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What does it cost to stabilize public debt?

From intuition to simulations with debtwatch 2.0

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Xavier Timbeau

1 Key findings

- A debt target of 120% of GDP requires a fiscal effort[1] of 3.4 points of GDP between 2026 and 2032 (€105 billion at 2026 GDP), on the basis of the IFE|OFCE autumn 2026 forecast scenario, incorporating a realistic path for the weighted sovereign rate and a multiplier effect (Section 3). The average output loss (between 2026 and 2032) amounts to 1.5 points of GDP (Table 2)[2], with 2028 marking the trough of a severe slowdown lasting four consecutive years. In this scenario, unemployment would reach 9.4% of the labour force in 2028.
- Stabilising the debt ratio in 2032 (balance target, Table 7) implies a fiscal effort of 2.8% of GDP between 2026 and 2032 (€84 billion at 2026 GDP), i.e. 0.7 point less than in the previous scenario, with public debt reaching almost 125% of GDP in the long term. The fiscal effort is smaller because the debt target is less ambitious, and it increases over time because the interest–growth differential widens as market rates exceed weighted rates. Choosing a balance target rather than a debt target defers the effort and has a

[1] In this paper, *fiscal effort* denotes the opposite of fiscal impulses cumulated over several years (the period relevant to the fiscal adjustment). The term "fiscal effort" is sometimes used — notably in the forecast referred to here — to denote the impulse corrected for automatic stabilisers and for the elasticity of taxes and social contributions to their bases or to GDP. Here, impulses are cumulated from 2026 to 2032. If 2026 is regarded as a given, the opposite of the 2026 impulse, i.e. 0.5 point of GDP (€15 billion at 2026 GDP), simply needs to be subtracted from the 2026–2032 fiscal effort.

[2] The cumulative effects of the scenarios on the fiscal effort and on the output gap are assessed relative to the 2025 situation. An alternative would be to measure them as deviations from a reference scenario, such as the no-policy-change scenario (Section 6.1) or the zero-multiplier scenario (Section 4.7). The estimated output loss, for instance, is increased by the persistent initial negative output gap, which accounts for 0.9 in the no-policy-change scenario or 0.5 in the zero-multiplier case. For the sake of simplicity, we do not make this comparison with a reference scenario, even though this means we cannot directly answer the question "what is the impact of the assumptions on the cumulative output loss?".

less adverse impact on activity (an average output loss of 1.2% of GDP between 2026 and 2032), with unemployment peaking at 8.8% in 2028.

- If, instead of stabilising the debt ratio, the aim is to put it on a path of decline of half a point per year from 2032, the required fiscal effort is 3.2 points of GDP (€98 billion at 2026 GDP), 0.2 point less than for stabilising debt at 120% of GDP (Table 8). Debt peaks (at 124.5% of GDP in 2031) but declines thereafter. This is a credible alternative to stabilising public debt at 120% of GDP.
- Postponing the debt target by five years, to 2037 instead of 2032, only marginally reduces the fiscal effort required (−0.2 point of GDP, Section 4.2 and Table 2) but substantially reduces the impact on activity (−0.6 point of GDP in terms of the average output gap, Table 2). The effort is smaller because multipliers matter less towards the end of the period, and the smaller average impact on activity stems from a smaller effort spread over a longer period.
- The lower the fiscal multiplier, the smaller the fiscal effort. Between a zero multiplier and persistent multiplier, the difference in the required effort is 1.0 point of GDP (€31 billion at 2026 GDP) (Section 4.7). Taking fiscal multipliers into account is therefore indispensable. Accordingly, the proposal by Jaravel *et al.* (2026) for an *année blanche* (a one-year nominal freeze, excluding minimum social benefits) is inconsistent with the assumption of a zero multiplier. If such a low multiplier cannot be achieved, favouring measures that combine lower private saving with deficit reduction — for example tax increases on the wealthiest households, an exceptional wealth levy, or a freeze of the highest pensions — is a sounder avenue, capable of significantly reducing the required fiscal effort.
- A sovereign rate 0.5 point lower reduces the required fiscal effort by 0.3 point of GDP over 2026–2032 (€10 billion at 2026 GDP) (Section 4.5). More precisely, 1 percentage point on the interest rate "costs" an additional €20 billion (at 2026 GDP) of fiscal effort over 2026–2032 — a cost that increases slightly with the size of the multipliers. This factor is therefore particularly important, but not the only one to play (Figure 2).
- The level of debt matters little as long as the interest–growth differential $r - g$ remains small (Section 5). Conversely, should it become large — which takes time owing to the maturity structure of public debt — the snowball effect could become significant. As noted in the previous paragraph, for debt of around 120% of GDP, one point of interest–growth differential raises the fiscal effort by 19% (€20 billion), whereas this cost is only 9% (€9.5 billion) (Figure 4) when debt stands at 60% of GDP[3]. More precisely, then, a high differential is one that significantly increases the fiscal effort, and when debt is 120% of GDP, a differential of 1 point falls into the "not-small" category.
- The stochastic analysis (Section 6.2), which captures the possible risks and shocks only partially, points to an uncertainty of around plus or minus 0.6 point of GDP on the 2026–2032 fiscal effort (Table 2).

[3]It is intuitive that the cost should be roughly halved when public debt is halved as interest growth differential is nearly divided by 2 (except for the year 2026 — unchanged — and gradually in 2027 and 2028) . By contrast, the additional fiscal effort runs counter to intuition. In the long run, one point of interest–growth differential should entail an additional cost of 1.2 points of GDP (120% debt times 1 point of differential), i.e. €36 billion at 2026 GDP. This amount is found in the "LT" columns of the simulation tables. At the 2032 horizon, because the interest–growth differential is still negative, debt is not a cost but an advantage.

2 From intuition to simulation

Stabilising public debt requires the government balance to be equal to a specific value, referred to as the *debt-stabilising balance*. The core equation of public debt dynamics is recalled in Tip 1. The debt-stabilising balance (in points of GDP) depends on the interest rate (the implicit rate, which changes every period), the growth rate (nominal, for each period) and the debt-to-GDP ratio (which evolves over time).

Box 1: Public debt dynamics

The public debt ratio evolves according to a simple law, where d is the debt-to-GDP ratio, r the interest rate on public debt (implicit, nominal), g GDP growth (nominal) and s_p the government balance excluding interest payments, i.e. the primary balance:

$$\Delta d = \frac{r-g}{1+g} d_{-1} + s_p$$

The modelling used here relies on this equation while incorporating: 1. the dynamics of the various variables, 2. the interactions between variables, some of which do not appear in this equation (notably the output gap and inflation).

