine war, kept domestic energy prices stable. The cost to keep energy prices fixed significantly increased with the end of the energy-price hedging agreement in April 2022. As a result, during 2023, overall, non-core inflation contributed to an average of just 0.4 pp to headline inflation. This emanated solely from unprocessed food, since energy inflation remained zero. On the other hand, core inflation amounted to 5.2% of which services (2.4 pp) contributed the most, followed by processed foods, including alcohol and tobacco (1.6 pp), and non-energy industrial goods (1.2 pp). Nonetheless, inflationary pressures are gradually easing, with both headline and core inflation dropping below 4.5% by October 2023 and continuing to decline since.

From an income perspective, looking at the GDP deflator, the growth of corporate unit profits has surpassed the growth in unit labour costs especially over the past three years. In this case, various factors may influence profitability developments, including market conditions, the degree of competition and efficiency gains. In order to strengthen competitiveness, excess profits should be channelled towards investment in research and innovation while also enhancing labour productivity.

GDP Deflator growth
(percentage change year-on-year, percentage points)

Decomposition of Core HICP in Malta
(percentage change year-on-year)

Sources: Eurostat & MFAC calculations

9. **For 2023**, **potential output estimates show a consistent upward revision across forecast vintages, while the output gap has been revised down showing a closed gap in the most recent estimate available.** Potential output has been revised upwards from 4.0% in the MTFS 22-25 to 4.2% in the DBP 23, increasing to 5.1% as estimated by the COM in its Spring forecast round.[5] The increase in potential output estimate between the MTFS 22-25 and the DBP 23, mainly stems from increasing expectations for labour, while capital was revised slightly downwards and TFP remained unchanged. Indeed, there

---

[5] The latest estimates for the output gap quoted in the MFIN Annual Report 2023 are those published by the COM in its Spring forecast round.

is a significant upward trajectory in the estimates for labour, with initial figures at 1.4% in the MTFS 22-25, which then increased to 2.1% in the DBP 23. This increase reflects positive shifts in employment growth which for 2023 was forecasted at 2.1% in the MTFS 22-25, while employment growth was projected at 3.4% in the DBP 23. Capital contributions show a slight decline, from 1.9% in the MTFS 22-25 to 1.4% in the DBP 23. On the other hand, total factor productivity (TFP), which measures efficiency improvements in production, remained stable, at 0.7% in both the MTFS 22-25 and the DBP 23.

This potential output reflected into a negative output gap for 2023 in both the MTFS 22-25 and the DBP 23, but this was revised down from -1.3% of potential output in the MTFS 22-25 to -0.6% of potential output in the DBP 23. The most recent estimates by the COM show that the output gap closed (0.0% of potential output) in 2023. The MFAC has in its most recent assessments consistently indicated that there is an upside risk to the output gap.[6] Indeed, high core inflation and higher than expected actual GDP for 2023 indicate that the economy might be operating above its potential, potentially leading to a positive output gap. More recent analysis by the MFAC provides similar indications (refer to Box A). In this context, the Council positively notes that the revisions to the output gap estimates by the MFIN across these reports involved a smaller output gap, although still in negative territory, while the most recent estimate by the COM indicated a closing of the output gap.

Potential output and its drivers for 2023
(percentage change year-on-year)
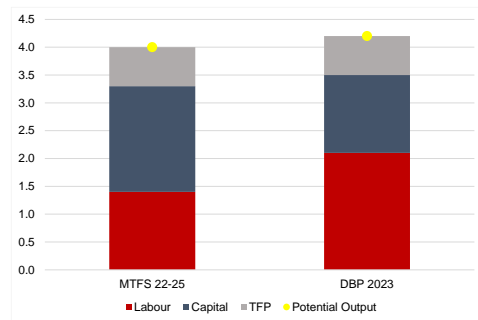
Source: MFIN

Output gap estimates by the COM
(percent of potential output)
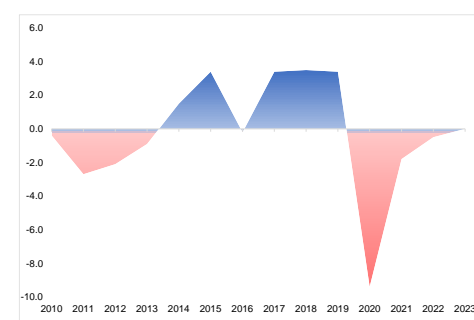
Source: AMECO database

10. **The upside risks identified by the MFAC in its assessment reports materialised**. In the assessment of the MTFS 22-25, the Council had pointed out the possibility of upside risks (i.e., macroeconomic data turning out better than expected) in all components save for investment for which a downside

---

[6] This risk was outlined in the MFAC assessment of the Draft Budgetary Plan 2023 (published January 2023), the MFAC assessment of the Update of Stability Programme 2023 – 2026 (published June 2023) and the MFAC assessment of the Draft Budgetary Plan 2024 (published December 2023) which may be viewed here.

risk was envisaged. On the other hand, in the assessment of the DBP 23, the Council indicated upside risks for private consumption, exports and GDP and neutral risks for the other components. Comparing these risks with the most recent published actual data, the Council's assessment of risk, in both vintages, is consistent with the direction of growth for overall GDP, private consumption and exports. The assessment of risk for investment (downside risk) in the MTFS 22-25 is also consistent with actual data which shows a contraction in growth for 2023, due to the unforeseen sizable one-off investments in machinery and equipment that occurred in 2022 which created a base effect for the subsequent years. The Council's risk assessment in the MTFS 22-25 for public consumption and imports was also consistent with movements in actual data given that growth turned out higher than expected. However, the Council had indicated a neutral risk for these components in the DBP 23.

The Council's Assessment of the macroeconomic projections in the MTFS 22-25 and the DBP 23

	MTFS 22-25	DBP 23	Actual Data 23	MFAC's Assessment MTFS 22-25	MFAC's Assessment DBP 23
Private Consumption	4.6	7.9	13.9	⬆ (green)	⬆ (green)
Public Consumption	3.5	-0.2	6.7	⬆ (green)	⬌ (red)
Investment	7.7	10.3	-16.8	⬇ (green)	⬌ (red)
Exports	4.9	5.7	11.6	⬆ (green)	⬆ (green)
Imports	4.3	4.9	7.2	⬆ (green)	⬌ (red)
GDP	5.8	7.3	11.3	⬆ (green)	⬆ (green)

Note: The Green arrow indicates that the Council's Assessment of the MFIN's projections materialised in actual data. Red arrow indicates discrepancies between the Council's assessment and actual data materialisation. An arrow pointing upwards indicated that the Council assessed stronger growth than projected by the MFIN. A neutral arrow indicated that the Council's supports the MFIN's projections. An arrow pointing downwards indicates that the Council assessed lower growth than the MFIN's projection.

