CONSEIL D'ORIENTATION DES RETRAITES
Séance plénière du 21 décembre 2023 à 10h00
« Cibles d'évolution de la productivité à long terme : nouveaux éléments de cadrage »

2024 Ageing Report. Underlying Assumptions and Projection Methodologies

European Commission's Directorate - General
for Economic and Financial Affairs

3. LABOUR PRODUCTIVITY AND POTENTIAL GDP PROJECTIONS

3.1. INTRODUCTION

To project potential GDP growth in the long term, a production function framework with the standard specification of the Cobb-Douglas production function with constant returns to scale is used. In this framework, potential GDP growth is driven by long-term developments in labour input and labour productivity.

Projections of labour productivity are based on assumptions about long-run developments in its underlying determinants, namely labour-augmenting total factor productivity (TFP) and the capital stock per worker (also referred to as capital deepening). The long-run projection is based on the central assumption of convergence of all Member States towards the same value of labour productivity by the end of the projection horizon, while accounting for cross-country GDP per capita differences in the short to medium term. Labour input projections are based on assumptions taken from Eurostat's latest population projections (see Chapter 1) and the labour market participation rate projected by the Commission's Cohort Simulation Model (see Chapter 2).

A detailed description of the production function framework and the key assumptions underpinning the long-term GDP projections presented in this section are summarised in Annex 3. All assumptions have been approved by the EPC, including the methodology developed by the EPC's Output Gap Working Group (OGWG) to calculate potential GDP over the first 10 years of the projection period. Indeed, following the practice used for previous Ageing Reports, the OGWG T+10 methodology is used for projecting potential growth and its components over the medium term – namely up to 2032 (Annex 3). The long-term projections, and T+10 projections, in this report are based on the Commission 2023 spring forecast.[24] Thus, the EPC's working groups, the OGWG and the AWG, are fully aligned. [25]

The rest of this section summarises (i) the long-term GDP projections in the baseline (Section 3.2.1), (ii) the results of the higher and lower TFP growth scenarios (Section 3.2.2) [26] and (iii) the main differences between these projections and those of the 2021 Ageing Report (Section 3.3).

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[24] The Commission 2023 spring forecast was published on 15 May 2023 and took account of all available information at that time. The revisions in the national accounts published in autumn 2023 are therefore not included in the assumptions presented in this report. The 2022 nominal GDP in the EU was estimated to be 0.6% higher than in the spring 2023 update. For a number of Member States the revision was downward.

[25] Since the 2024 Ageing Report, the T+10 methodology and the long-term projections adopted by the Ageing Working Group are based on the same population projections, namely EUROPOP2023. Moreover, the T+10 projections used in this report reflect the impact of the latest pension reforms on labour market participation rates.

[26] These alternative scenarios are also described in Chapter 5, together with other stress tests.

Table I.3.1: **Potential GDP growth rate - period average (%)**

	2022-2030	2031-2040	2041-2050	2051-2060	2061-2070	**2022-2070**
BE	1.4	1.3	1.5	1.3	1.2	**1.3**
BG	2.0	1.5	1.3	1.2	1.2	**1.4**
CZ	1.4	1.4	1.6	1.5	1.5	**1.5**
DK	1.2	1.3	1.7	1.4	1.1	**1.3**
DE	0.8	1.1	1.4	1.1	1.2	**1.1**
EE	1.5	1.8	1.8	1.4	1.5	**1.6**
IE	5.2	1.9	1.3	1.3	1.1	**2.1**
EL	1.0	0.7	1.2	1.2	1.2	**1.1**
ES	1.2	1.1	1.4	1.3	1.1	**1.2**
FR	0.8	0.9	1.4	1.3	1.1	**1.1**
HR	2.3	1.5	1.5	1.2	0.9	**1.5**
IT	0.8	0.8	1.4	1.4	1.2	**1.1**
CY	2.3	1.7	1.7	1.2	1.2	**1.6**
LV	1.6	1.4	0.8	0.5	1.1	**1.1**
LT	2.3	1.4	0.9	0.3	0.6	**1.1**
LU	2.2	1.8	2.0	1.5	1.3	**1.8**
HU	2.4	1.8	1.7	1.5	1.3	**1.7**
MT	4.2	3.1	1.8	0.9	0.8	**2.1**
NL	1.3	1.1	1.7	1.4	1.1	**1.3**
AT	1.4	1.4	1.4	1.1	1.1	**1.3**
PL	2.6	2.0	1.0	0.9	1.0	**1.5**
PT	1.4	0.7	1.3	1.5	1.2	**1.2**
RO	2.6	1.9	1.3	1.4	1.2	**1.7**
SI	2.6	1.9	1.1	1.2	1.2	**1.6**
SK	1.7	1.6	1.4	1.2	1.3	**1.4**
FI	1.1	1.3	1.3	1.0	0.9	**1.1**
SE	1.6	1.8	1.8	1.6	1.4	**1.6**
NO	1.6	1.4	1.7	1.4	1.2	**1.5**
EA	1.2	1.1	1.4	1.2	1.1	**1.2**
EU	1.3	1.2	1.4	1.3	1.1	**1.3**

Source: European Commission, EPC.

3.2. LONG-TERM POTENTIAL GDP PROJECTIONS

Relatively stable potential annual GDP growth of almost 1½% is projected over the long term in the EU. This is much lower than in previous decades and involves downside risks should future TFP growth develop less favourably than assumed, especially over the medium term.

3.2.1. Baseline

Annual potential GDP growth is projected to average 1.3% in the EU over the period 2022-2070. It would average 1.3% up to 2030, falling slightly to 1.2% during 2031-40 after which it rises again to 1.4% in the 2040s. It is then expected to fall in the 2050s to 1.3% and in the 2060s to 1.1% (see Table I.3.1). The projections for the euro area follow a similar, though slightly lower, trajectory at the beginning of the projection period, with annual growth of 1.2% through 2030, 1.1% in 2031-40, rising to 1.4% during the 2040s, and then falling to 1.2% in the 2050s and to 1.1% in the final decade. Overall, average growth in the euro area over the period 2022-2070 is projected at 1.2%.