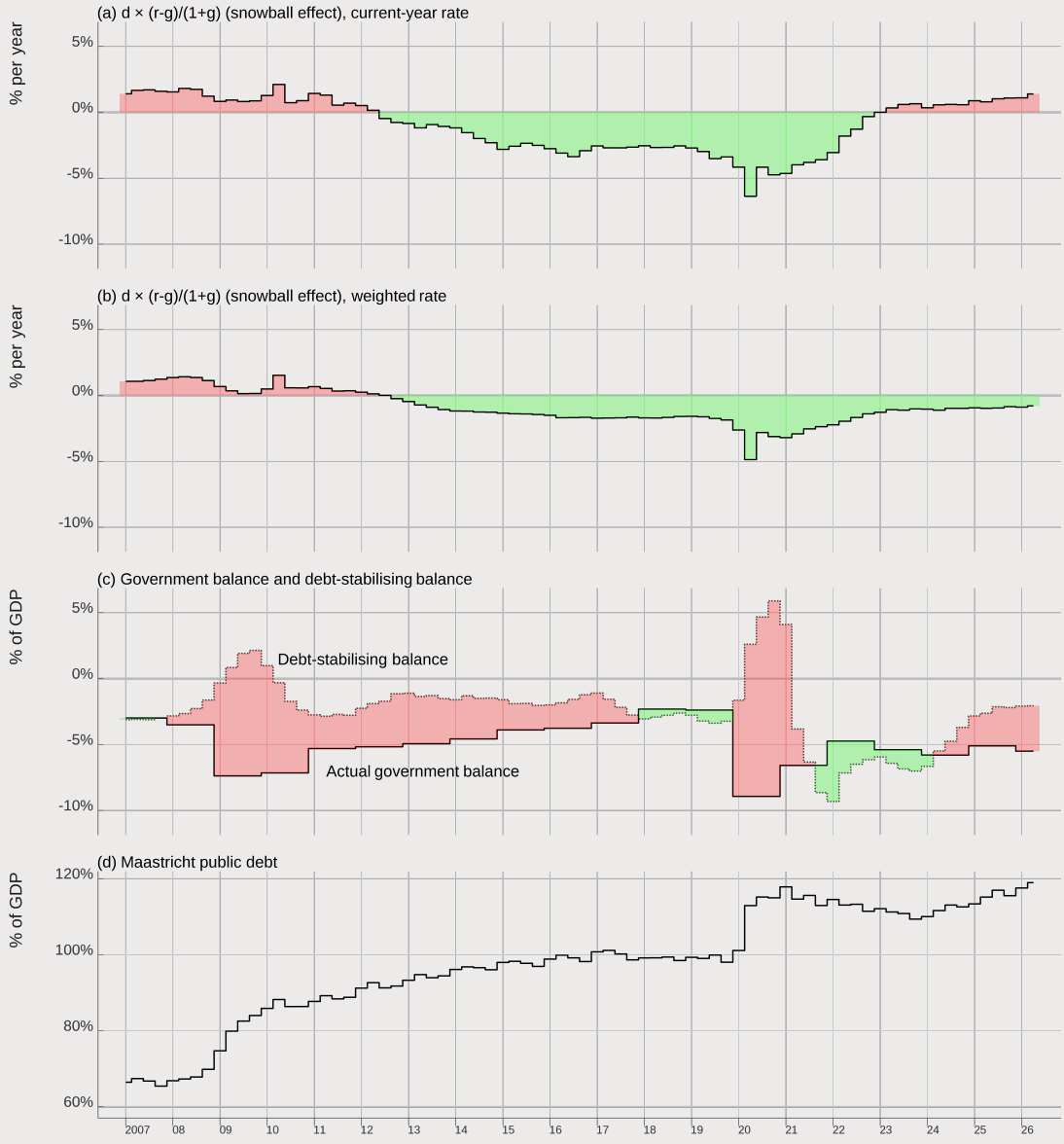
From this equation one can derive the debt-stabilising balance at each point in time, as well as an equilibrium condition for debt in a steady state (i.e. one in which all variables are constant over time). The debt-stabilising balance can thus be written:

$$s_p^* = -\frac{r-g}{1+g} d_{-1}$$

Since each of the variables changes over time — for example, the implicit rate as debt is rolled over — the debt-stabilising balance may itself change over time. Blanchard (2019) and Blanchard, Leandro and Zettelmeyer (2021) are developping on this equation and Wyplosz (2011) is making some important points about this.

Figure 1 illustrates these concepts for France from 2007 to 2026.

Figure 1: Public debt and its dynamics, 2007–2026



Reading: Panel (b) shows the contribution of the interest–growth differential to debt dynamics. Panel (a) shows what this contribution would be if the weighted (or implicit) rate were equal to the instantaneous 10-year sovereign rate.

Sources: INSEE, Banque de France.

2.1 The naive calculation of the fiscal effort

To stabilise public debt at 120% of GDP, with an implicit rate of 2.3% (the nominal implicit rate on French public debt in 2026) and a current nominal growth rate of 2.2% per year (growth in 2026 as forecast by IFE|OFCE in October 2026, see Table 3), a primary balance of 0.1 point of GDP is required. The gap with the primary deficit expected for 2026 is therefore 3.0 points of GDP (€92 billion at 2026 GDP) (row 5 of Table 1).

If, instead of 2026 growth, one uses long term potential growth (1.1% per year in volume, with 1.8% inflation); instead of the primary deficit, the structural primary deficit

(i.e. adjusted for the cycle, −2.2% of GDP in 2026); and, for the interest rate, the current weighted rate, the debt-stabilising balance is −0.7 point of GDP and the gap with the structural primary balance is 1.5 points of GDP (€46 billion at 2026 GDP, row 8 of Table 1). Using the same assumptions but with the long-term rate (an interest–growth differential of 0.5%), the fiscal effort amounts to €85 billion (row 12 of Table 1).

Table 1 covers 12 configurations, depending on whether one starts from the primary or the structural (i.e. cyclically adjusted) deficit; on whether one uses the rate observed on markets, the weighted average rate or an estimated long-term rate (based on an interest–growth differential $r - g$ assumed to be 0.5%); and on the nominal growth benchmark (expected volume growth and GDP deflator growth in 2026, or potential growth and the central bank's inflation target). Each of these combinations is nonetheless unsatisfactory, all the more so as the estimated fiscal efforts range from €46 billion to €192 billion, a very wide interval.