11. **Discrepancies between forecasted and actual growth rates can be partly explained by base effects caused by historical data revisions.[7]** The latest actual data generally involves upward revisions from data published previously. This implies that when the MFIN was preparing its macroeconomic projections for the MTFS 22-25 and the DBP 23 in June and October 2022, respectively, the data available at that time was weaker than what the latest data is showing, impacting the macroeconomic forecast accuracy of the government. The latest GDP release shows that GDP for 2021 (base year) was €797.4 million (5.4%) and €650.0 million (4.4%) higher, respectively, when compared to the statistical vintage available prior to the preparation of the forecasts of the MTFS 22-25 and the DBP 23. This has resulted into a lower base year for the forecasts of 2022 and 2023. The most significant revisions across the years (2021-2023) were in exports, mainly due to conservative tourism expectations, as well as in imports. Additionally, statistical data revisions implemented were not proportional from one year to the other, which affects the growth rates recorded at the expenditure level. Subsequently, all these factors contributed to underestimations in the macroeconomic projections of the Government, both in level as well as in growth rate terms.

MTFS 2022-2025: Revisions between base data and latest actual data
(Billions)
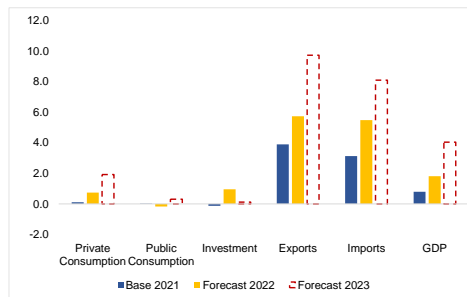
DBP 2023: Revisions in base data and latest actual data
(Billions)
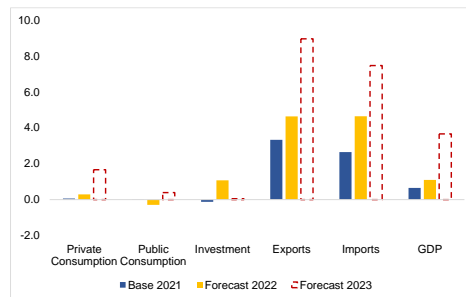
Sources: NSO, MFIN AND MFAC staff calculations

---

[7] At the time of preparation of the MTFS 22-25 and DBP 23, the only actual data available was that of 2021. The data in level terms of 2022 and 2023 is worked out according to the growth rates envisaged by MFIN at the time. The latest actual data is the most recent published NSO data which is NR 099/2024. The revisions are worked out by subtracting the forecasts presented in the MTFS 22-25 and DBP 23 respectively from the latest actual data.

Box A: MFAC's Suite of Models approach to estimate potential output and the output gap
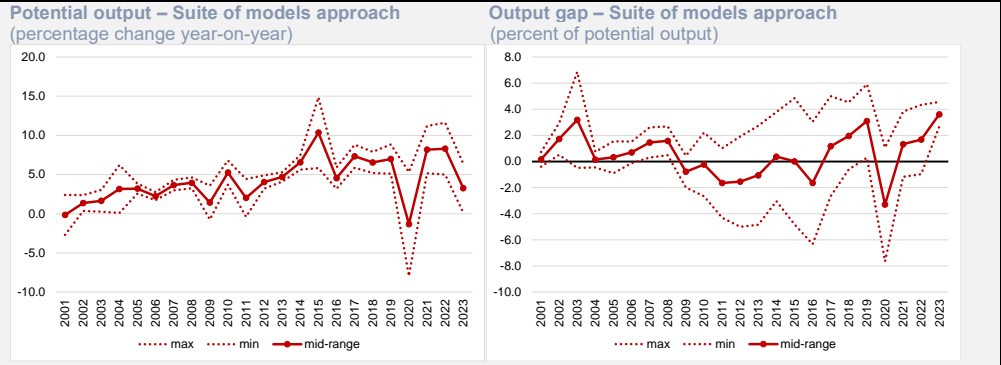
To aid its assessment of the potential output and output gap estimates produced by the COM and the MFIN, which both utilise the EU Commonly Agreed Methodology (CAM), the MFAC developed a suite of models approach (SOM) to estimate potential output and the output gap using three univariate methods (the HP filter, Kalman filter, Baxter King filter) and one multivariate method (Principal Components Analysis).[8] The data utilised for these methods span from 2001 to 2023. The results obtained from these different methods are then combined by taking the mid-point of the full-range of estimates.[9] The range of estimates (i.e., the maximum and minimum bounds) will be used to aid the endorsement of the Council for these components. The variances between the methods used typically arise due to different economic models' assumptions, data inputs, and analytical frameworks. Utilising the mid-point of these estimates (depicted as the dark red line in the following charts) provides a balanced measure that mitigates the extremes of any single model's output.

The resultant potential output estimates from the suite of model's approach demonstrate a generally upward trend, signifying economic growth through increasing capacity. However, the pace of growth is not consistent and is interrupted by periods of slower growth, particularly around significant economic events. It is important to note that improvements in various factors contributing to labour productivity and economic efficiency, such as technology, education and infrastructure, can indirectly affect GDP, thereby contributing to sustained economic growth. The period from 2001 to 2008 shows a steady increase in potential output growth, indicative of robust economic expansion before the global financial crisis. Similarly, the period from 2012 to 2019 illustrates a phase of recovery marked by moderate volatility but overall positive growth, highlighting a stable economic recovery and expansion. The fluctuations in potential output estimates in recent years, reflect the responses to external shocks emanating from the COVID-19 pandemic and the conflict between Russia and Ukraine, which resulted in global supply chain disruptions and geopolitical tensions.[10] The sharp recovery in 2021-2022 highlights the economic rebound driven by stimulus measures and a resurgence in consumer demand, while the drop in 2023 suggests a cooling down, possibly due to the stabilisation after the post-pandemic surge.

---

[8] The methodologies utilised for these methods are outlined in appendix 2 within this document.
[9] This methodology is used by the Irish Fiscal Advisory Council in its estimation of Ireland's output gap.
[10] It is important to note that both the HP filter and the Baxter-King filter are known to suffer from end-point bias. The HP filter, while effective in trend extraction, can produce inaccurate trends at the boundaries of the data set due to its reliance on future data points for smoothing, leading to overreaction at the end points. Similarly, the Baxter-King filter, which is used for band-pass filtering to isolate cycles of specific durations, faces issues at the data series' boundaries because it requires symmetric data windows, making the estimates at the start and end of the series less reliable.

