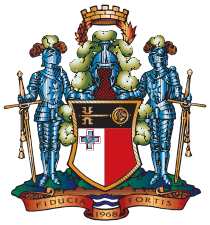

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OUTLOOK FOR LONG-TERM POTENTIAL OUTPUT

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BOX 2: OUTLOOK FOR LONG-TERM POTENTIAL OUTPUT[1]

Potential output is the level of output that can be generated within an economy at full and sustainable employment of its available resources without creating inflationary pressures in excess of the target. Although a useful concept in economics, it is not directly observable and therefore, needs to be estimated or inferred from other variables. There are several methods which can be applied to determine potential output. However, the Bank employs the production function approach which decomposes potential output into contributions from capital, labour, and the efficiency generated with the combined use of these factors, known as total factor productivity (TFP).[2,3]

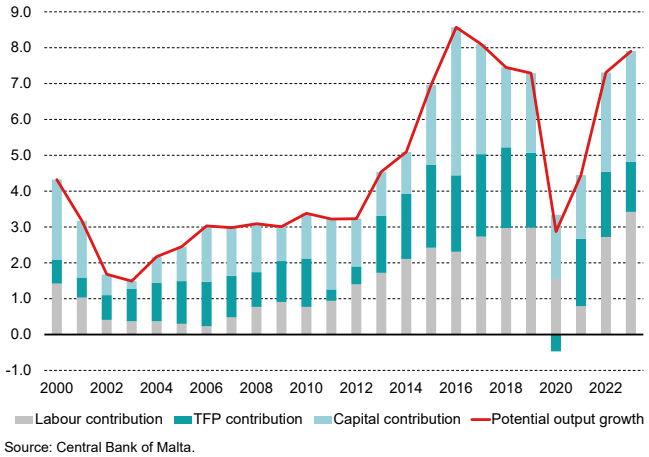
This box provides a brief overview of the Bank's estimate of historical potential output and its components, followed by an analysis of expected developments in their contribution to potential output growth in the long-term.

In view of the significant uncertainty surrounding such long-term projection, this box is complemented by an additional scenario analysis whereby the Maltese economy is assumed to transform to lower labour-intensive growth with higher investment and productivity growth.

Overview of historical potential output

Chart 1 shows the Bank's estimate of potential growth and the contributions of its components for the past two decades. During the period 2000-2012, potential output growth is estimated to have averaged around 2.9% largely supported by contributions from capital and TFP. After 2012, potential output grew more rapidly, with its growth rate reaching 8.6% in 2016 as the contribution from all factors, especially labour, increased. This mainly arose from an increase in the working age population due to higher year-on-year flows of foreign workers compared to previous years, and a

Chart 1
HISTORICAL POTENTIAL OUTPUT GROWTH
(% growth; percentage point contribution)



Source: Central Bank of Malta.

[1] Prepared by Lynn Cumbo, a Senior Economist within the Economic Analysis Department of the Central Bank of Malta.

[2] We employ a Cobb-Douglas production function in the form $Y_t = A_t \cdot L_t^{\alpha} \cdot K_t^{1-\alpha}$ where Y_t denotes output at time t, L_t^{α} is the labour input, $K_t^{1-\alpha}$ is the capital input and A_t is calculated as a residual representing TFP. The labour input elasticity α is derived from the share of labour income (based on the compensation of employees) in total nominal Gross Value Added (GVA).

[3] See Grech, A. G. and Micallef, B. (2015). Assessing potential output growth of the Maltese economy using a production function approach, *Xjenza 3*(1), pp. 57-63.

larger contribution from the participation rate, mainly as a result of policies that boosted the female activity rate.[4]

Growth in potential output decelerated slightly in the years after 2016 due to a weaker contribution from capital. However, the labour contribution continued to increase mainly on account of a sustained inflow of migrant workers. Higher participation of females and those reaching retirement age also contributed to this increase. Hence, potential growth remained elevated from both a historical perspective and in relation to estimates available for most advanced economies.

Growth dipped to 2.9% and 4.4% in 2020 and 2021, respectively, due to pandemic-related restrictions on inward migration as reflected in the lower contribution from the labour component.[5] Furthermore, the TFP contribution turned negative in 2020 because of a sharp decline in labour productivity growth and capacity underutilisation reflecting outright shutdown or restrictions in certain activities. Nevertheless, potential output growth recovered quickly in the years following the pandemic with the gradual re-opening of all activities, reaching an estimated 7.9% growth in 2023 led by a resumption of migration flows and further gains in activity rates, as well as a significant contribution from the capital stock.

The strong GDP growth rates recorded in recent years indicate that the extraordinary conditions brought about by COVID-19 did not leave any significant scarring effects on the Maltese economy. Moreover, the recent surge in inflation due to the Russia-Ukraine war, as well as other geopolitical conflicts, did not have a major impact on Malta's potential output level.