Table 1: Fiscal effort 2026–2032, naive approach

	Government balance (2026)		Interest rate			GDP growth		Debt-stabilising primary balance[c]	Fiscal effort	
	primary	structural primary	weighted current	market current[a]	long-term[b]	2026	potential		% of GDP[d]	€ billion (2026 GDP)[d]
1	−2.9	—	—	5.1	—	2.2	—	3.4	6.3	192
2	—	−2.2	—	5.1	—	2.2	—	3.4	5.6	171
3	−2.9	—	—	5.1	—	—	2.9	2.6	5.5	167
4	—	−2.2	—	5.1	—	—	2.9	2.6	4.8	145
5	−2.9	—	2.3	—	—	2.2	—	0.1	3.0	92
6	—	−2.2	2.3	—	—	2.2	—	0.1	2.3	71
7	−2.9	—	2.3	—	—	—	2.9	−0.7	2.2	67
8	—	−2.2	2.3	—	—	—	2.9	−0.7	1.5	46
9	−2.9	—	—	—	3.4	2.2	—	1.4	4.3	131
10	—	−2.2	—	—	3.4	2.2	—	1.4	3.6	110
11	−2.9	—	—	—	3.4	—	2.9	0.6	3.5	106
12	—	−2.2	—	—	3.4	—	2.9	0.6	2.8	85

[a] Highest rate in October 2026 (20 October) [b] Interest–growth differential (r-g) of 0.5% [c] sp = d^* × (r-g)/(1+g) [d] e = sp - sstab

2.2 Calculating the fiscal effort through simulations

The aim of this paper is to go beyond the naive approach and to account, as far as possible, for the dynamics of each of the variables involved and for the interactions between them.

The interest rate considered, which is decisive in the debt equation, is the weighted sovereign rate. This rate, however, is not fixed: it evolves with the current market rate and with changes in that rate. It also depends on the level of debt and on its rollover. The GDP growth rate, another key variable, depends on long-term potential growth, but

also on fiscal effort, through the fiscal multiplier mechanism, as well as on the intrinsic dynamics of the output gap and the characteristic time required to return to the potential output path. Inflation itself follows a process that depends on the output gap but also on its own shocks. In each period, every variable in the fundamental equation of debt dynamics follows a path and interacts with the fiscal choices made. The naive method therefore provides only a rough estimate, which the simulations allow us to refine.

The simulations detailed below were implemented in Heyer *et al.* (2025) and Timbeau (2025), within a theoretical framework close to that of Ragot (2026) and Timbeau (2025). This modelling builds on earlier work by Heyer and Timbeau (2017) and Timbeau, Aurissergues and Heyer (2021). A first version of the debtwatch model was developed for the iAGS report (notably Timbeau *et al.* (2012) and its modelling appendix, as well as the 2014 to 2019 reports; see the iAGS website). The simulations are based on the IFE| OFCE autumn 2026 forecast (Heyer *et al.*, 2026).

The elements presented here are consistent with the assumptions of Jaravel *et al.* (2026) and with the naive estimates of Table 1, even though the conclusions differ[4]. In particular, the central case of the simulations (Table 3) yields a fiscal effort of 3.4 points of GDP over 2026–2032 (€105 billion at 2026 GDP)[5] under assumptions that converge in the long run with those of row 12 of Table 1.

The additional gap of 0.7 point of GDP (€20 billion at 2026 GDP) results from the sum of the factors that increase the effort (⊕) or reduce it (⊖) and that are taken into account in the simulations. The relative closeness of the results thus masks large effects of opposite sign.

⊖ The weighted rate is lower and rises only gradually; the snowball effect is zero or even negative at first, then increases with the rise in the weighted rate once the current rate is high. Had the interest–growth differential remained at zero, the fiscal effort would have been 0.3 point of GDP lower.

⊖ The dynamics of the output gap raise actual growth (in volume) relative to potential growth in the early periods.

⊖ Inflation is initially above target and contributes to a zero or negative snowball effect in the first years, although it subsequently falls below the central bank's target owing to a negative output gap.

⊕ Fiscal impulses reduce growth through the fiscal multiplier, which raises the interest–growth differential (making it less favourable and increasing the effort).

⊕ The output gap widens in 2026, owing to the international environment and to past shocks (notably fiscal ones).

⊕ The interest rate is higher in 2026 owing to market tensions, which are assumed to be temporary (Section 3).

⊕ The accumulation of deficits (above the debt-stabilising deficit) increases debt, raises interest payments and increases the debt-stabilising balance.

[4] See, on this subject, the exchanges between François Geerolf and the Director General of INSEE (Geerolf, 2024).

[5] As indicated above, if 2026 is regarded as a given, the fiscal effort over 2027–2032 is 2.9% of GDP, i.e. €90 billion at 2026 GDP.

⊕ The persistence of a negative output gap, and hence of unemployment above its equilibrium level, marginally reduces inflation and increases the snowball effect.

When the multiplier depends on the output gap (cycle-dependent multipliers), some of these feedback loops are amplified.

Table 2 summarises the simulations — most of which are described in detail in Section 4 — that make it possible to gauge the contribution of each of these factors to the required fiscal effort. The simulations are carried out using a Monte Carlo method by introducing random variables (see Section 6.2). A full optimisation is not performed for each random draw: fiscal policy is determined by a linear rule for the stochastic component and by constrained optimisation for the deterministic component. Thus, for random disturbances to the output gap and inflation consistent with French historical experience, the 95% error band is estimated at ± 0.6 point of GDP for the 2026–2032 fiscal effort in the prev2609 scenario (row 1 of Table 2).

Table 2: Summary of simulations

				From 2026 to target year						Long term[a]	
		Target	Year	Fiscal effort[b,c]		Output loss[b,d]		Debt[b,e]		Fiscal effort[b]	
1	IFE|OFCE forecast 2609	Debt	2032	3.4	(± 0.6)	1.5	(± 0.4)	120	(± 4.5)	3.2	(± 0.8)
2	IFE|OFCE forecast 2609, AMECO output gap[f]	Debt	2032	3.3	(± 0.6)	1.5	(± 0.4)	120	(± 4.5)	3.1	(± 0.8)
3	Lower rates (r-g: 0%)	Debt	2032	3.1	(± 0.6)	1.4	(± 0.4)	120	(± 4.5)	2.7	(± 0.8)
4	Higher rates (r-g: +1.7%)	Debt	2032	4.2	(± 0.6)	1.7	(± 0.4)	121	(± 4.6)	4.5	(± 0.8)
5	No impulse in 2027	Debt	2032	3.6	(± 0.6)	1.6	(± 0.4)	120	(± 4.5)	3.2	(± 0.8)
6	Two years earlier	Debt	2030	3.7	(± 0.4)	1.9	(± 0.3)	122	(± 4.1)	3.2	(± 0.8)
7	Five years later	Debt	2037	3.2	(± 0.7)	0.9	(± 0.5)	120	(± 5.3)	3.2	(± 0.8)
8	Optimal impulses from 2026	Debt	2032	3.2	(± 0.6)	1.4	(± 0.4)	120	(± 4.5)	3.2	(± 0.8)
9	Debt stabilisation in 2032[g]	Balance	2032	2.8		1.2	(± 0.3)	125	(± 5.6)	3.2	
10	Debt stabilisation in 2030[g]	Balance	2030	2.5		1.5	(± 0.3)	123	(± 4.1)	3.2	

[a] 2050 [b] % of GDP [c] Opposite of cumulative impulses from 2026 to the target year (debt or balance target) [d] Average output loss from 2026 to the target year (debt or balance target) [e] Debt as % of GDP in the target year [f] og = output gap, AMECO 5/2026 [g] The simulation runs without a fiscal rule; the impulse is therefore not stochastic

Note: 256 draws; the simulation starts in 2026. Headline figures are those of the deterministic simulation; figures in brackets give the 95% confidence interval derived from the stochastic simulations.