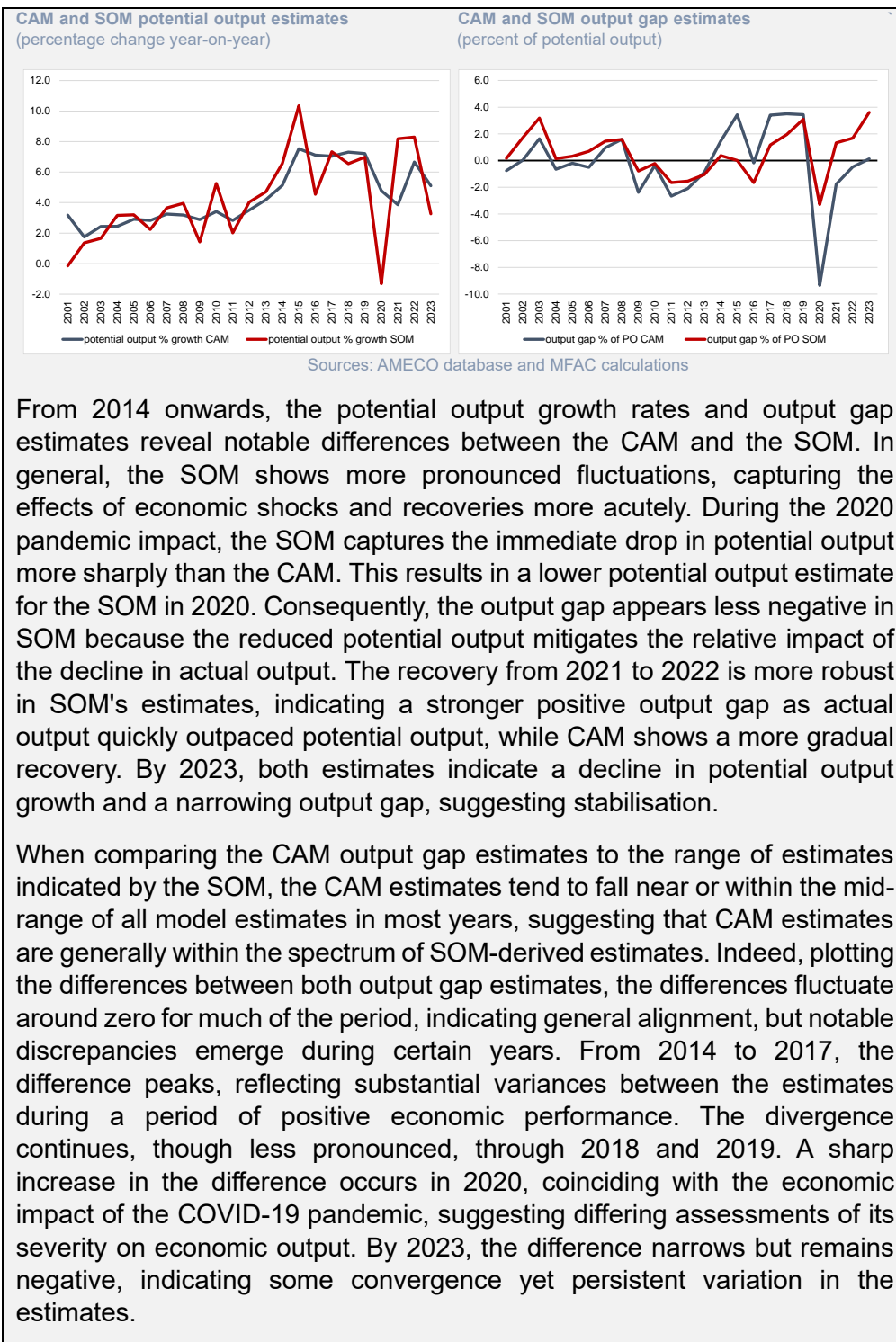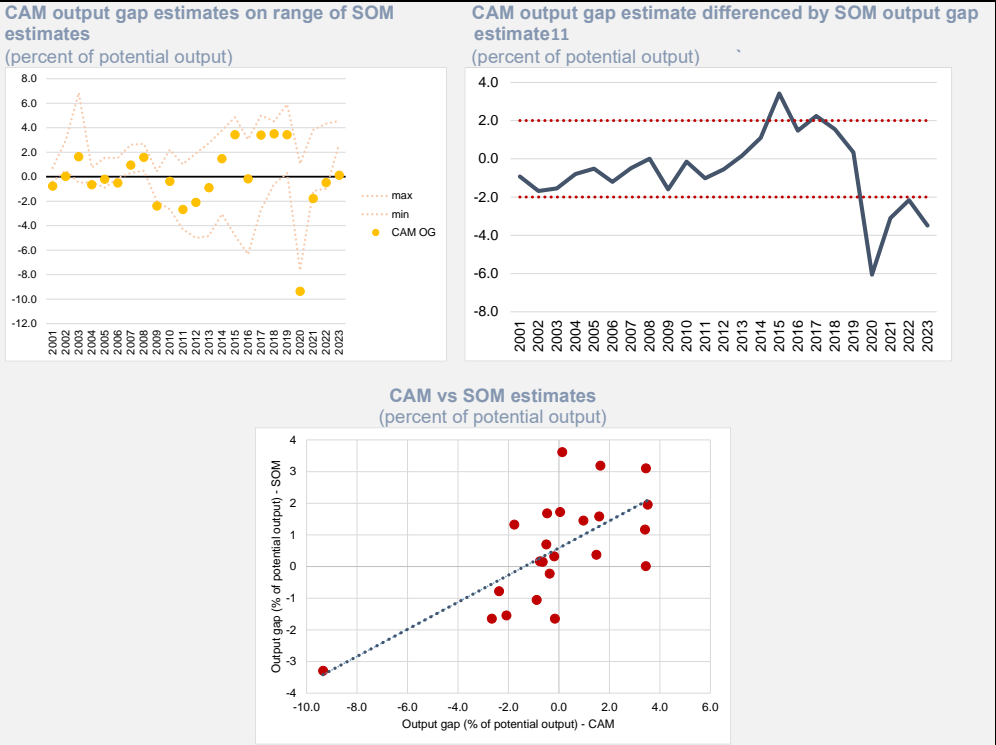| Potential output – Suite of models approach (percentage change year-on-year)	Output gap – Suite of models approach (percent of potential output)

Source: MFAC calculations

On the other hand, the output gap was generally positive until 2008, reflecting economic expansion. However, it turned negative in 2009 due to the international financial crisis and remained negative up to 2013 as potential output growth steadily increased during this period. Subsequently, the output gap became generally positive, indicating that actual output was often above potential output, despite strong potential output growth. The exception was in 2020, when the output gap turned negative again due to the sharp contraction in economic activity resulting from the COVID-19 pandemic. It is important to note that peaks and troughs in the output gap apart from resulting from external shocks, can also result from the internal dynamics between potential and actual growth. For instance, potential output may increase, but actual growth might lag for various reasons, contributing to fluctuations.

When comparing the estimates of potential output and the output gap as resulting from the CAM and the SOM, the CAM demonstrates a generally smoother trajectory for potential output growth, likely due to its approach of averaging out short-term fluctuations and integrating long-term economic trends more effectively. This method tends to clean the cyclical component more thoroughly, resulting in more stable estimates of the structural component of output. In contrast, the SOM shows more variability, especially during periods of economic shocks. This variability indicates that the SOM is somewhat more sensitive to immediate economic conditions.