Expected developments in the long-term contribution of labour

In the Bank's framework for estimating potential output, the labour contribution consists of the contribution from the working age population which comprises of persons aged between 15 and 74 years, the participation rate (projection obtained from a cohort model employed in forecasting the labour supply),[6] usual weekly hours worked[7] and the non-accelerating inflation rate of unemployment (NAIRU) as a proxy for trend unemployment derived from an unobserved components model (UCM).[8]

Chart 2 shows that over time, the contribution from labour is expected to diminish as increases in the participation rate become progressively smaller and growth in the working age population also slows down. This reflects an ageing indigenous population and the fact that the participation rate already exceeds the euro area average.

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4 See Micallef, B. (2018) Estimating the impact of structural reforms to increase the female participation rate in Malta, *International Journal of Social Science Studies, 6*(8), pp. 73-84.

5 Hours worked also dipped during the pandemic but had a limited effect on potential growth.

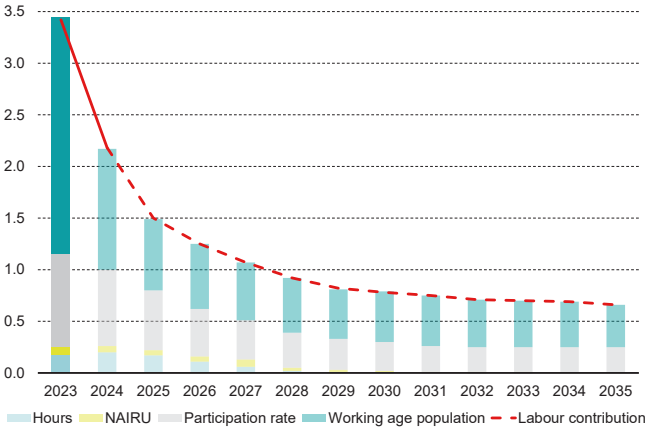
6 See Rapa, A. M. (2019). A cohort approach to project the labour participation rate in Malta. Central Bank of Malta, *Policy Note.*

7 These are a Labour Force Survey (LFS)-consistent definition of the average hours normally worked in the main job per week, inclusive of extra hours (whether paid or not), production and ancillary activities and time spent in education and training required for the main job. These differ from the average actual weekly hours which refer to the hours spent in actual work.

8 See Ellul, R. (2019). Box 1: An unobserved components model for potential output in Malta. Central Bank of Malta*, Quarterly Review* 2019:2, pp. 17-21.

Following the recent expansion of the working age population due to high net migration flows, we expect a moderation in its growth over time. This follows from an envisaged decline in inflows of foreign workers to around the average in the pre-pandemic decade, partly reflecting recent proposals in labour migration policies, and also because the working age population of Maltese nationals is expected to continue to decline due to a low birth rate. Nevertheless, by 2035, the working age population is expected to comprise around 60.0% of the total labour contribution to potential output growth; accounting for 0.4 percentage points of the 0.7 percentage points labour contribution (see Table 1).

Chart 2
COMPONENTS OF THE LABOUR CONTRIBUTION
(percentage point contributions)



Source: Central Bank of Malta.

On the other hand, the contribution of the participation rate is expected to decline initially before stabilising in the outer years at around 0.3 percentage points. Activity rates are envisaged to continue trending upwards as there is further scope for an increase in female participation in the labour market due to cohort effects. In particular, older female cohorts with typically low participation rates will exit the working age population, to be replaced by younger cohorts with higher participation rates. Moreover, the projected inflow of foreigners will continue to raise participation rates also among males as these typically enter the working age population for work purposes.

The contribution from labour hours and the NAIRU is marginal in the medium term (2027) and neutral in the longer term. Trend usual hours worked are expected to remain stable in the long term following a recovery to 2018 levels. The NAIRU is envisaged to continue declining slightly before stabilising at around 2.9% and hence, giving no contribution to growth as actual unemployment is projected to remain close to the trend.

Expected developments in the long-term contribution of capital

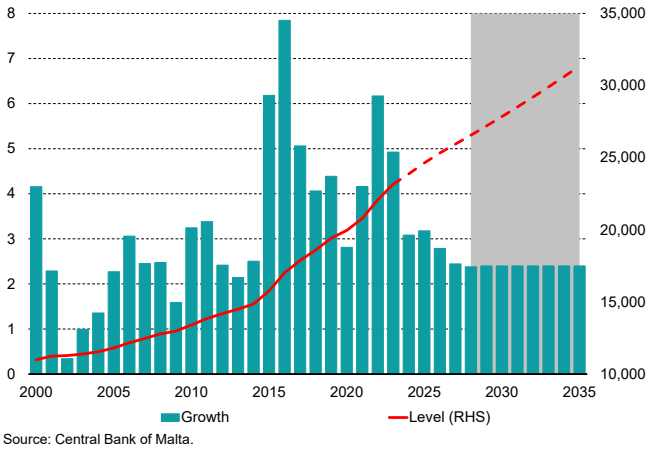
The capital stock is calculated using the perpetual inventory method whereby real public and non-dwelling private investment (i.e. capital flows), net of depreciation, are added to the existing level of the capital stock.