The contribution of labour input – total hours worked – to potential growth in the EU and the euro area is projected to be negative as of the late 2020s. The demographic assumptions result in a decline in the working-age population and, by extension, a negative contribution of labour input to potential growth for most EU countries. The projected increase in participation and employment rates would not be sufficient to counterbalance the decline in the working-age population (see Chapter 2). After a recovery in the first years of the projection, total hours worked fall in the EU and the euro area, by 0.3% and 0.2% respectively over the period 2030-2070 (see Table I.3.2). As a result, potential GDP growth in the EU and the euro area become entirely driven by labour productivity.

Table I.3.2:		Total hours worked growth rate - period average (%)				
	2022-2030	2031-2040	2041-2050	2051-2060	2061-2070	**2022-2070**
BE	0.9	0.3	0.0	-0.1	-0.1	**0.2**
BG	-0.5	-1.0	-1.0	-0.8	-0.2	**-0.7**
CZ	0.2	-0.5	-0.5	-0.2	0.1	**-0.2**
DK	0.1	0.1	0.2	0.1	-0.2	**0.1**
DE	-0.2	-0.2	0.0	-0.2	-0.1	**-0.1**
EE	0.3	-0.1	-0.2	-0.3	0.1	**0.0**
IE	1.3	0.4	-0.1	0.0	-0.2	**0.3**
EL	-0.1	-0.9	-0.9	-0.6	-0.2	**-0.6**
ES	0.7	-0.1	-0.4	-0.3	-0.3	**-0.1**
FR	0.6	0.1	0.0	-0.1	-0.2	**0.1**
HR	0.4	-0.6	-0.7	-0.7	-0.6	**-0.4**
IT	0.2	-0.2	-0.2	-0.1	-0.1	**-0.1**
CY	0.8	0.0	0.1	-0.2	-0.1	**0.1**
LV	-0.9	-1.3	-1.3	-1.3	-0.3	**-1.0**
LT	-0.3	-1.2	-1.1	-1.4	-0.8	**-1.0**
LU	2.5	0.9	0.6	0.2	0.0	**0.8**
HU	0.0	-0.6	-0.5	-0.4	-0.1	**-0.3**
MT	2.1	1.3	0.4	-0.5	-0.5	**0.5**
NL	0.8	0.0	0.2	0.1	-0.2	**0.2**
AT	0.5	0.1	0.0	-0.2	-0.1	**0.0**
PL	-0.2	-0.8	-1.1	-0.9	-0.4	**-0.7**
PT	-0.1	-0.9	-0.7	-0.3	-0.2	**-0.4**
RO	-0.7	-1.1	-1.0	-0.5	-0.3	**-0.7**
SI	0.4	-0.2	-0.5	-0.3	-0.1	**-0.1**
SK	-0.5	-0.7	-0.7	-0.6	-0.1	**-0.5**
FI	0.0	-0.1	-0.2	-0.3	-0.3	**-0.2**
SE	0.8	0.6	0.4	0.2	0.2	**0.4**
NO	0.9	0.5	0.3	0.1	0.0	**0.3**
EA	0.3	-0.2	-0.2	-0.2	-0.2	**-0.1**
EU	0.2	-0.3	-0.3	-0.3	-0.2	**-0.2**

Source: European Commission, EPC.

Table I.3.3:		Hourly labour productivity growth rate - period average (%)				
	2022-2030	2031-2040	2041-2050	2051-2060	2061-2070	**2022-2070**
BE	0.5	1.0	1.4	1.3	1.3	**1.1**
BG	2.5	2.6	2.3	1.9	1.5	**2.2**
CZ	1.2	1.9	2.1	1.8	1.4	**1.7**
DK	1.1	1.2	1.4	1.3	1.3	**1.3**
DE	1.0	1.3	1.4	1.3	1.3	**1.3**
EE	1.2	1.9	2.0	1.7	1.4	**1.6**
IE	3.8	1.5	1.4	1.3	1.3	**1.8**
EL	1.1	1.6	2.1	1.8	1.4	**1.6**
ES	0.5	1.2	1.8	1.6	1.3	**1.3**
FR	0.2	0.8	1.4	1.3	1.3	**1.0**
HR	1.9	2.0	2.2	1.9	1.4	**1.9**
IT	0.6	1.1	1.6	1.4	1.3	**1.2**
CY	1.5	1.6	1.6	1.5	1.3	**1.5**
LV	2.5	2.7	2.1	1.8	1.4	**2.1**
LT	2.6	2.6	2.0	1.7	1.4	**2.1**
LU	-0.3	0.9	1.4	1.3	1.3	**0.9**
HU	2.5	2.4	2.2	1.9	1.4	**2.0**
MT	2.0	1.8	1.4	1.3	1.3	**1.6**
NL	0.5	1.1	1.4	1.3	1.3	**1.1**
AT	0.8	1.2	1.4	1.3	1.3	**1.2**
PL	2.9	2.8	2.1	1.8	1.4	**2.2**
PT	1.5	1.6	2.0	1.8	1.4	**1.7**
RO	3.4	3.0	2.3	1.9	1.5	**2.4**
SI	2.2	2.1	1.7	1.5	1.3	**1.7**
SK	2.2	2.4	2.1	1.8	1.4	**2.0**
FI	1.1	1.4	1.4	1.3	1.3	**1.3**
SE	0.8	1.2	1.4	1.3	1.3	**1.2**
NO	0.9	1.0	1.4	1.3	1.3	**1.2**
EA	0.9	1.3	1.6	1.4	1.3	**1.3**
EU	1.1	1.5	1.7	1.5	1.3	**1.4**

Source: European Commission, EPC.