Sources: AMECO data May 2026, debtwatch 2.0.

				From 2026 to target year			Long term[a]
		Target	Year	Fiscal effort[b,c]	Output loss[b,d]	Debt[b,e]	Fiscal effort[b]
11	Debt declining from 2032[g]	Balance	2032	3.2	1.3 (± 0.3)	124 (± 5.6)	3.7
12	Zero multipliers	Debt	2032	2.9 (± 0.5)	0.5 (± 0.3)	120 (± 4.0)	3.2 (± 0.7)
13	More persistent output gap	Debt	2032	3.9 (± 0.6)	2.0 (± 0.3)	121 (± 4.7)	3.2 (± 0.8)
14	Higher multipliers	Debt	2032	3.5 (± 0.6)	1.9 (± 0.4)	120 (± 4.7)	3.2 (± 0.8)
15	Cycle-dependent multipliers	Debt	2032	3.6 (± 0.6)	1.7 (± 0.4)	121 (± 4.7)	3.2 (± 0.8)

[a] 2050 [b] % of GDP [c] Opposite of cumulative impulses from 2026 to the target year (debt or balance target) [d] Average output loss from 2026 to the target year (debt or balance target) [e] Debt as % of GDP in the target year [f] og = output gap, AMECO 5/2026 [g] The simulation runs without a fiscal rule; the impulse is therefore not stochastic

Note: 256 draws; the simulation starts in 2026. Headline figures are those of the deterministic simulation; figures in brackets give the 95% confidence interval derived from the stochastic simulations.

Sources: AMECO data May 2026, debtwatch 2.0.

2.3 A decomposition of the 2026–2032 fiscal effort

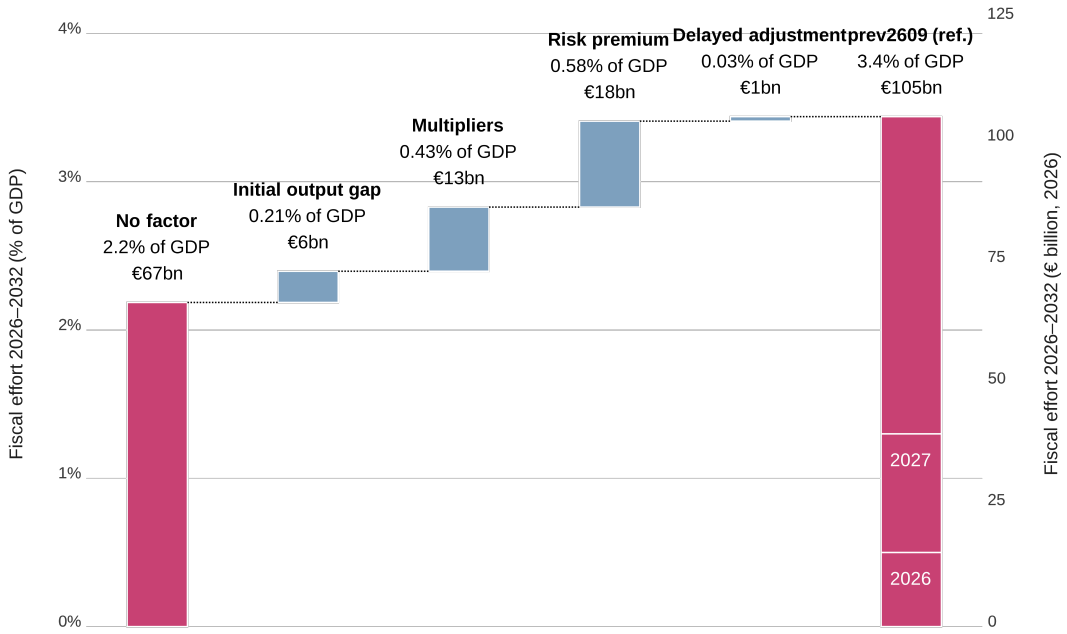
Four main drivers of the fiscal effort can be isolated (thereby simplifying Table 2):

1. the negative output gap in 2026, resulting from past fiscal adjustments, from geopolitics (the rise in oil prices following the closure of the Strait of Hormuz) and from the 2026 drought and heatwave;
2. a multiplier effect. A world without a multiplier is an abstraction, but it makes it possible to isolate the impact of this specific factor;
3. a zero interest–growth differential from 2026 to 2032, and hence the removal, over the period, of the rise in interest rates unrelated to inflation;
4. an earlier adjustment, which replaces the impulses forecast by IFE|OFCE for 2026 and 2027 with "optimal" impulses (see Section 3 and Section 6.2 for the exact definition), thereby capturing the gap between the fiscal policy actually implemented and what would have been desirable in the first two years of the simulation.

By running the simulations for all 16 cases in which each of these factors is either present or absent, one can then attribute the difference between the world in which none of these factors is present and the world in which all of them are (the 3.4 effort reference scenario). When none of the factors is present (no multiplier, no risk premium, optimal adjustment from 2026, no initial output gap), the fiscal effort is 2.2% of GDP (€67 billion at 2026 GDP); when all of them are present, it is 3.4% of GDP (€105 billion at 2026 GDP). Figure 2 shows the contributions of these factors computed using Shapley values[6].

[6] Shapley values, derived from cooperative game theory, allocate a total effect among several factors. The contribution of a factor is its average marginal effect, computed over all combinations and all possible orders of activation of the other factors. The contributions sum to the total difference, and the decomposition does not depend on the order chosen. Formally, if v is the payoff function and S denotes