Chart 3 shows that the capital stock (net of depreciation) grew steadily during the period 2000-2015, with an average growth rate of 2.6%. This accelerated to almost 5.0% year-on-year growth in the following years up to 2023 due to high investment outlays particularly in machinery and equipment, which includes ICT equipment, as well as an increased

accumulation of intellectual property products in more recent years.

The outlook for the medium term is conditioned by the Bank's investment projections, which include the impact from Next-Generation EU (NGEU) funds. Beyond the standard projection horizon (2028 onwards), we assume growth in the capital stock at 2.4%, close to the 2000-2015 average (grey shaded area in Chart 3).

Chart 3
CAPITAL STOCK
(annual % growth; EUR millions)



Source: Central Bank of Malta.

There is high uncertainty on the extent and rate at which possible major structural shifts will affect businesses and their investment decisions. On the one hand, the capital stock would be boosted by a higher adoption of artificial intelligence (AI), digitalisation and the transition towards green energy. At the same time, these structural changes could also lead to a faster rate of depreciation of the existing capital stock.

Total factor productivity in the long term

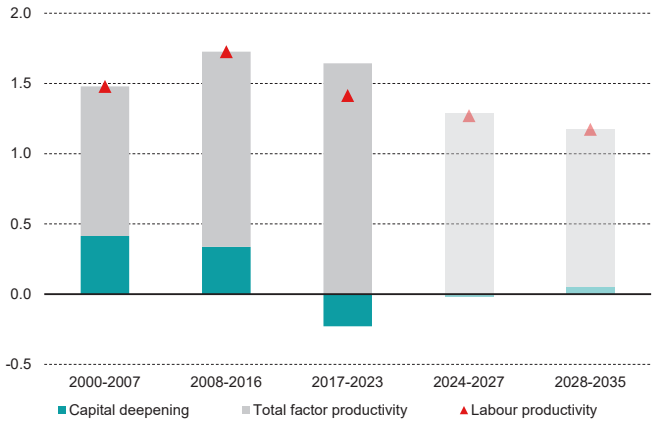
In the Bank's framework, TFP is estimated as the residual contribution to growth after considering contributions from labour and capital. It captures the efficiency at which labour and capital are used together in the production process, and therefore represents a measure of technological advancement and other gains in productivity, which are crucial for the long-term capacity of the economy. Due to its highly conceptual nature, the significance of TFP in driving long-term growth is better examined through its contribution to labour productivity growth.

By employing a growth accounting approach, labour productivity (output per worker) is decomposed into the contributions from capital deepening (capital per worker) and TFP as a residual. Chart 4 shows that the historical contribution from capital deepening declined from an average of 0.4 percentage points during the period 2000-2007 to 0.3 percentage points between 2008 and 2016 before turning negative in more recent years at -0.2 percentage points. This means that capital became more scarce in relation to persons in employment, contributing less and less to worker productivity. This partly reflects the shift towards a more service-oriented economy.

Therefore, growth in productivity has been mostly sustained by the TFP component which includes productivity gains other than those related to capital deepening. This may include efficiency gains from the reallocation of factors of production through the shift towards

new higher value-added sectors in services.[9] This economic transition may have also brought about an improvement in the quality of labour through higher education attainment[10] and training of professional personnel required in services.

Chart 4
DECOMPOSITION OF LABOUR PRODUCTIVITY GROWTH
(average % growth per person employed, average percentage point contribution)



Sources: Central Bank of Malta; author's calculations.

Considering these developments and in line with macroeconomic theory, we expect TFP to be the sole driver of labour productivity growth in the medium and long run contributing by 1.3 percentage points in the standard projection horizon (2024-2027) and by 1.1 percentage points in the longer term (2028-2035). The contribution from capital deepening remains subdued due to moderate investment growth.[11]

Potential output in the long term

The Bank's baseline projection of potential output in the long term and its contributing factors, which is largely informed by historical trends and structural reforms, is that by 2035, potential output growth will gradually reach a rate of 3.4% (see Table 1). This projection leans towards the average growth rate estimated for the period 2000-2015 since potential output during more recent years grew at exceptionally strong rates, particularly due to the developments in the working age population and investment.