Annual growth in labour productivity per hour worked is projected to increase in the period to the 2030s, from 1.1% to 1.5%, while reaching 1.7% in the 2040s. Thereafter annual growth in labour productivity is projected to fall to 1.5% in the 2050s and 1.3% in the 2060s. As a result, the average annual growth rate is projected at 1.4% over 2022-2070. A similar trajectory is envisaged in the euro area, with labour productivity rising from an average of 0.9% up to 2030 to about 1.6% in the 2040s, with an overall average of 1.3% over the entire period (see Table I.3.3).

Total factor productivity (TFP) growth explains around two-thirds of labour productivity growth during the projection period. Annual TFP growth converges to 0.8% by 2070 at the latest for all Member States. For the EU, TFP growth averages 0.7% per year over 2022-30, rising to just above 1% in 2031-40 and converging to 0.8% by the end of the projection horizon. The resulting average annual growth rate over 2022-70 is 0.9% (Table I.3.4). The annual TFP growth rate in the euro area follows a similar path, albeit from a lower starting point over 2022-30 (0.6%) and rising more slowly in the coming decades, with an average growth rate of 0.9% over 2022-70.

The contribution of capital deepening to labour productivity for the EU averages 0.5% per year during 2022-2070 (see Table I.3.5). The contribution rises from 0.4% in the 2020s to 0.6% in the 2040s and falls afterwards to 0.5%. For the euro area, the contribution from capital deepening averages just 0.3% per year during 2022-30 and rises to 0.6% before falling back to 0.5% in the 2050s and 2060s. The average is

0.4% for the entire projection period. For countries whose GDP per capita is below the EU average, the capital deepening contribution is projected to be considerably higher than the EU average in the first part of the projection period, reflecting the assumed catching-up process.

Table I.3.4: **TFP growth rate - period average (%)**

	2022-2030	2031-2040	2041-2050	2051-2060	2061-2070	**2022-2070**
BE	0.3	0.7	0.9	0.9	0.8	**0.7**
BG	1.7	1.5	1.5	1.3	0.9	**1.4**
CZ	0.6	1.2	1.4	1.2	0.9	**1.1**
DK	0.5	0.9	0.9	0.9	0.8	**0.8**
DE	0.7	0.9	0.9	0.9	0.8	**0.8**
EE	0.5	1.2	1.3	1.1	0.9	**1.0**
IE	3.6	0.9	0.9	0.9	0.8	**1.4**
EL	0.8	1.1	1.3	1.2	0.9	**1.1**
ES	0.3	0.8	1.2	1.0	0.9	**0.8**
FR	0.0	0.6	0.9	0.9	0.8	**0.7**
HR	1.2	1.2	1.4	1.2	0.9	**1.2**
IT	0.4	0.7	1.0	0.9	0.8	**0.8**
CY	0.7	0.9	1.1	0.9	0.8	**0.9**
LV	1.4	1.7	1.4	1.1	0.9	**1.3**
LT	1.2	1.5	1.3	1.1	0.9	**1.2**
LU	-0.2	0.6	0.9	0.9	0.8	**0.6**
HU	1.4	1.5	1.4	1.2	0.9	**1.3**
MT	1.2	1.1	0.9	0.9	0.8	**1.0**
NL	0.3	0.7	0.9	0.9	0.8	**0.7**
AT	0.5	0.8	0.9	0.9	0.8	**0.8**
PL	1.6	1.7	1.4	1.2	0.9	**1.4**
PT	1.2	1.0	1.3	1.1	0.9	**1.1**
RO	1.7	1.9	1.5	1.3	0.9	**1.4**
SI	1.6	1.4	1.1	1.0	0.8	**1.2**
SK	1.3	1.5	1.4	1.2	0.9	**1.2**
FI	0.5	0.9	0.9	0.9	0.8	**0.8**
SE	0.4	0.8	0.9	0.9	0.8	**0.8**
NO	0.6	0.7	0.9	0.9	0.8	**0.8**
EA	0.6	0.8	1.0	0.9	0.8	**0.9**
EU	0.7	1.0	1.1	1.0	0.9	**0.9**

Source: European Commission, EPC.

Table I.3.5: **Annual contribution of capital deepening - period average (%)**

	2022-2030	2031-2040	2041-2050	2051-2060	2061-2070	**2022-2070**
BE	0.1	0.3	0.5	0.5	0.4	**0.4**
BG	0.9	1.1	0.8	0.7	0.5	**0.8**
CZ	0.6	0.7	0.8	0.6	0.5	**0.6**
DK	0.6	0.4	0.5	0.5	0.4	**0.5**
DE	0.3	0.4	0.5	0.5	0.4	**0.4**
EE	0.8	0.7	0.7	0.6	0.5	**0.6**
IE	0.3	0.6	0.5	0.5	0.4	**0.4**
EL	0.3	0.6	0.7	0.6	0.5	**0.5**
ES	0.2	0.4	0.6	0.6	0.5	**0.5**
FR	0.2	0.3	0.5	0.5	0.4	**0.4**
HR	0.6	0.8	0.8	0.7	0.5	**0.7**
IT	0.2	0.3	0.6	0.5	0.5	**0.4**
CY	0.8	0.8	0.6	0.5	0.5	**0.6**
LV	1.1	1.0	0.7	0.6	0.5	**0.8**
LT	1.4	1.1	0.7	0.6	0.5	**0.9**
LU	-0.1	0.3	0.5	0.5	0.4	**0.3**
HU	1.0	0.9	0.8	0.6	0.5	**0.8**
MT	0.9	0.6	0.5	0.5	0.4	**0.6**
NL	0.2	0.4	0.5	0.5	0.4	**0.4**
AT	0.3	0.4	0.5	0.5	0.4	**0.4**
PL	1.2	1.1	0.8	0.6	0.5	**0.8**
PT	0.3	0.6	0.7	0.6	0.5	**0.5**
RO	1.7	1.2	0.8	0.7	0.5	**1.0**
SI	0.6	0.6	0.6	0.5	0.5	**0.6**
SK	1.0	0.8	0.7	0.6	0.5	**0.7**
FI	0.5	0.5	0.5	0.5	0.4	**0.5**
SE	0.3	0.4	0.5	0.5	0.4	**0.4**
NO	0.3	0.3	0.5	0.5	0.4	**0.4**
EA	0.3	0.4	0.6	0.5	0.5	**0.4**
EU	0.4	0.5	0.6	0.5	0.5	**0.5**