Figure 2: Decomposition of the 2026–2032 fiscal effort

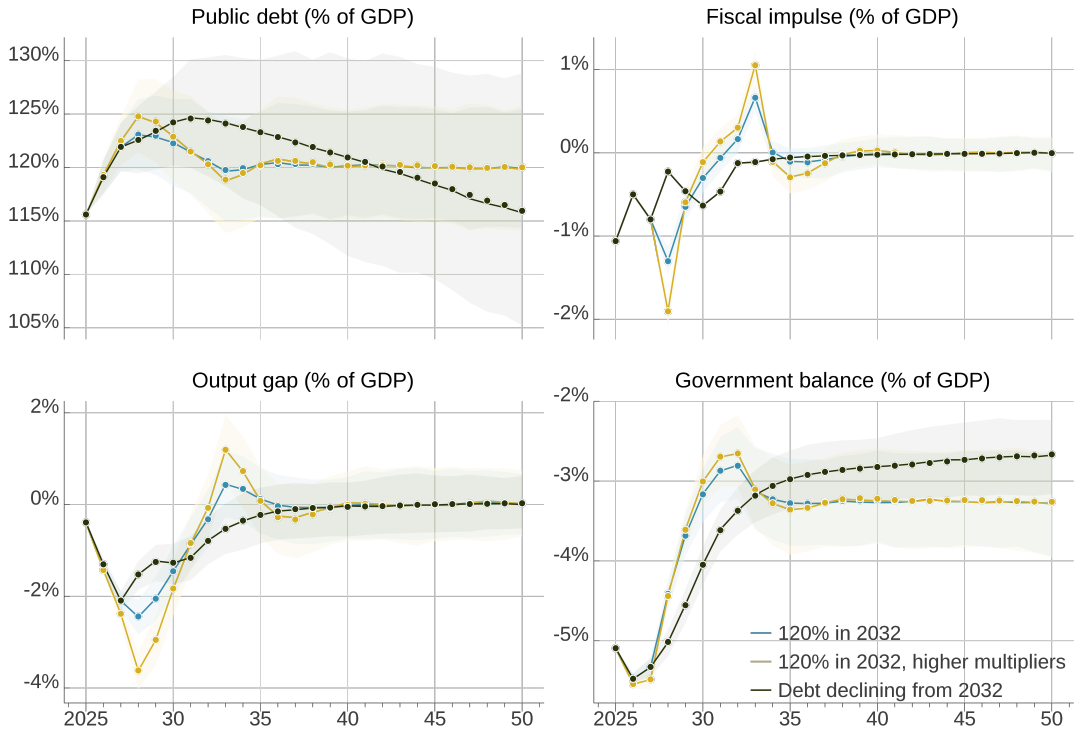


Note: Fiscal effort: opposite of the cumulative impulse from 2026 to 2032. Deterministic simulation, Shapley values of the four factors.

Sources: Debtwatch v2.0, AMECO, OFCE autumn 2026 forecast.

coalitions of s of the N players, the Shapley value ϕ of player i is $\phi_i(v) = \sum_{S \subseteq N \setminus \{i\}} \frac{s!\,(n-s-1)!}{n!} \Big[v(S \cup \{i\}) - v(S) \Big]$.

Figure 3: Optimal adjustments



Note: Impulses for 2026 and 2027 are those of the OFCE autumn 2026 forecast.

Sources: Debtwatch v2.0, AMECO, OFCE autumn 2026 forecast.

3 The IFE|OFCE autumn 2026 forecast and the 2027 Budget Bill

The “optimal” adjustment — which seeks to minimise the (negative) impact on activity subject to meeting the objective of debt at 120% of GDP in 2032 Section 6.1 — leads to an impulse of −1.3 points of GDP in 2028 (Table 3) and a cumulative impulse of 3.4 points of GDP by 2032 (€105 billion at 2026 GDP). This result stems from a large initial deficit (5.1% in 2025, 5.5% in 2026, 5.3% in 2027) and from a short-dated debt objective (2032). The adjustment (the primary impulse) in 2026 is −0.5%, which corresponds to the IFE|OFCE autumn 2026 forecast (Heyer *et al.*, 2026) (prev2609). This forecast was published on 15 October 2026, before the difficult negotiations surrounding the vote on the 2027 budget.

The prev2609 forecast projects a deficit of 5.5% of GDP in 2026, in line with the government’s communication and with the assessment of the High Council of Public Finance (*Haut Conseil des finances publiques*), and higher than the assumption of Jaravel *et al.* (2026) (5.0% in July 2026). The IFE|OFCE forecast differsas regards growth (0.4% in 2026), owing, among other things, to a large multiplier effect. Despite an impulse of −0.5 point of GDP, the government deficit widens by 0.4 point of GDP between 2025 and 2026. This is due to a sharp rise in interest payments (+0.3 point of GDP)est

payments (+0.3 point of GDP) and to particularly weak economic conditions resulting from higher energy prices and political uncertainty.

For 2027, IFE|OFCE anticipates a combination of factors similar to that of 2026: activity is weighed down by a sluggish international environment, by caution among domestic economic agents at a time of political tension, and by a fairly strong negative impulse. The rise in interest payments continues (+0.3 point in 2027). With a budget approved by a political majority all but ruled out, the budget results from a complex compromise, combining a special stopgap law (*loi spéciale*) and the absence of a successful censure motion, as in 2026.

Beyond 2027, the simulation proceeds by determining an "optimal" economic policy that achieves an objective (*e.g.* a debt target at a given date) while minimising the impact on activity over all the periods concerned (Section 6.2). The adjustment anticipated for 2027 by IFE|OFCE in October 2026 is loosely close to an "optimal" adjustment (cumulative over 2026 and 2027 of 1.3% of GDP opposed to 1.9% of GDP in the "true" optimal case (Table 4)) and is consistent with the rules of the Stability and Growth Pact (SGP). The adjustment then gradually eases. This is partly due to the easing of sovereign rates in 2029, which allows interest payments to stabilise relatively (at around 3.4 points of GDP in 2032, or 1.5 points of GDP once the inflation tax is taken into account).

This adjustment results in a widening of the output gap between 2026 and 2028. From 2029 onwards, impulses are smaller and, owing to the multiplier dynamics, the adjustment has less effect on the output gap, which narrows slowly before turning positive from 2033 (Figure 3, blue line).

The peak in public debt in this scenario is 123.1% of GDP (Table 3), although the confidence interval is fairly wide (Figure 3), particularly for public debt. Note that this interval is constructed under specific assumptions (see Timbeau, 2025) and should be interpreted accordingly. To simplify to the extreme, it reflects the historical variability of growth, while assuming that mean growth is stable and that there is little autocorrelation in this process (i.e. that it is stationary). This assumption implies mean reversion of the output gap and therefore limits the amplification of a median deviation of the debt path.

In this scenario, public debt peaks in 2028 and the French government deficit falls below 3.0% from 2031. In the long run, the deficit is above 3% because, at this level of debt, the debt-stabilising balance is around −3.3% (−2.75% × 120%). This leads to a hump-shaped profile for the government balance: a higher balance must first be reached to reduce debt, before returning to the debt-stabilising deficit[7].

[7]This property is common in optimal control problems when the available instrument acts on acceleration and the objective is defined in terms of both position (the debt target) and velocity (debt no longer changes).