The highest contribution is expected to be from TFP at 1.4 percentage points, followed by a stable contribution from capital at 1.3 percentage points. In contrast, the contribution from labour gradually drops to 0.7 percentage points by 2035 from an estimated contribution of 3.4 percentage points in 2023, mainly as a result of the expected developments in the working age population. The contribution from TFP is approximately in line with its long-term average (2000-2023) while the capital contribution is closer to the average during 2000-2015 given that the capital stock is expected to grow at a rate similar to that estimated in this period. Since the outlook for the labour component is less optimistic, its contribution by the year 2035 is almost half its long-term average.

[9] See Darmanin, J., Montebello R., and Deguara, W. (2021), The shifting structure of the Maltese economy: evidence from chain-linked data, *Mediterranean Journal of Social Sciences, 12*(4), pp. 97-111.
[10] See Gauci, T. M. (2021). An analysis of education attainment in Malta. Central Bank of Malta, *Policy Note.*
[11] While on the grounds of prudence the bank assumes a constant average of the past for the future, this may not necessarily be the case due to several possible scenarios of potential output.

Table 1

LONG-TERM POTENTIAL OUTPUT[1]

(% growth; percentage point contribution)

	Potential output growth	TFP contribution	Capital contribution	Labour contribution
2023	7.9	1.4	3.1	3.4
2024	5.3	1.4	1.8	2.2
2025	4.5	1.3	1.7	1.5
2026	4.0	1.3	1.5	1.3
2027	3.7	1.3	1.4	1.1
2028	3.5	1.4	1.3	0.9
2029	3.4	1.4	1.3	0.8
2030	3.4	1.4	1.3	0.8
2031	3.4	1.4	1.3	0.8
2032	3.4	1.4	1.3	0.7
2033	3.4	1.4	1.3	0.7
2034	3.4	1.4	1.3	0.7
2035	3.4	1.4	1.3	0.7

Source: Central Bank of Malta.

[1] Figures may not add up due to rounding.

Alternative scenario for long-term potential output

Potential output projections, both in the medium and long term, continue to be surrounded by a high level of uncertainty especially in view of emerging structural trends which can significantly influence its components in different ways. These include the adoption of AI, the green transition, digitalisation, demographic shifts and geopolitical challenges such as tensions between countries, fragmentation of trade blocs and relations and volatility in energy prices. Furthermore, the assessment of potential output during the past few years has been subject to a higher level of uncertainty due to significant revisions in national accounts and population statistics, which make it more challenging to derive projections for the supply-side in the medium-term.

In this regard, an alternative scenario is constructed whereby it is assumed that the drivers of long-term potential output growth would be different to those shown above. In particular, it maintains the view that long-term potential output growth would stand at 3.4%, but with lower net migration flows and higher contributions from capital stock and TFP. This is a scenario in which the Maltese economy would gradually transform to lower labour-intensive growth, with higher investment and productivity. This could imply, for example, a higher rate of investment in digital technologies than assumed in the baseline, which could in turn induce higher productivity.

More specifically, foreign net migration flows are assumed to be lower than in the pre-pandemic decade to reflect a possible decline in the dependence on labour. This implies a sharper drop in the labour contribution than that envisaged above, to 0.3 percentage points

by 2035. To sustain the 3.4% potential growth in the long term, growth in the capital stock and/or TFP would also have to be higher than in the baseline scenario.[12]

Table 2 shows that long-term growth of 3.4% can also be attained if the contribution from both factors increases. In this scenario, the capital stock is assumed to grow by an annual growth of around 3.0% by 2035, which is closer (but still well below) to the growth rates observed between 2016 and 2023 and above that envisaged in the baseline scenario shown in Table 1. Hence, the contribution from the capital stock would reach 1.5 percentage points. The TFP contribution is also assumed to increase to 1.5 percentage points by 2035.

Table 2
LONG-TERM POTENTIAL OUTPUT: LOWER MIGRATION SCENARIO(1)

(% growth; percentage point contribution)

	Potential output growth	TFP contribution	Capital contribution	Labour contribution
2023	7.9	1.4	3.1	3.4
2024	5.3	1.4	1.8	2.2
2025	4.5	1.3	1.7	1.5
2026	4.0	1.3	1.5	1.3
2027	3.7	1.3	1.4	1.1
2028	3.5	1.5	1.3	0.7
2029	3.4	1.5	1.4	0.5
2030	3.4	1.5	1.5	0.4
2031	3.4	1.5	1.5	0.4
2032	3.4	1.5	1.5	0.4
2033	3.4	1.5	1.5	0.4
2034	3.4	1.5	1.5	0.4
2035	3.4	1.5	1.5	0.3

Source: Central Bank of Malta.
(1) Figures may not add up due to rounding.

[12] By targeting the capital contribution only, long-term growth in the capital stock would need to be around 3.0%-3.2% such that its contribution gradually increases to 1.7 percentage points. Alternatively, the TFP contribution would need to rise to 1.8 percentage points by 2035 if growth in the capital stock were to remain as assumed in the baseline projection.