On the other hand, the estimates for the output gap both exhibit cyclical behaviour, aligning with known economic cycles over the last two decades. Both estimates generally align during major economic events, such as the 2009-2010 global financial crisis and the 2020 COVID-19 pandemic, where they both show notable negative gaps. However, the CAM estimate tends to be more conservative with smaller deviations, while the SOM estimate displays greater variability with higher peaks and deeper troughs.

CAM and SOM potential output estimates
(percentage change year-on-year)

CAM and SOM output gap estimates
(percent of potential output)

From 2014 onwards, the potential output growth rates and output gap estimates reveal notable differences between the CAM and the SOM. In general, the SOM shows more pronounced fluctuations, capturing the effects of economic shocks and recoveries more acutely. During the 2020 pandemic impact, the SOM captures the immediate drop in potential output more sharply than the CAM. This results in a lower potential output estimate for the SOM in 2020. Consequently, the output gap appears less negative in SOM because the reduced potential output mitigates the relative impact of the decline in actual output. The recovery from 2021 to 2022 is more robust in SOM's estimates, indicating a stronger positive output gap as actual output quickly outpaced potential output, while CAM shows a more gradual recovery. By 2023, both estimates indicate a decline in potential output growth and a narrowing output gap, suggesting stabilisation.

When comparing the CAM output gap estimates to the range of estimates indicated by the SOM, the CAM estimates tend to fall near or within the mid-range of all model estimates in most years, suggesting that CAM estimates are generally within the spectrum of SOM-derived estimates. Indeed, plotting the differences between both output gap estimates, the differences fluctuate around zero for much of the period, indicating general alignment, but notable discrepancies emerge during certain years. From 2014 to 2017, the difference peaks, reflecting substantial variances between the estimates during a period of positive economic performance. The divergence continues, though less pronounced, through 2018 and 2019. A sharp increase in the difference occurs in 2020, coinciding with the economic impact of the COVID-19 pandemic, suggesting differing assessments of its severity on economic output. By 2023, the difference narrows but remains negative, indicating some convergence yet persistent variation in the estimates.

CAM output gap estimates on range of SOM estimates
(percent of potential output)

CAM output gap estimate differenced by SOM output gap estimate[11]
(percent of potential output)

CAM vs SOM estimates
(percent of potential output)

Sources: AMECO database and MFAC calculations

Also, plotting the output gap estimates provided by both the CAM and the SOM we find a linear relationship between the two sets of estimates with a Pearson's correlation coefficient of 0.688, which indicates a moderately strong positive corelation between the CAM and SOM potential output estimates. The moderate positive correlation indicates that CAM and SOM estimates tend to move in the same direction, but the relationship is not very strong. Similarly, the means and variances of the two sets of estimates were tested using the T-test and the F-test, respectively and no significant differences were identified. This suggests that while the two estimates are related, on average they do not significantly differ in their central tendency or variability.

The development of the suite of models approach by the MFAC provides a valuable complement to the EU Commonly Agreed Methodology, which is utilised by the COM and MFIN for estimating potential output and the output gap. By integrating multiple univariate and multivariate methods, the SOM offers a broad perspective on economic conditions, effectively capturing short-term dynamics. The SOM's approach of averaging estimates mitigates extremes, offering a balanced methodology. It is positive to note that in general there is alignment of CAM estimates with the mid-range of SOM estimates. However, there are also variations in the estimates particularly

---

[11] The red dotted lines at ±2% underscore the thresholds where differences are particularly significant.

during economic shocks, which highlights the relevance of using alternative methodologies to the CAM, to enhance the validity of the MFAC's endorsement with regards to MFIN's potential output growth and output gap estimates.

FISCAL ASSESSMENT [12]

12. **The deficit was reduced by €14.4 million in 2023 over 2022, as the increases in expenditure were close to those in revenue. When comparing the €950.4 million deficit outturn to the forecasts, the MTFS 22-25 was projecting a lower deficit, while the outturn turned close to the projection of the DBP 23**. The higher-than-expected increase in expenditure, which more than offset higher revenue from better economic performance, led to a deterioration in the general government balance of €191.4 million compared to the MTFS 22-25 projections. On the other hand, when compared to the DBP 2023 forecast, the deficit was much closer to the forecast, being only €21.6 million lower.

    The fiscal deficit as a percentage of GDP stood at 4.9% at the end of 2023, registering a 0.6 percentage points improvement over the previous year's deficit. However, it remains above the 3% of GDP reference value. Expenditure on the ongoing energy price support measures continued to exert upward pressure on the deficit.

    When compared to the previous forecasts, the outturn for the deficit ratio was worse than in the MTFS 22-25 (4.6%) but better than the DBP 23 target (5.5%). The stronger than expected economic performance in 2023, driven by robust growth in various sectors, helped to contain the deficit ratio.[13]

13. **The 2023 revenue outturn surpassed projections in the MTFS 22-25 by a significant margin, aided by more robust macroeconomic conditions, whereas the projection in the DBP 23 was rather close to the actual.** Total revenue increased by 9.8% in 2023 compared to 2022, marking a slightly higher growth from the 9.6% increase observed in the previous year. The most

---

[12] The following assessment does not consider the statistical data revisions featured in the NSO's News Release 122/2024 Quarterly Accounts for General Government: Q1/2024 since it adopts the same cut-off date of the report published by the MFE. Notwithstanding this, it is worth mentioning that the statistical data revisions in total revenue, total expenditure, and the fiscal deficit between the latest two releases are minimal and, consequently, should not materially affect the overall fiscal assessment provided hereunder by the MFAC.

[13] The weaker fiscal outturn in the previous year is another contributing factor to the divergence between the forecasted deficit and the actual outturn.

substantial revenue increase was from current taxes on income and wealth (+€181.5 million), followed closely by 'other revenue' (+€173.5 million), primarily driven by capital transfers receivable, including EU capital funding. In 2023, general government revenue surpassed the MTFS 22-25 estimates by €195.0 million and the DBP 23 estimates by €7.2 million. While the variance from the MTFS was substantial, the DBP estimates demonstrated a closer alignment with the actual revenue performance, despite the higher-than-expected economic growth. Indeed, taxes were not as responsive to higher GDP, with both the direct and indirect tax elasticities to GDP growth at low levels when compared to the previous 10 years.

When comparing the actual revenue outturn with the forecast in the MTFS 22-25, social contributions explained €76.3 million of the difference whilst current taxes on income and wealth contributed to €47.2 million of the variance. Other revenue sources also resulted to be considerably higher than the MTFS 2022 forecast, mainly property income (€30.5 million), and 'other revenue' (€59.0 million).[14] On the other hand, VAT and other taxes on production and imports were lower than projected (€28.4 million).

At an aggregate level, the MFIN reports that stronger-than-anticipated macroeconomic developments boosted revenue by €151.0 million from the total variance of €195.0 million.[15] In particular, better than expected economic growth contributed to considerably higher current taxes on income and wealth.