Table 3: Prev2609 until 2027, debt at 120% in 2032 (reference scenario)

	2025	2026	2027	2028	2029	2030	2031	2032	2033	LT (2050)
GDP growth[a]	0.8	0.4	0.5	0.9	1.6	1.8	1.6	1.6	1.8	1.0
Output gap[b]	−0.4	−1.3	−2.1	−2.4	−2.1	−1.4	−0.9	−0.3	0.4	0.0
Average cumulative output gap[b]	—	−1.3	−1.7	−1.9	−2.0	−1.9	−1.7	−1.5	−1.3	−0.4
Potential GDP growth[a]	—	1.3	1.3	1.3	1.2	1.1	1.0	1.0	1.0	1.0
Inflation[c]	1.2	1.8	2.0	1.8	1.6	1.5	1.5	1.6	1.7	1.8
Unemployment rate[d]	7.7	8.3	8.7	9.4	9.4	8.9	8.3	7.7	7.0	7.0
Government balance[b]	−5.1	−5.5	−5.3	−4.4	−3.7	−3.2	−2.9	−2.8	−3.1	−3.3
Primary government balance[b]	−2.8	−2.9	−2.4	−1.3	−0.5	0.1	0.5	0.6	0.3	0.5
Structural primary balance[b]	−2.6	−2.2	−1.5	−0.1	0.5	0.8	0.9	0.7	0.0	0.5
Primary fiscal impulse[b]	−1.1	−0.5	−0.8	−1.3	−0.7	−0.3	−0.1	0.2	0.7	0.0
of which revenue[b]	−0.8	−0.2	−0.4	−0.7	−0.3	−0.2	0.0	0.1	0.3	0.0
of which expenditure[b]	−0.1	−0.2	−0.4	−0.7	−0.3	−0.2	0.0	0.1	0.3	0.0
Cumulative primary impulse[b]	—	−0.5	−1.3	−2.6	−3.3	−3.6	−3.6	−3.4	−2.8	−3.2
Current sovereign rate[e]	3.4	4.3	4.2	3.7	3.4	3.4	3.3	3.3	3.3	3.3
Weighted sovereign rate[f]	2.0	2.3	2.5	2.6	2.7	2.8	2.8	2.9	2.9	3.3
Public debt[b]	115.6	119.1	122.0	123.1	123.0	122.2	121.3	120.4	119.5	120.0
Interest payments[b]	2.3	2.6	2.9	3.1	3.2	3.3	3.4	3.4	3.4	3.8
Interest payments net of inflation[b]	1.0	0.5	0.4	0.9	1.3	1.5	1.5	1.5	1.4	1.6
Snowball effect[b]	0.0	0.1	0.0	−0.1	−0.6	−0.6	−0.4	−0.3	−0.6	0.5

[a] annual % change, volume [b] % of GDP [c] GDP deflator, annual % change [d] % of labour force [e] 10-year, annual % [f] annual %

Note: First simulation year: 2026. Deterministic simulation.

Sources: AMECO spring 2026 data, debtwatch v2.0 (github.com/OFCE/dwr).

4 Detailed simulations

4.1 Optimal adjustment in 2026 and 2027

Table 4 describes a world slightly different from the IFE|OFCE forecast (Heyer *et al.*, 2026). Instead of the forecast impulses, an optimal impulse is assumed. Applying optimal fiscal policy from 2026 yields a standard result: *backloading* (deferring adjustment over time) is justified only by a strong preference for the present, by a preference for impulses that vary as little as possible, or by fiscal multipliers that vary over the cycle. As none of these features is present in the simulation, the optimal impulse is that of a sharp recession in 2026, followed by a more gradual adjustment thereafter. The trough in activity occurs in 2027 and is less pronounced than that of 2028 in the prev2609 scenario (Table 3).

The average output loss between 2026 and 2032 is 1.4 points of GDP, compared with 1.5 points in the prev2609 scenario.

The fiscal effort is appreciably lower in this scenario (3.2% of GDP cumulated, compared with 3.4%). An immediate negative impulse curbs the rise in debt and in cumulative interest payments. This strategy is broadly equivalent (in terms of fiscal effort, output cost and unemployment) to simply stabilising debt in 2032 (Section 4.4) — although debt ends up higher in the latter scenario.

Table 4: Optimal adjustment from 2026, debt at 120% in 2032

	2025	2026	2027	2028	2029	2030	2031	2032	2033	LT (2050)
GDP growth[a]	0.8	−0.3	0.9	1.8	1.7	1.5	1.4	1.3	1.4	1.0
Output gap[b]	−0.4	−2.0	−2.4	−1.9	−1.4	−1.0	−0.7	−0.4	0.0	0.0
Average cumulative output gap[b]	—	−2.0	−2.2	−2.1	−1.9	−1.7	−1.6	−1.4	−1.2	−0.4
Potential GDP growth[a]	—	1.3	1.3	1.3	1.2	1.1	1.0	1.0	1.0	1.0
Inflation[c]	1.2	1.8	2.0	1.8	1.6	1.6	1.6	1.6	1.7	1.8
Unemployment rate[d]	7.7	8.7	9.1	9.2	8.8	8.4	8.0	7.7	7.3	7.0
Government balance[b]	−5.1	−5.0	−4.9	−4.3	−3.8	−3.4	−3.2	−3.1	−3.2	−3.3
Primary government balance[b]	−2.8	−2.4	−2.0	−1.2	−0.6	−0.2	0.1	0.3	0.2	0.5
Structural primary balance[b]	−2.6	−1.4	−0.9	−0.3	0.1	0.3	0.5	0.5	0.2	0.5
Primary fiscal impulse[b]	−1.1	−1.3	−0.6	−0.5	−0.4	−0.3	−0.1	0.0	0.2	0.0
of which revenue[b]	−0.8	−0.7	−0.3	−0.3	−0.2	−0.1	−0.1	0.0	0.1	0.0
of which expenditure[b]	−0.1	−0.7	−0.3	−0.3	−0.2	−0.1	−0.1	0.0	0.1	0.0
Cumulative primary impulse[b]	—	−1.3	−1.9	−2.4	−2.8	−3.1	−3.2	−3.2	−3.0	−3.2
Current sovereign rate[e]	3.4	4.3	4.2	3.7	3.4	3.4	3.3	3.3	3.3	3.3
Weighted sovereign rate[f]	2.0	2.3	2.5	2.6	2.7	2.8	2.8	2.9	2.9	3.3
Public debt[b]	115.6	119.4	121.4	121.5	121.5	121.2	120.9	120.5	120.0	120.0
Interest payments[b]	2.3	2.6	2.9	3.1	3.2	3.3	3.3	3.4	3.4	3.8
Interest payments net of inflation[b]	1.0	0.5	0.5	0.9	1.3	1.4	1.4	1.4	1.4	1.6
Snowball effect[b]	0.0	1.0	−0.5	−1.1	−0.6	−0.4	−0.2	−0.1	−0.2	0.5

[a] annual % change, volume [b] % of GDP [c] GDP deflator, annual % change [d] % of labour force [e] 10-year, annual % [f] annual %

Note: First simulation year: 2026. Deterministic simulation.

Sources: AMECO spring 2026 data, debtwatch v2.0 (github.com/OFCE/dwr).

4.2 Debt at 120% in 2037

Table 5 optimises fiscal policy so that public debt reaches 120% of GDP in 2037 instead of 2032, i.e. five years later.

This scenario requires a sequence of less abrupt impulses. The fiscal effort is of the same magnitude as with a 2032 debt target (Table 3), as the additional interest payments arising from higher debt are a second-order effect, the interest–growth differential being close to zero or negative.