Source: European Commission, EPC.

A summary of the relative contribution to potential GDP growth of labour productivity and labour utilisation (and their determinants) in the baseline over the entire projection horizon 2022-70 is provided by the standard growth accounting framework reported in Table I.3.6.

Table I.3.6: **Breakdown of potential GDP growth (baseline), 2022-2070**

	GDP growth 2022-2070	labour prod. (GDP per hour worked)	TFP	capital deepening	labour input	total population	employment rate	share of working-age population (1)	change in average hours worked	GDP per capita growth 2022-2070
	1=2+5	2=3+4	3	4	5=6+7+8+9	6	7	8	9	10=1-6
BE	1.3	1.1	0.7	0.4	0.2	0.2	0.1	-0.1	0.0	1.1
BG	1.4	2.2	1.4	0.8	-0.7	-0.5	0.1	-0.3	0.0	2.0
CZ	1.5	1.7	1.1	0.6	-0.2	0.0	0.0	-0.2	0.0	1.5
DK	1.3	1.3	0.8	0.5	0.1	0.1	0.1	-0.2	0.0	1.2
DE	1.1	1.3	0.8	0.4	-0.1	0.0	0.0	-0.2	0.0	1.1
EE	1.6	1.6	1.0	0.6	0.0	0.0	0.2	-0.2	0.0	1.6
IE	2.1	1.8	1.4	0.4	0.3	0.4	0.0	-0.1	0.0	1.7
EL	1.1	1.6	1.1	0.5	-0.6	-0.6	0.3	-0.3	0.0	1.7
ES	1.2	1.3	0.8	0.5	-0.1	0.0	0.1	-0.2	0.0	1.2
FR	1.1	1.0	0.7	0.4	0.1	0.1	0.2	-0.2	0.0	1.1
HR	1.5	1.9	1.2	0.7	-0.4	-0.6	0.3	-0.2	0.0	2.0
IT	1.1	1.2	0.8	0.4	-0.1	-0.2	0.3	-0.2	0.0	1.3
CY	1.6	1.5	0.9	0.6	0.1	0.2	0.1	-0.2	0.0	1.4
LV	1.1	2.1	1.3	0.8	-1.0	-0.8	0.1	-0.2	0.0	1.9
LT	1.1	2.1	1.2	0.9	-1.0	-0.7	-0.1	-0.3	0.0	1.7
LU	1.8	0.9	0.6	0.3	0.8	0.9	0.1	-0.2	0.0	0.9
HU	1.7	2.0	1.3	0.8	-0.3	-0.2	0.1	-0.2	-0.1	1.9
MT	2.1	1.6	1.0	0.6	0.5	0.9	0.0	-0.3	-0.1	1.2
NL	1.3	1.1	0.7	0.4	0.2	0.1	0.2	-0.2	0.0	1.2
AT	1.3	1.2	0.8	0.4	0.0	0.1	0.1	-0.2	0.0	1.1
PL	1.5	2.2	1.4	0.8	-0.7	-0.3	0.0	-0.3	0.0	1.8
PT	1.2	1.7	1.1	0.5	-0.4	-0.3	0.1	-0.3	0.0	1.5
RO	1.7	2.4	1.4	1.0	-0.7	-0.5	0.0	-0.2	0.0	2.2
SI	1.6	1.7	1.2	0.6	-0.1	-0.1	0.2	-0.2	0.0	1.7
SK	1.4	2.0	1.2	0.7	-0.5	-0.3	0.1	-0.3	0.0	1.7
FI	1.1	1.3	0.8	0.5	-0.2	-0.1	0.1	-0.2	0.0	1.2
SE	1.6	1.2	0.8	0.4	0.4	0.4	0.1	-0.1	0.0	1.2
NO	1.5	1.2	0.8	0.4	0.3	0.4	0.1	-0.1	0.0	1.1
EA	1.2	1.3	0.9	0.4	-0.1	0.0	0.1	-0.2	0.0	1.2
EU	1.3	1.4	0.9	0.5	-0.2	-0.1	0.1	-0.2	0.0	1.3

(1) Working-age population refers to people aged 15-74.
Source: European Commission, EPC.

For the EU and for the euro area, the total population and the change in total hours worked over the entire projection period are projected to remain quite stable, while an assumed increase in employment rates makes a positive contribution to potential growth (0.1 pp). However, this is more than offset by a decline in the share of the working-age population, which is a substantial negative drag on growth, with an annual average of -0.2 pps. As a result, labour input contributes negatively to annual potential output growth on average over the projection period (by 0.2 pps in the EU and by 0.1 pp in the euro area). Hence, growth in labour productivity (production per hour worked) becomes the sole source of potential output growth in both the EU and the euro area, averaging 1.4 pps and 1.3 pps, respectively. As a result, over the projection horizon, annual potential GDP growth in the EU and euro area will average 1.3% and 1.2%, respectively.