In comparison, the projections in the DBP 23 were closer to the actual revenue outturn. Current taxes on income and wealth and 'other revenue' recorded marginal variances.[16] Social contributions, on the other hand, surpassed the DBP estimate by €45.9 million, mainly reflecting sustained employment growth. On the other hand, revenue from taxes on production and imports fell short of the DBP estimate by €46.7 million, despite the more favourable economic environment.

---

[14] The contribution from market output and output for own final use and payments for non-market output, and other current transfers offset the lower capital transfers received.

[15] Other sources include the divergence due to the outturn in the previous year, and 'other revisions'.

[16] Similar to the MTFS, in the DBP the variances in current taxes on income and wealth due to better macroeconomic projections were compensated for by divergences in the outturn of the previous year from corporate profits. In particular, when comparing to the DBP 2023 forecast, the more positive turnout in taxes on individual or household income than forecasted was almost entirely offset by lower taxes generated from the income or profits of corporations.

Evolution of Revenue: Deviations in MTFS and DBP Projections
(EUR millions)
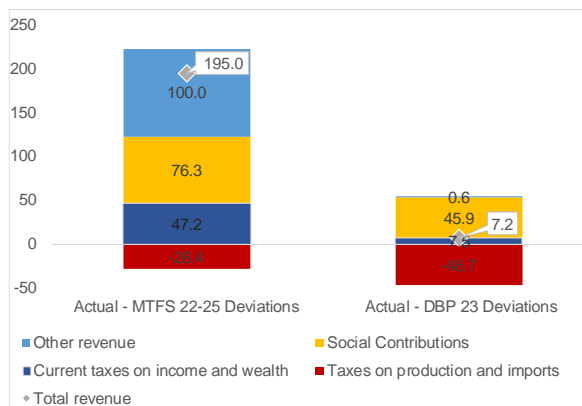
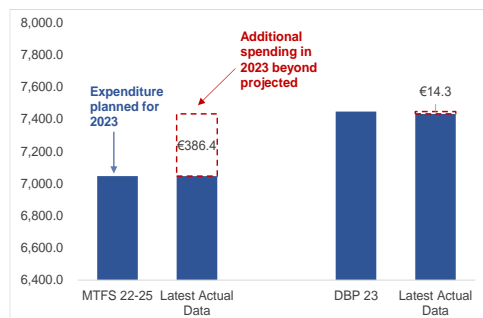
Sources: MFIN, NSO and MFAC staff calculations

14. **Compared to the expenditure targets outlined in the MTFS 22-25, the 2023 outturn was significantly higher, while it aligned closely with the DBP projections.** In 2023, expenditure exceeded projections by €386.4 million compared to the MTFS 22-25 targets. A large part of this increase was attributed to base effects due to higher than estimated expenditure in 2022. In particular, the higher cost in subsidies than planned in 2022, contributed to a total overrun of €266.1 million in 2023. The rest of the 2023 overrun was primarily driven by higher-than-anticipated capital transfers, interest payments and other expenditure. Higher interest rates led to higher outlays on servicing of government debt. On the other hand, actual outlays on compensation of employees, intermediate consumption and gross fixed capital formation were lower than the projections in the MTFS 22-25.

Conversely, expenditure was €14.3 million below the DBP 23 target. Revisions due to base effects were much lower during this forecast round (€47.0 million), due to the availability of more accurate actual data for 2022. It is notable that actual spending on subsidies was €114.3 million lower than projected in the DBP23, particularly due to outlays on energy subsidies. This reflects lower costs for energy support measures following market stabilisation.[17] Additionally, restructuring assistance to Air Malta was less than estimated. However, increased spending in other areas partially offset these savings. Capital transfers turned out higher by €130.9 million, reflecting stronger-than-planned investment in infrastructure projects. Intermediate consumption also surpassed the estimates by €107.3 million. In particular, the MFIN reports that a higher FISIM allocation was made, and intermediate consumption by Extra-Budgetary Units (EBUs) was higher, driven by the need to support various

---

[17] The MFAC has requested more detailed information on the calculations of energy subsidies, however to date, the Council has not received the requested information.

public services and initiatives amidst ongoing economic challenges.[18] Such costs, particularly operational and maintenance costs, were influenced by higher-than-expected inflationary pressures.

Evolution of General Government Expenditure: Deviations in MTFS and DBP Projections
(EUR millions)

Sources: MFIN, NSO and MFAC staff calculations

Evolution of Expenditure by Component: Deviations in MTFS and DBP Projections
(EUR millions)
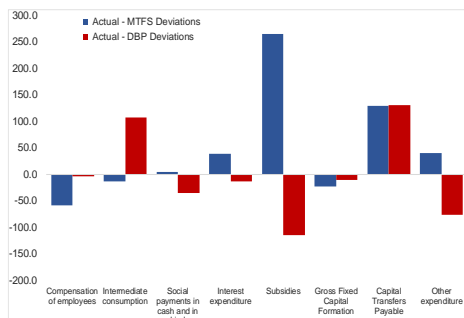

Sources: MFIN, NSO and MFAC staff calculations

15. **The structural balance turned out the same as the headline balance reflecting a closed output gap and no one-offs being recorded. The structural adjustment, an important indicator in view of the application of the fiscal rules as from 2024, turned out less than planned in 2023.** At the time of the MTFS 22-25, the output gap for 2023 was estimated as -1.3% of potential GDP. The latter was reduced to -0.6% in the subsequent DBP 23 forecast round, but the most recent estimate is of a closed output gap.[19] Consequently, the cyclical budgetary element was reduced from the MTFS 22-25 to the DBP 23 and was nil in the latest estimate. However, most of the difference in the structural balance estimates reflects revisions in the headline fiscal balance. The realised structural adjustment in 2023 was 0.4 pp, which is considerably lower than that which was projected in the MTFS 22-25 (0.9 pp) and also lower than the target in the DBP 23 (0.6 pp).[20] It is important to note that this adjustment is below the minimum annual structural adjustment of 0.5% of GDP, which is required when a country is subject to a deficit-based excessive deficit procedure.

---

[18] Financial Intermediation Services Indirectly Measured (FISIM) refers to the estimation of the value of financial services provided by banks and other financial intermediaries that are not directly charged to customers but are instead included in the interest rate spreads.

[19] The output gap quoted in the Annual Report for 2023 is based on the European Commission's Spring 2024 forecast.

[20] The structural adjustment measures the change in the structural balance between one year and another.