The average output loss over 2026-2032 period is 1.4 point of GDP, 0.9 point of GDP over the period 2026-2037 and peak in unemployment (9.0% of the labour force) are smaller then in the 2032 target year case. From 2035, positive impulses (Figure 3) stimulate growth and induce a positive output gap.

Table 5: Optimal adjustment from 2028, debt at 120% in 2037

	2025	2026	2027	2028	2029	2030	2031	2032	2033	LT (2050)
GDP growth[a]	0.8	0.4	0.5	1.5	1.5	1.4	1.3	1.3	1.3	1.0
Output gap[b]	−0.4	−1.3	−2.1	−1.9	−1.6	−1.3	−1.0	−0.8	−0.5	0.0
Average cumulative output gap[b]	—	−1.3	−1.7	−1.8	−1.7	−1.6	−1.5	−1.4	−1.3	−0.4
Potential GDP growth[a]	—	1.3	1.3	1.3	1.2	1.1	1.0	1.0	1.0	1.0
Inflation[c]	1.2	1.8	2.0	1.8	1.6	1.6	1.6	1.6	1.6	1.8
Unemployment rate[d]	7.7	8.3	8.7	9.0	8.9	8.6	8.3	8.0	7.8	7.0
Government balance[b]	−5.1	−5.5	−5.3	−4.8	−4.2	−3.7	−3.3	−3.1	−2.9	−3.3
Primary government balance[b]	−2.8	−2.9	−2.4	−1.7	−1.0	−0.4	0.1	0.4	0.6	0.5
Structural primary balance[b]	−2.6	−2.2	−1.5	−0.8	−0.3	0.2	0.6	0.8	0.9	0.5
Primary fiscal impulse[b]	−1.1	−0.5	−0.8	−0.6	−0.6	−0.5	−0.3	−0.2	−0.1	0.0
of which revenue[b]	−0.8	−0.2	−0.4	−0.3	−0.3	−0.2	−0.2	−0.1	−0.1	0.0
of which expenditure[b]	−0.1	−0.2	−0.4	−0.3	−0.3	−0.2	−0.2	−0.1	−0.1	0.0
Cumulative primary impulse[b]	—	−0.5	−1.3	−1.9	−2.5	−2.9	−3.3	−3.5	−3.6	−3.2
Current sovereign rate[e]	3.4	4.3	4.2	3.7	3.4	3.4	3.3	3.3	3.3	3.3
Weighted sovereign rate[f]	2.0	2.3	2.5	2.6	2.7	2.8	2.8	2.9	2.9	3.3
Public debt[b]	115.6	119.1	122.0	122.8	123.3	123.4	123.3	122.9	122.3	120.0
Interest payments[b]	2.3	2.6	2.9	3.1	3.2	3.3	3.4	3.5	3.5	3.8
Interest payments net of inflation[b]	1.0	0.5	0.4	0.9	1.2	1.4	1.5	1.5	1.5	1.6
Snowball effect[b]	0.0	0.1	0.0	−0.8	−0.5	−0.2	0.0	0.0	0.0	0.5

[a] annual % change, volume [b] % of GDP [c] GDP deflator, annual % change [d] % of labour force [e] 10-year, annual % [f] annual %

Note: First simulation year: 2026. Deterministic simulation.

Sources: AMECO spring 2026 data, debtwatch v2.0 (github.com/OFCE/dwr).

4.3 The cost of inaction: no impulse in 2027

Table 6 describes a slightly different world. Instead of an impulse of −0.8% of GDP in 2027, a zero impulse is assumed. The optimisation shifts the effort beyond 2027, which is a central result in the computation of an optimal fiscal policy: *backloading* is justified only by a strong preference for the present, by a preference for impulses that vary as little as possible, or by fiscal multipliers that vary over the cycle.

However, what the simulations show here is also consistent with analyses of so-called *self-defeating austerity*. If the deadline for the debt target is too close, the effort required is amplified through the fiscal multiplier. Once the target has been reached, and once the negative dynamics of the multipliers have faded, activity returns to a normal level — this is how the multiplier and activity dynamics are modelled, with a return to trend always ensured in the medium term, super-neutrality of public spending (see Section 6.3 for the definition of super-neutrality) and no hysteresis effect running, for instance, from unemployment to potential growth. In the short term, however, which includes the debt target deadline, the fiscal multiplier erodes the gain from deficit reduction and reduces the denominator of the debt ratio, and therefore implies a larger effort to achieve the objective.

We do not include additional pressure on interest rates in this scenario, which reflects a different short-term strategy. To meet the objective of 120% debt in 2032, the effort is very large in 2028 and the average output loss reaches 1.6 points of GDP, with unemployment peaking at 9.6% of the labour force. The cumulative fiscal effort is slightly higher (+0.2 point of GDP) owing to the induced effects on debt and hence on cumulative interest paid over the period.

Table 6: Optimal adjustment, inaction in 2027

	2025	2026	2027	2028	2029	2030	2031	2032	2033	LT (2050)
GDP growth[a]	0.8	0.4	1.2	0.0	1.4	1.9	1.8	1.8	2.0	1.0
Output gap[b]	−0.4	−1.3	−1.4	−2.7	−2.5	−1.8	−1.0	−0.3	0.7	0.0
Average cumulative output gap[b]	—	−1.3	−1.4	−1.8	−2.0	−1.9	−1.8	−1.6	−1.3	−0.4
Potential GDP growth[a]	—	1.3	1.3	1.3	1.2	1.1	1.0	1.0	1.0	1.0
Inflation[c]	1.2	1.8	2.0	1.9	1.6	1.5	1.5	1.6	1.6	1.8
Unemployment rate[d]	7.7	8.3	8.3	9.3	9.6	9.2	8.5	7.8	6.9	7.0
Government balance[b]	−5.1	−5.5	−5.8	−4.5	−3.7	−3.0	−2.7	−2.6	−3.1	−3.3
Primary government balance[b]	−2.8	−2.9	−2.9	−1.4	−0.4	0.3	0.7	0.8	0.3	0.5
Structural primary balance[b]	−2.6	−2.2	−2.3	−0.1	0.8	1.2	1.2	0.9	−0.1	0.5

[a] annual % change, volume [b] % of GDP [c] GDP deflator, annual % change [d] % of labour force [e] 10-year, annual % [f] annual %

Note: First simulation year: 2026. Deterministic simulation.

Sources: AMECO spring 2026 data, debtwatch v2.0 (github.com/OFCE/dwr).