While the majority EU Member States are projected to experience a slowdown in the contribution of labour input (total hours worked) to potential growth rates due to the adverse impact of demographic developments (^{27}), overall potential growth rates differ substantially across countries over the projection horizon. This is mainly explained by differences in productivity developments, especially in the first half of the projection period, reflecting different productivity growth rates at the outset of the projection and the assumed different future paths given the catching-up potential (see description in Box I.3.1).

In particular, *for countries with GDP per capita below the EU average*, growth rates are projected to be higher. Indeed, TFP growth is above 1% for those countries with GDP per capita below the EU average, which are thus assumed to have high catch-up potential. For these countries, annual TFP growth peaks during the 2040s before gradually falling to 0.8% by 2070.

(^{27}) However, under the baseline, average labour input growth is positive for some countries including Belgium, Denmark, Ireland, France, Cyprus, Luxembourg, Malta, the Netherlands, Sweden, and Norway (see also Table I.3.6).

By contrast, *for countries with GDP per capita above the EU average*, annual TFP growth is generally below 1%, before converging to 1% by 2040, 0.9% by 2048, and to 0.8% by 2070.

Graph I.3.1: **Average actual and potential GDP growth rates 2022-2032**
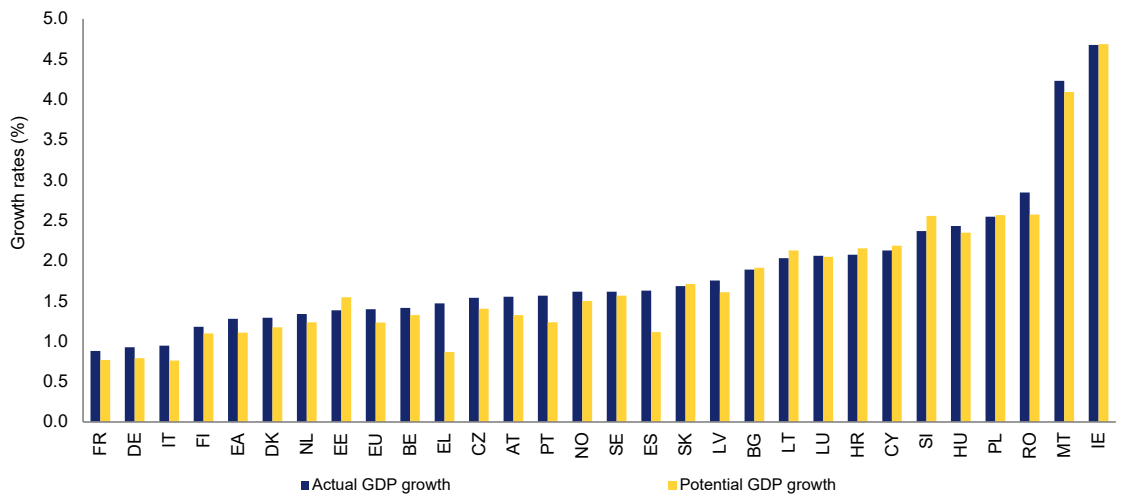
Source: European Commission, EPC.

Finally, the GDP growth projections consider the position of the economies in the business cycle, differentiating between potential and actual GDP growth. The commonly agreed rule is that the output gap is closed at the latest three years after the end of the 2023 spring forecast, i.e in 2027 for the 2024 Ageing Report. As in most member states in 2021 potential GDP was higher than actual GDP, actual GDP *growth* is projected to be higher than potential GDP *growth* until the output gap is closed in 2027 (see Graph I.3.1).

Table I.3.7: **Breakdown of potential GDP growth (higher TFP growth scenario), 2022-2070**

	GDP growth 2022-2070	labour productivity	TFP	capital deepening	labour input	GDP growth 2022-2070
	1=2+5	2=3+4	3	4	5	Baseline
BE	1.4	1.2	0.8	0.4	0.2	1.3
BG	1.5	2.2	1.4	0.8	-0.7	1.4
CZ	1.6	1.8	1.1	0.7	-0.2	1.5
DK	1.5	1.4	0.9	0.5	0.1	1.3
DE	1.3	1.4	0.9	0.5	-0.1	1.1
EE	1.7	1.7	1.1	0.7	0.0	1.6
IE	2.2	1.9	1.5	0.5	0.3	2.1
EL	1.1	1.7	1.1	0.6	-0.6	1.1
ES	1.3	1.4	0.9	0.5	-0.1	1.2
FR	1.2	1.1	0.7	0.4	0.1	1.1
HR	1.5	2.0	1.3	0.7	-0.4	1.5
IT	1.2	1.3	0.9	0.5	-0.1	1.1
CY	1.7	1.6	1.0	0.7	0.1	1.6
LV	1.2	2.2	1.3	0.8	-1.0	1.1
LT	1.2	2.2	1.3	0.9	-1.0	1.1
LU	1.9	1.1	0.7	0.4	0.8	1.8
HU	1.8	2.1	1.3	0.8	-0.3	1.7
MT	2.2	1.7	1.1	0.6	0.5	2.1
NL	1.4	1.3	0.8	0.4	0.2	1.3
AT	1.4	1.3	0.9	0.5	0.0	1.3
PL	1.6	2.3	1.4	0.9	-0.7	1.5
PT	1.3	1.7	1.2	0.6	-0.4	1.2
RO	1.7	2.5	1.5	1.0	-0.7	1.7
SI	1.7	1.8	1.2	0.6	-0.1	1.6
SK	1.5	2.1	1.3	0.8	-0.5	1.4
FI	1.2	1.4	0.9	0.5	-0.2	1.1
SE	1.8	1.3	0.9	0.5	0.4	1.6
NO	1.6	1.3	0.9	0.4	0.3	1.5
EA	1.3	1.4	0.9	0.5	-0.1	1.2
EU	1.4	1.5	1.0	0.5	-0.2	1.3

Source: European Commission, EPC.