General Government Balance and Structural Balance
(Percentage of GDP)
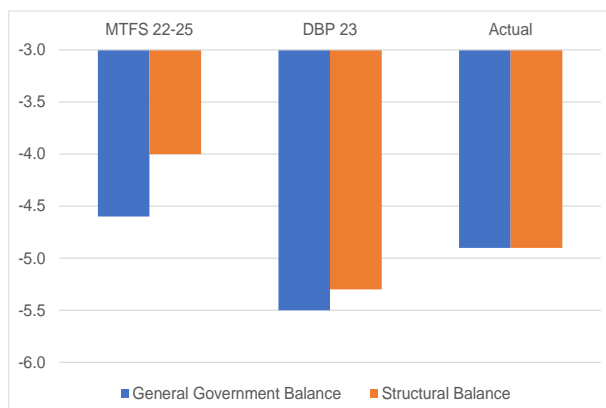
Sources: MFIN, NSO

16. **The debt ratio turned out lower than projected at 50.4%, well below the 60% benchmark.** In absolute terms, government debt stood at €9,767.8 million, an increase of €768.1 million over the level recorded in 2022. However, reflecting strong GDP growth, the debt ratio decreased from 51.6% in 2022 to 50.4% in 2023. This is considerably lower than the MTFS 22-25 and the DBP 23 estimates which projected that the debt ratio would converge to close to 60% by 2023. This reflects downward revisions in the debt ratio for both 2021 and 2022, aided by a more favourable macroeconomic turnout. The ratio continued to recede in 2023, by 1.2 pp, which contrasts with the previous projections of an increasing debt ratio in 2023 (by 0.8 pp in the MTFS 22-25 and by 2.2 pp in the DBP 23). This shift in debt developments during 2023 was primarily due to a larger debt-reducing snowball effect, with both real GDP growth and inflation turning out higher than projected.[21] The stock-flow adjustment (SFA) also turned out as more debt-reducing than was envisaged in the previous forecasts.[22,23]

---

[21] The snowball effect comprises interest expenditure, real GDP growth and the inflation effect.

[22] The contributions to the actual change in the gross debt ratio were: +3.8 pp from the primary balance, -4.1 pp from the snowball effect, -0.9 pp from stock-flow adjustments; leading to a reduction of 1.2 pp in the debt ratio.

[23] The stock-flow adjustment is the difference between the change in the debt and the deficit for the year. Estimates, particularly in accruals adjustments, varied over consecutive forecasts. For 2023, the largest contribution to the -0.9 pp SFA contributions was from 'other accounts receivable / payable' (-2.9 pp), which increased from the previous two years (-1.7 pp in 2022 and -0.2 pp in 2021). Offsetting some of this difference was an increase in currency and deposits to 1.8 pp, as the other SFA components almost balanced out.

Evolution of Public Debt: Deviations in MTFS and DBP Projections
(Percentage of GDP)
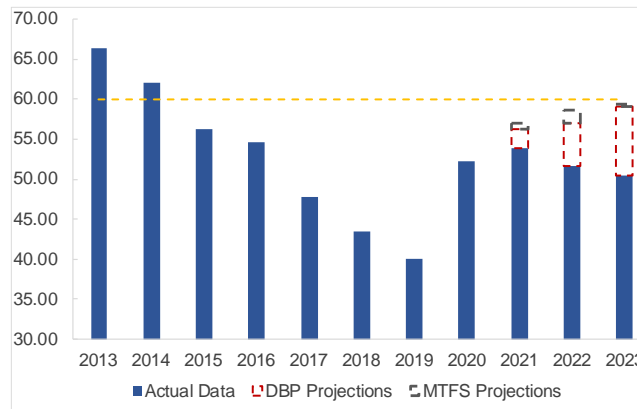
Sources: MFIN, NSO and MFAC staff calculations

COUNCIL'S APPRAISAL

17. **Malta's economy continued to sustain its robust performance in 2023, achieving stronger growth than was forecasted. This aided in the reduction of the deficit and debt ratios for the year. Notwithstanding this, the deficit remained above the 3% of GDP benchmark, whilst the debt ratio was further reduced to below the 60% of GDP threshold.** In 2023, Malta recorded the highest real GDP growth in the EU-27, exceeding expectations. With inflation at a high level, even though energy prices remained fixed, nominal GDP growth turned out as double-digit. The most significant contributions towards growth were from private consumption and exports of goods and services. The external side of the economy was the main contributor to actual 2023 GDP growth, as opposed to what was being forecasted in 2022. The better GDP outturn had a positive impact on the fiscal ratios. Indeed, it was growth in GDP that led to the deficit ratio turning out as 0.6 pp less than the previous year's outturn, as in absolute terms, the deficit remained close to the level of 2022. In terms of the government's debt ratio, it is positive to note further declines, as opposed to the increments projected in the MTFS 22-25 and the DBP 23. Indeed, the debt ratio held a good buffer of almost 10 pp below the 60% of GDP reference value.

18. **With the EU's general escape clause terminated at the end of 2023, and fiscal rules applying again as from 2024, fiscal policy should aim for a gradual and sustainable reduction of the budget deficit.** The country's end of year deficit, both in nominal and in structural terms, stood at 1.9 pp above the 3 percent-to-GDP benchmark, which benchmark returned in force as from 2024 with the application of the new fiscal rules. At the same time, the estimated structural adjustment as reported in the Annual Report was less than that projected in the government forecasts published in 2022. Going forward, the adjustment needs to be at least 0.5 pp, given the Commission's proposal for a Council decision on the

existence of an excessive deficit in Malta. On the other hand, the MFAC notes the Commission's Report published on 19 June 2024 stating that in 2023, the growth of nationally financed primary current expenditure in 2023 was in line with the Council recommendation. This is important given that in the new EU governance framework, expenditure growth shall serve as the main indicator of fiscal surveillance. The MFAC emphasises that the national budgetary process should shift towards limiting expenditure growth in line with the targets that are eventually going to be specified in the Medium-Term Fiscal Structural Plan for Malta. In this context, priority should be given to productive public expenditure, whilst ensuring efficiency and effectiveness in public spending.

COUNCIL'S RECOMMENDATIONS

19. Following this Assessment of the Annual Report 2023, the Council hereby recommends the following:

a. The economy's growth should continue to be export-led, with less dependence on the domestic drivers of economic growth, especially private consumption. This requires further efforts to ensure a strong competitive position, through labour productivity increases, particularly by addressing skills gaps.

b. Considering the recent research carried out by the MFAC and the update provided in this report, it is recommended that firms channel excess profits into productive investment and towards enhancing labour productivity.[24] This will not only enhance competitiveness, but also strengthen the country's capacity for sustainable economic growth.

c. Recent research by the MFAC showed that the persistent underestimation of economic growth by MFIN may be partly explained by the upward revisions carried out by the NSO.[25] It is recommended that the MFIN takes into account such statistical tendencies in its forecasting process and address any forecast biases adhering to Council Directive 2011/85/EU – Article 4(6).[26]

---

[24] The referenced research which was presented as a thematic chapter in the MFAC Annual Report 2023, may be accessed here.
[25] The referenced research which was published as a working paper WP01/2024 may be accessed here.
[26] Council Directive 2011/85/EU – Article 4(6) states that 'The macroeconomic and budgetary forecasts for fiscal planning shall be subject to regular, unbiased, and comprehensive evaluation based on objective criteria, including ex-post evaluation. The result of that evaluation shall be made public and taken into account appropriately in future macroeconomic and budgetary forecasts. If the evaluation detects a significant bias affecting macroeconomic forecasts over a period of at least four consecutive years, the Member State concerned shall take the necessary action and make it public'.