3.2.2. Higher and lower TFP growth scenarios

Two scenarios with alternative TFP growth paths are evaluated: a higher TFP growth scenario with assumptions closer to those of the 2021 Ageing Report and a lower TFP growth scenario reflecting more conservative assumptions regarding TFP growth rates based on the visible trend decline in TFP growth over the last decades (see Box I.3.1 for more details on these two scenarios).

For the EU, GDP growth between 2022 and 2070 is projected to be on average 1.4% in the higher TFP growth scenario while it is projected at 1.1% in the lower TFP growth scenario, compared to 1.3% in the baseline (see Tables I.3.7 and I.3.8). For the euro area the projected growth rates are slightly lower at 1.3% for the higher TFP growth scenario, while being 1% in the lower TFP growth scenario compared to 1.2% in the baseline.

In the higher and lower TFP growth scenarios, average GDP growth is impacted through two

channels compared to the baseline. Firstly, the contribution of TFP growth itself on GDP growth is higher by assumption as TFP is one of the inputs of the production function (see Annex 3). Secondly, as TFP growth feeds over the long-run assumption into capital growth (see Box I.3.1 for details), the contribution of capital deepening to GDP growth also changes according to differing TFP growth.

Table I.3.8: **Breakdown of potential GDP growth (lower TFP growth scenario), 2022-2070**

	GDP growth 2022-2070	labour productivity	TFP	capital deepening	labour input	GDP growth 2022-2070
	1=2+5	2=3+4	3	4	5	Baseline
BE	1.1	0.9	0.6	0.3	0.2	1.3
BG	1.2	1.9	1.2	0.7	-0.7	1.4
CZ	1.3	1.5	0.9	0.6	-0.2	1.5
DK	1.1	1.1	0.7	0.4	0.1	1.3
DE	0.9	1.1	0.7	0.4	-0.1	1.1
EE	1.4	1.4	0.9	0.6	0.0	1.6
IE	1.9	1.6	1.2	0.4	0.3	2.1
EL	0.8	1.4	0.9	0.5	-0.6	1.1
ES	1.0	1.1	0.7	0.4	-0.1	1.2
FR	0.9	0.8	0.5	0.3	0.1	1.1
HR	1.3	1.7	1.1	0.6	-0.4	1.5
IT	0.9	1.0	0.7	0.4	-0.1	1.1
CY	1.4	1.3	0.7	0.5	0.1	1.6
LV	0.9	1.9	1.1	0.7	-1.0	1.1
LT	0.9	1.8	1.1	0.8	-1.0	1.1
LU	1.5	0.7	0.5	0.3	0.8	1.8
HU	1.5	1.8	1.1	0.7	-0.3	1.7
MT	1.9	1.3	0.8	0.5	0.5	2.1
NL	1.1	0.9	0.6	0.3	0.2	1.3
AT	1.1	1.0	0.7	0.4	0.0	1.3
PL	1.3	2.0	1.2	0.8	-0.7	1.5
PT	1.0	1.4	1.0	0.5	-0.4	1.2
RO	1.5	2.2	1.3	0.9	-0.7	1.7
SI	1.4	1.5	1.0	0.5	-0.1	1.6
SK	1.2	1.8	1.1	0.7	-0.5	1.4
FI	0.9	1.1	0.7	0.4	-0.2	1.1
SE	1.4	1.0	0.6	0.4	0.4	1.6
NO	1.3	1.0	0.6	0.3	0.3	1.5
EA	1.0	1.1	0.7	0.4	-0.1	1.2
EU	1.1	1.2	0.8	0.4	-0.2	1.3

Source: European Commission, EPC.

For the higher TFP growth scenario that means that the growth rate in labour productivity is 1.5% for the EU and 1.4% for the euro area compared with 1.4% and 1.3% for the EU and the euro area respectively in the baseline (see Table I.3.7). For the lower TFP growth scenario the values are 1.2% for the EU and 1.1% for the euro area (see Table I.3.8).

3.3. COMPARING THE 2024 AND 2021 GDP PROJECTIONS

Over the whole projection period, potential GDP growth is slightly lower in the 2024 exercise compared with the 2021 one, mainly due to the lower TFP convergence paths. There are, however, some differences for the sub-periods.

In particular, under the baseline of the 2024 Ageing Report, the annual average potential GDP growth rate over the period 2022-2070 in the EU and in the euro area is projected to be 1.3% and 1.2%, 0.1 pp lower than in the 2021 Ageing Report (Table I.3.9).

For the EU and the euro area, the annual contribution from labour productivity growth during 2022-70 is 0.2 pps lower than in the 2021 projection exercise. Labour input growth (hours worked) is projected to be 0.1 pp higher than in the 2021 Ageing Report for both the EU and the euro area.

However, there is some variation across countries in the differences between the 2024 and 2021 potential GDP growth projections under the baseline. The largest downward revisions in average annual potential GDP growth rates are for Cyprus, Denmark, and Greece (-0.3 pps) due to the contributions of both labour productivity (for Denmark) and labour input (for Cyprus and Greece) being lower than in the 2021 exercise. The largest upward revisions concern Croatia and Ireland (+0.4 pps). Ireland benefits from stronger labour productivity projections, while Croatia benefits from a higher projected labour input than in the 2021 Ageing Report. The latter is driven by higher projected participation rates in the 2024 Ageing Report for Croatia.

The differences between the 2024 and 2021 potential GDP growth projections under the baseline materialise primarily in the second part of the projections (2045-2070), particularly for the euro

Graph I.3.2: **GDP potential growth rates 2022-2070 - period average (%)**
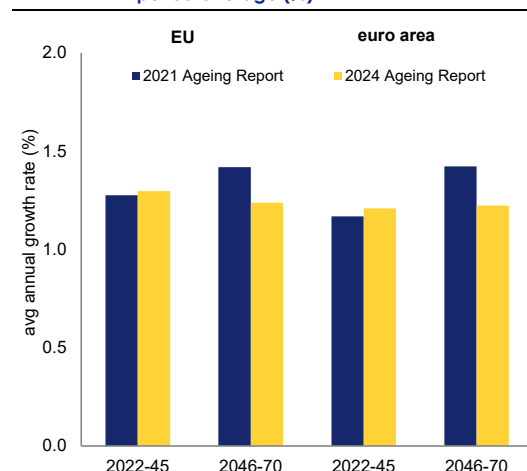
Source: European Commission, EPC.

area (Graph I.3.2). For the EU, annual potential GDP growth over the period 2022-45 is now projected to average 1.3% (the same as in the 2021 projection). Over the period 2046-70, average GDP growth is projected in the 2024 Ageing Report at 1.2%, while it was projected in 2021 to be 1.4%. For the euro area, annual potential GDP growth over the period 2022-45 is projected in the 2024 Ageing Report to average 1.2% (close to the 2021 Ageing Report average). Over the period 2046-70, it is projected to be 1.2% (versus 1.4% in the 2021 Ageing Report).

Table I.3.9:   **2024 and 2021 baseline projections compared (pps), 2022-2070**

	GDP growth in 2022-2070	labour prod. (GDP per hour worked)	TFP	capital deepening	labour input	total population	employment rate	share of working-age population	change in average hours worked	GDP per capita growth in 2022-2070
	1=2+5	2=3+4	3	4	5=6+7+8+9	6	7	8	9	10=1-6
BE	0.1	-0.2	-0.1	-0.1	0.3	0.1	0.1	0.0	0.0	0.0
BG	0.2	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.1
CZ	-0.1	-0.3	-0.2	-0.1	0.2	0.1	0.0	0.0	0.0	-0.2
DK	-0.3	-0.2	-0.2	0.0	-0.1	0.0	-0.1	0.0	0.0	-0.3
DE	-0.1	-0.2	-0.1	-0.1	0.1	0.1	0.0	0.0	0.0	-0.2
EE	-0.2	-0.5	-0.3	-0.2	0.3	0.2	0.0	0.0	0.1	-0.4
IE	0.4	0.3	0.3	0.0	0.1	-0.1	0.2	0.0	0.0	0.5
EL	-0.3	0.0	0.0	0.0	-0.3	-0.2	0.0	0.0	0.0	-0.1
ES	-0.2	-0.2	-0.2	-0.1	0.0	0.0	-0.1	0.0	0.0	-0.3
FR	-0.2	-0.3	-0.2	-0.1	0.1	0.0	0.0	0.0	0.0	-0.2
HR	0.4	0.0	0.1	0.0	0.4	0.0	0.3	0.0	0.0	0.4
IT	0.0	-0.2	-0.1	-0.1	0.2	0.0	0.1	0.0	0.0	0.0
CY	-0.3	0.0	0.0	0.0	-0.3	-0.2	-0.1	0.0	0.0	-0.1
LV	-0.1	-0.2	-0.1	-0.1	0.1	0.1	0.0	0.0	0.0	-0.2
LT	0.0	-0.1	-0.1	0.0	0.1	0.2	-0.1	0.0	0.0	-0.2
LU	-0.1	-0.3	-0.2	-0.1	0.2	0.4	-0.2	0.0	0.0	-0.5
HU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0
MT	0.0	-0.2	-0.2	-0.1	0.2	0.3	-0.1	0.0	0.0	-0.3
NL	0.0	-0.3	-0.2	-0.1	0.3	0.1	0.2	0.0	0.0	-0.1
AT	-0.1	-0.2	-0.1	-0.1	0.1	0.1	0.1	0.0	0.0	-0.1
PL	0.0	-0.1	-0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0
PT	0.1	-0.1	0.0	-0.1	0.2	0.1	0.0	0.0	0.0	0.0
RO	0.1	-0.1	-0.1	0.0	0.2	0.2	0.0	0.0	0.0	-0.1
SI	0.0	-0.2	-0.1	-0.1	0.2	0.1	0.1	0.0	0.0	-0.1
SK	0.1	-0.1	-0.1	-0.1	0.2	0.1	0.2	0.0	0.0	0.1
FI	-0.1	-0.2	-0.1	-0.1	0.1	0.1	0.0	0.0	0.0	-0.2
SE	-0.2	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.2
NO	-0.2	-0.3	-0.2	-0.1	0.1	-0.1	0.1	0.0	0.0	-0.1
EA	-0.1	-0.2	-0.1	-0.1	0.1	0.0	0.0	0.0	0.0	-0.1
EU	-0.1	-0.2	-0.1	-0.1	0.1	0.0	0.0	0.0	0.0	-0.1

(1) Working age populations refers to the total population aged 15-74.
Source: European Commission, EPC.

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Box I.3.1: **Assumptions on the components of the production function used for long-run potential growth projections**

In 2022-2032 potential growth estimates are based on the T+10 methodology described in Annex 3. The long-run projection is based on a similar production function, with a number of convergence rules for labour productivity growth. Using common methodologies for all Member States allows for cross-country comparability.

1. KEY ASSUMPTIONS ON TOTAL FACTOR PRODUCTIVITY (TFP)

Concerning total factor productivity growth, the AWG and EPC decided to lower the long-run TFP growth rate in comparison to the 2021 Ageing Report, namely from 1% to 0.8%. This decision was taken considering the trend decline in TFP growth over the last decades, especially in recent times. ([1]) As done in the previous projection exercise, countries with below average GDP per capita in 2032 are assumed to have higher TFP growth, thus acknowledging the catching-up potential. To avoid undue changes in relative GDP per capita terms, the catching up potential is evaluated in 2040. The labour share is assumed to stay constant at 0.65 over the projection period (see Annex 3 for details). In the long term, labour productivity broadly coincides with TFP growth divided by the labour share, i.e. 1.2%. Scenarios consider higher and lower TFP growth rate targets.