d. Government should avoid inflating government spending, to ensure adherence with the benchmark fiscal expenditure path. Whilst means of expenditure restraint should be explored, productive capital expenditure that promotes medium to long-term growth should not be curtailed. Rather, the Council encourages the Government to preserve nationally financed public investment and improve its efficiency and effectiveness. The effective absorption of RRF grants and other EU funds, in particular to foster the green and digital transitions, should also be ensured.

e. Fiscal consolidation should ensure that the required fiscal effort is achieved. Indeed, the structural adjustment must be more than the 0.4pp of GDP recorded in 2023, given that in an Excessive Deficit Procedure, a country must realise a minimum annual effort of 0.5pp. The Government should also consider targeting a larger effort than the minimum required, particularly whilst in a high economic growth environment, in order to build fiscal buffers.

f. Although GDP growth was significantly higher than the forecasts for 2023, government revenue was not as responsive. The elasticity of both direct and indirect taxes to GDP growth was at low levels when compared to the previous 10 years. The government ought to explore the reasons for such occurrences and take any necessary actions.

g. It is important to maintain the buffer achieved below the 60.0% debt benchmark and monitor the various components contributing to changes in debt, particularly interest expenditure and the level of stock-flow adjustment. The latter exhibits considerable volatility and over the past years has turned out rather different than forecasted.

h. The MFAC reiterates its recommendation to prepare an adequate exit strategy in relation to the fixed-energy-price policy, adopting a more targeted approach and enhancing incentives for energy savings.

Appendix 1

Summary Table of the Macroeconomic position of the Maltese Economy in 2023 and the Deviations from the Medium-Term Fiscal Strategy 2022-2025 and the Draft Budgetary Plan 2023

	MTFS 22-25	DBP 23	Actual 23
Macro Forecasts (% unless otherwise stated)			
Gross Domestic Product (Nominal Terms)	5.8	7.3	11.3
Private Final Consumption Expenditure	4.6	7.9	13.9
Public Consumption Expenditure	3.5	-0.2	6.7
Gross Fixed Capital Formation	7.7	10.3	-16.7
Exports of Goods and Services	4.9	5.7	11.6
Imports of Goods and Services	4.3	4.9	7.2
Employment (National Accounts Definition)	2.1	3.4	6.7
Compensation of employees	5.1	6.7	9.3
Inflation	2.2	3.7	5.6
Gross operating surplus and mixed incomes	5.4	8.1	11.7
Potential Output	4.0	4.2	5.1*
Output Gap (% of Potential output)	-1.3	-0.6	0.0*

*Since potential output and the output gap are estimates, actual values for 2023 represent the latest available estimates published by the COM in their Spring forecast round as indicated also in the MFIN Annual Report 2023.

Appendix 2

Methodology for estimating potential output and output gap using the Hodrick-Prescott Filter

This appendix describes the methodology employed to estimate potential output and output gaps from real GDP data using the Hodrick-Prescott (HP) filter. The HP filter is a widely recognised tool in economic time series analysis, designed to decompose a time series into its trend and cyclical components.

The initial step in this process involves acquiring annual real GDP data, which serves as the empirical basis for the analysis. The Hodrick-Prescott filter is then applied to decompose this series. The key feature of the HP filter is its ability to minimise the variance of the cycle around the trend while ensuring the smoothness of the series over time.

The mathematical foundation of the HP filter is based on minimising the following objective function:

$$min_T \left\{ \sum_{t=1}^{T} (y_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1} [(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1})]^2 \right\}$$

where:

- y_t is the actual data at time t,

- τ_t is the trend component,

- λ is the smoothing parameter.

For annual data, λ is typically set to 100. This value is chosen to appropriately penalise variations in the trend's growth rate, thus extracting a smoother representation of the underlying trend. The choice of λ significantly influences the smoothness of the resulting trend component, with higher values leading to a smoother trend.

The output of this minimisation provides the trend component τ_t, which is interpreted as the potential output. The output gap is then calculated as the difference between the actual real GDP and its estimated trend component:

$$Output\ Gap = y_t - \tau_t$$

The HP filter is widely used for estimating the output gap due to its simplicity, intuitive appeal, and flexibility in application across different datasets and periods. It effectively smooths out short-term fluctuations to reveal underlying trends, making it easier to identify the output gap. However, it suffers from significant end-point bias, making initial and final period estimates less reliable, and the choice of smoothing parameter (λ) can greatly influence results, introducing uncertainty. The filter may over-smooth data, potentially eliminating relevant short-term fluctuations, and lacks a strong economic foundation, ignoring structural breaks and supply-side factors. Additionally,

HP filter estimates are prone to revisions with new data, affecting their reliability for real-time policy decisions. Despite these drawbacks, its widespread use facilitates comparability across studies and policy reports.

Methodology for estimating potential output and output gap using the Baxter-King Filter

This appendix provides an overview of the methodology used to estimate potential output and output gaps from annual real GDP data, employing the Baxter-King (BK) band-pass filter. This filter is a widely utilised tool in economic time series analysis, designed to separate cyclical components from the overall trends in macroeconomic data.

The BK filter is applied to the real GDP data to extract the cyclical and trend components by suppressing frequency components outside a pre-specified band. The filter's effectiveness hinges on its parameters: the low-pass cutoff λ_L and high-pass cutoff λ_H. These parameters define the range of cycle lengths that the filter allows, which is critical for isolating the business cycle frequencies from the noise and long-term trends.

The BK filter is mathematically represented as follows:

$$y_t = \sum_{k=-K}^{K} a_k X_{t-k}$$

where y_t is the filtered series, X_t is the original input series, and a_k are the filter coefficients determined by the filter design, with K indicating the number of lags and leads in the filter.

From the filtered data, the trend component (potential output) and the cyclical component (output gap) are extracted. Potential output is identified as the trend component representing the underlying long-term economic growth trend, while the output gap is calculated using the formula:

$$\text{Output Gap} = \text{Observed GDP} - \text{Potential Output}$$

The BK filter is a popular method for estimating the output gap due to its ability to extract business cycle components by removing both high-frequency noise and low-frequency trends from the data. This filter provides a clearer view of the cyclical component of economic activity, aiding in the identification of the output gap. However, it has several limitations, including end-point bias, which affects the reliability of estimates at the beginning and end of the sample period. The BK filter also requires the selection of specific frequency bands, which can introduce subjectivity and variability in the results. Furthermore, it assumes that economic cycles have a fixed periodicity, which may not hold true in practice, leading to potential inaccuracies. Like the HP filter, the BK filter lacks a strong economic foundation and may overlook

27

structural changes and other fundamental factors influencing potential output. Despite these challenges, its ability to focus on business cycle fluctuations makes it a valuable tool for economic analysis and policy-making.