Baseline

The baseline assumption for TFP is that country-specific growth rates converge to 0.8%. The speed and the year of convergence to the common growth rate are determined by Member States' income position relative to the EU average (see Table 1). Hence, the lower the GDP per capita, the higher the real catching-up potential.

The specific assumptions agreed for the baseline by the AWG and EPC are as follows (see Table 2):

- The 'leader group' includes countries that have a GDP per capita above the EU average in 2032. For these countries, TFP growth is assumed to converge from the estimated value in 2032 to a 1% growth rate by 2040, and to 0.9% in 2048.

- The 'follower group' comprises the countries with GDP per capita below the EU average in 2032. A differentiation is made depending on the distance to the average, with 1.5% as an upper limit and 1% as a lower limit in 2040 and 1.5% and 0.9% in 2048.

- For both groups TFP growth converges from the 2048 value to 0.8% in 2070 by linear interpolation.

Higher and lower TFP growth scenarios

In the higher TFP growth scenario, the 'leader' group is projected to converge to a TFP growth of 1% by 2040 from their 2032 values and to stay at this value until 2070. For the 'follower' group there is again a

Table 1:	**GDP per capita (2032)**
	GDP per capita (% of EU27)
IE	355.1
LU	298.5
DK	171.0
SE	160.2
NL	140.3
FI	137.3
AT	136.9
BE	127.1
DE	122.1
EA	*107.9*
FR	107.7
EU27	**100.0**
MT	98.0
IT	93.3
CY	88.2
SI	84.3
ES	79.0
PT	66.2
EE	65.8
EL	63.1
LT	62.9
CZ	61.3
SK	59.3
LV	58.8
PL	56.5
HU	54.8
HR	53.8
RO	44.6
BG	30.0

Source: European Commission, EPC.

([1]) See European Commission (2023), 'Prospects for long-term productivity growth' in Quarterly Report on the Euro Area, European Economy, Institutional Paper No 201.

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Box (continued)

differentiation made depending on their distance to the EU average with 1.5% and 1% as upper and lower limits until 2048, with TFP growth converging to 1% in 2070.

In the lower TFP growth scenario, the 'leader' group of countries is projected to converge to a TFP growth of 0.8% by 2040 from their 2032 values, to 0.7% in 2048, and to 0.6% in 2070. For the 'follower' group there is again a differentiation made depending on their distance to the EU average with upper and lower limits of 1.3% and 0.8% until 2040, 1.3% and 0.7% until 2048, with TFP growth converging to 0.7% in 2070.

In the long term, labour productivity broadly coincides with TFP growth divided by the labour share, namely 1.5% for the higher TFP growth scenario and 0.9% for the lower TFP growth scenario.

Table 2:   **TFP growth: baseline assumptions on the speed of convergence**

2033-2040	
GDP/cap > EU27 (2032) BE, DK, DE, IE, FR, LU, NL, AT, FI, SE, NO	*GDP/cap < EU27 (2032)* BG, CZ, EE, EL, ES, HR, IT, CY, LV, LT, HU, MT, PL, PT, RO, SI, SK
From value in 2032 to 1%, by linear interpolation	From value in 2032 to $$\frac{1.5\% \times \left(1 - \frac{GDPcap_{i,2032}}{GDPcap_{EU,2032}}\right) + 1\% \times \left(\frac{GDPcap_{i,2032}}{GDPcap_{EU,2032}} - 0.5\right)}{0.5}$$ with a maximum of 1.5%, by linear interpolation

2041-2048	
GDP/cap > EU27 (2040) BE, DK, DE, IE, FR, LU, MT, NL, AT, FI, SE, NO	*GDP/cap < EU27 (2040)* BG, CZ, EE, EL, ES, HR, IT, CY, LV, LT, HU, PL, PT, RO, SI, SK
From value in 2040 to 0.9%, by linear interpolation	From value in 2040 to $$\frac{1.5\% \times \left(1 - \frac{GDPcap_{i,2040}}{GDPcap_{EU,2040}}\right) + 0.9\% \times \left(\frac{GDPcap_{i,2040}}{GDPcap_{EU,2040}} - 0.5\right)}{0.5}$$ with a maximum of 1.5%, by linear interpolation

2049-2070
All Member States
From value in 2048 to 0.8%, by linear interpolation

Source: European Commission, EPC.

2.   KEY ASSUMPTIONS ON CAPITAL FORMATION

With regard to capital deepening, the assumption is unchanged from previous updates, namely a constant capital-to-labour ratio in efficiency units in the long term. It is assumed therefore that in the long run, the capital stock adjusts to the steady state path according to the 'capital rule': the growth rate of capital is equal to the sum of labour and labour-augmenting technical progress. This fulfils the steady state property, as the ratio of capital to labour expressed in efficiency unit remains constant over time. Consequently, labour productivity growth coincides with that of labour-augmenting technical progress. As done in the 2021 Ageing report a transition between the investment rule and the capital rule is applied to smooth the investment profile:

- First, the transition to the constant capital/labour (in efficiency units) ratio is introduced gradually in the period 2032-2042 in a linear manner (*'transition rule'*).

- Second, the capital/labour (in efficiency units) ratio is constant as of 2042 (*'capital rule'*).

The transition rule was introduced in the 2021 Ageing Report to avoid too pessimistic productivity projections for many of the catching-up countries, which have comparatively higher investment rates, while making little difference for countries that are already close to their long-run TFP growth rate.