Methodological framework for estimating potential output and output gap using the Kalman Filter

This appendix describes the methodology used to estimate potential output and output gaps from annual real GDP data utilising the Kalman filter. The Kalman filter is an optimal recursive data processing algorithm known for its effectiveness in estimating the state of linear dynamic systems from series of incomplete and noisy measurements.

The Kalman filter is structured around two key concepts: the state equation and the observation equation. These equations collectively help in predicting a system's future state and then updating this prediction based on new measurement data.

State Equation: This component models the true state of the system at time t as a linear function of its state at time t-1, incorporating random process noise that follows a normal distribution:

$$x_t = F_t x_{t-1} + w_t$$

  - x_t represents the state vector at time t,

  - F_t is the state transition matrix, which in this context is simplified to unity (1) reflecting a stable process,

  - w_t is the process noise with covariance matrix Q_t.

Observation Equation: This equation relates the observable data at time t to the state at time t, plus some measurement noise:

$$z_t = H_t x_t + v_t$$

  - z_t is the observed data (real GDP),

  - H_t is the observation matrix, set to unity (1) indicating a direct observation of the state,

  - v_t is the observation noise with covariance matrix R_t.

In economic time series analysis, the Kalman filter is utilised to estimate unobservable components such as potential output from observable GDP data. The filter adjusts its estimates over time, improving the accuracy of potential output estimates and thereby the calculated output gaps. The output gap is then determined as the difference between the observed GDP and the estimated potential output:

$$Output\ Gap = z_t - \hat{x}_t$$

where $\hat{x}_t$ denotes the estimated state (potential output).

The main advantage of using the Kalman filter in economic time series analysis is its flexibility in handling noisy data and its ability to adapt to new information, which makes it particularly powerful for real-time analysis and forecasting. However, its reliance on model assumptions about noise characteristics and the linearity of relationships can be a limitation, particularly when the economic processes do not strictly adhere to linear dynamics.

Methodology for estimating potential output using Principal Components Analysis (PCA)

This section outlines the methodology employed to estimate potential output using Principal Components Analysis (PCA). The analysis leverages multiple economic indicators to derive a single measure of potential output. The relevant variables from the dataset include real GDP, real government consumption, real private consumption, real gross fixed capital formation, real exports, real imports, unemployment, inflation, labour force participation rate, industrial production index, productivity, retail consumer confidence, interest rates, government expenditure and population.

Each variable in the dataset was standardised to ensure that all variables contribute equally to the PCA. Standardisation involves subtracting the mean and dividing by the standard deviation for each variable. The standardised value Z_{ij} of variable X_{ij} is calculated as:

$$Zij = \frac{X_{ij} - \mu_j}{\sigma_j}$$

where:

X_{ij} is the original value of the j-th variable for the i-th observation.

μ_j is the mean of the j-th variable.

σ_j is the standard deviation of the j-th variable.

After standardising the data, the covariance matrix C of the standardised variables was computed to understand the relationships between the variables. The covariance matrix is given by:

$$C = \frac{1}{n-1} Z^T Z$$

where Z is the matrix of standardized variables and n is the number of observations.

The eigenvalues and eigenvectors of the covariance matrix were then calculated. These eigenvectors represent the principal components, and the eigenvalues indicate the amount of variance captured by each principal component. The eigenvector equation is:

$$Cv_i = \lambda_i v_i$$

where:

λ_i is the i-th eigenvalue.

v_i is the i-th eigenvector.

The eigenvectors (principal components) were sorted in descending order of their corresponding eigenvalues. The principal component with the highest eigenvalue captures the most variance in the data and is thus the most significant.

The original standardised data was projected onto the principal components to obtain the new set of variables. This transformation is represented by:

$$Y = ZV$$

where Y is the transformed data, and V is the matrix of eigenvectors.

The first principal component, which captures the most variance in the dataset, was used as a proxy for the underlying economic trend (potential output).

A linear regression model was fitted using the first principal component to estimate the real GDP. The regression equation is:

$$\text{real\_gdp}_t = \alpha + \beta \cdot \text{PC1}_t + \epsilon_t$$

where:

real_gdp$_t$ is the actual real GDP at time t.

PC1$_t$ is the first principal component at time t.

α and β are the regression coefficients.

ϵ_t is the error term.

The fitted values from the regression model represent the estimated potential output:

$$\text{potential\_output}_t = \hat{\alpha} + \hat{\beta} \cdot \text{PC1}_t$$

The output gap was calculated as the percentage difference between the actual real GDP and the estimated potential output:

$$\text{output\_gap}_t = \frac{\text{real\_gdp}_t - \text{potential\_output}_t}{\text{potential\_output}_t} \times 100$$

PCA is a valuable tool for estimating the output gap as it reduces the dimensionality of data by identifying the principal components that capture the most variance in the dataset. This method is particularly useful for handling large datasets with multiple variables, as it condenses the information into a smaller set of components, making the analysis more manageable and insightful. PCA helps in isolating the cyclical components of economic activity, aiding in a clearer identification of the output gap. However, it also has limitations. PCA is purely statistical and lacks a direct economic interpretation, which can make the results harder to relate to economic theory and practical policy decisions.

References

Baxter, M. and King, R.G., 1999. Measuring Business Cycles: Approximate Band-Pass Filters for Economic Time Series. Review of Economics and Statistics, 81(4), pp.575-593.

Hamilton, J.D., 1994. Time Series Analysis. Princeton: Princeton University Press.

Harvey, A.C., 1989. Forecasting, Structural Time Series Models and the Kalman Filter. Cambridge: Cambridge University Press.

Hodrick, R.J. and Prescott, E.C., 1997. Postwar U.S. Business Cycles: An Empirical Investigation. Journal of Money, Credit and Banking.

Hotelling, H., 1933. Analysis of a complex of statistical variables into principal components. Journal of Educational Psychology, 24(6), pp.417.

Jolliffe, I.T., 2002. Principal Component Analysis. Springer Series in Statistics.

Welch, G. and Bishop, G., 2006. An Introduction to the Kalman Filter. TR 95-041. University of North Carolina at Chapel Hill, 24 July.

Appendix 3

Summary Table of the Budgetary position of the Maltese Economy in 2023 and the Deviations from the Medium-Term Fiscal Strategy 2022-2025 and the Draft Budgetary Plan 2023

	Medium-Term Fiscal Strategy 2022-2025	Draft Budget Plan 2023	Actual 2023
Budgetary Forecasts (% of GDP unless otherwise stated)			
Revenue (€ millions)	6,288.0	6,475.8	6,483.0
Expenditure (€ millions)	7,047.0	7,447.8	7,433.5
General Government Balance (€ millions)	-759.0	-972.0	-950.4
General Government Balance	- 4.6	- 5.5	- 4.9
Primary Balance	- 3.5	- 4.2	- 3.8
Cyclically adjusted Budget Balance	- 4.0	- 5.3	- 4.9
Structural Balance	- 4.0	- 5.3	- 4.9
Gross Debt	59.4	59.1	50.4