	2025	2026	2027	2028	2029	2030	2031	2032	2033	LT (2050)
Primary fiscal impulse[b]	−1.1	−0.5	0.0	−2.1	−0.9	−0.4	0.0	0.3	1.0	0.0
of which revenue[b]	−0.8	−0.2	0.0	−1.1	−0.5	−0.2	0.0	0.1	0.5	0.0
of which expenditure[b]	−0.1	−0.2	0.0	−1.1	−0.5	−0.2	0.0	0.1	0.5	0.0
Cumulative primary impulse[b]	—	−0.5	−0.5	−2.6	−3.5	−3.9	−3.9	−3.6	−2.7	−3.2
Current sovereign rate[e]	3.4	4.3	4.2	3.7	3.4	3.4	3.3	3.3	3.3	3.3
Weighted sovereign rate[f]	2.0	2.3	2.5	2.6	2.7	2.8	2.8	2.9	2.9	3.3
Public debt[b]	115.6	119.1	121.6	123.9	124.0	122.9	121.7	120.4	119.2	120.0
Interest payments[b]	2.3	2.6	2.9	3.1	3.3	3.3	3.4	3.4	3.4	3.8
Interest payments net of inflation[b]	1.0	0.5	0.4	0.8	1.3	1.5	1.6	1.5	1.4	1.6
Snowball effect[b]	0.0	0.1	−0.9	1.0	−0.3	−0.7	−0.5	−0.5	−0.9	0.5

[a] annual % change, volume [b] % of GDP [c] GDP deflator, annual % change [d] % of labour force [e] 10-year, annual % [f] annual %

Note: First simulation year: 2026. Deterministic simulation.

Sources: AMECO spring 2026 data, debtwatch v2.0 (github.com/OFCE/dwr).

4.4 Debt stabilisation or decline in 2032 (balance target)

Here we carry out a calculation that differs substantially in principle, and to which the analysis of Ragot (2026) is close. The aim is to stabilise public debt at a given date (2032 in this case) regardless of its level at that date, and then to target a primary balance 0.5 point of GDP above the debt-stabilising balance (i.e. a reduction of 0.5 point of GDP per year in the debt-to-GDP ratio).

The optimisation scheme is simpler, since the debt-stabilising balance must be reached (which, in a stationary world with a zero interest–growth differential $r - g$, is 0). This is the case in the "low rates" scenario, whereas the differential is 0.5 point in the reference scenario and 1.7 points in the "high rates" scenario. To a first approximation, a steady (quasi-linear) reduction from the starting point to the end point in 2032 is the optimal path. A few feedback effects, and above all the dynamics of the fiscal multiplier, alter this first approximation.

Table 7 results from the full optimisation. Debt reaches 125% of GDP in the long term. The required impulse is appreciably smaller (a cumulative 2.8 points of GDP by 2032 compared with 3.4 points, i.e. a difference of €21 billion at 2026 GDP). The average output loss is 1.2 points of GDP, appreciably lower than in the prev2609 scenario (1.5 points of GDP).

Table 7: Optimal adjustment, debt stabilisation in 2032

	2025	2026	2027	2028	2029	2030	2031	2032	2033	LT (2050)
GDP growth[a]	0.8	0.4	0.5	1.9	1.5	1.1	1.4	1.3	1.2	1.0
Output gap[b]	−0.4	−1.3	−2.1	−1.5	−1.2	−1.2	−0.8	−0.6	−0.4	0.0
Average cumulative output gap[b]	—	−1.3	−1.7	−1.6	−1.5	−1.5	−1.4	−1.2	−1.1	−0.4
Potential GDP growth[a]	—	1.3	1.3	1.3	1.2	1.1	1.0	1.0	1.0	1.0
Inflation[c]	1.2	1.8	2.0	1.8	1.6	1.6	1.6	1.6	1.7	1.8
Unemployment rate[d]	7.7	8.3	8.7	8.8	8.5	8.4	8.1	7.8	7.6	7.0
Government balance[b]	−5.1	−5.5	−5.3	−5.1	−4.6	−4.1	−3.9	−3.7	−3.6	−3.4
Primary government balance[b]	−2.8	−2.9	−2.4	−2.0	−1.4	−0.8	−0.5	−0.2	0.0	0.5
Structural primary balance[b]	−2.6	−2.2	−1.5	−1.3	−0.8	−0.2	−0.1	0.0	0.1	0.5
Primary fiscal impulse[b]	−1.1	−0.5	−0.8	−0.2	−0.4	−0.6	−0.1	−0.1	−0.1	0.0
of which revenue[b]	−0.8	−0.2	−0.4	−0.1	−0.2	−0.3	−0.1	−0.1	0.0	0.0
of which expenditure[b]	−0.1	−0.2	−0.4	−0.1	−0.2	−0.3	−0.1	−0.1	0.0	0.0
Cumulative primary impulse[b]	—	−0.5	−1.3	−1.5	−1.9	−2.5	−2.6	−2.8	−2.9	−3.2
Current sovereign rate[e]	3.4	4.3	4.2	3.7	3.4	3.4	3.3	3.3	3.3	3.3
Weighted sovereign rate[f]	2.0	2.3	2.5	2.6	2.7	2.8	2.8	2.9	2.9	3.2
Public debt[b]	115.6	119.1	122.0	122.6	123.5	124.3	124.5	124.7	124.8	124.9
Interest payments[b]	2.3	2.6	2.9	3.1	3.2	3.3	3.4	3.5	3.6	3.9
Interest payments net of inflation[b]	1.0	0.5	0.4	0.8	1.2	1.3	1.4	1.5	1.5	1.7
Snowball effect[b]	0.0	0.1	0.0	−1.3	−0.5	0.1	−0.2	0.0	0.1	0.5

[a] annual % change, volume [b] % of GDP [c] GDP deflator, annual % change [d] % of labour force [e] 10-year, annual % [f] annual %

Note: First simulation year: 2026. Deterministic simulation.

Sources: AMECO spring 2026 data, debtwatch v2.0 (github.com/OFCE/dwr).

Alternatively, instead of targeting debt stabilisation in 2032, Table 8 targets a steady decline in public debt from 2032, with the primary balance set 0.5 point of GDP above the debt-stabilising level.

Table 8: Optimal adjustment, debt declining from 2032

	2025	2026	2027	2028	2029	2030	2031	2032	2033	LT (2050)
GDP growth[a]	0.8	0.4	0.5	1.8	1.5	1.1	1.1	1.4	1.3	1.0
Output gap[b]	−0.4	−1.3	−2.1	−1.5	−1.3	−1.3	−1.2	−0.8	−0.5	0.0
Average cumulative output gap[b]	—	−1.3	−1.7	−1.6	−1.5	−1.5	−1.4	−1.3	−1.2	−0.5
Potential GDP growth[a]	—	1.3	1.3	1.3	1.2	1.1	1.0	1.0	1.0	1.0
Inflation[c]	1.2	1.8	2.0	1.8	1.6	1.6	1.6	1.6	1.6	1.8
Unemployment rate[d]	7.7	8.3	8.7	8.8	8.6	8.5	8.3	8.1	7.8	7.0
Government balance[b]	−5.1	−5.5	−5.3	−5.0	−4.6	−4.0	−3.6	−3.4	−3.2	−2.7
Primary government balance[b]	−2.8	−2.9	−2.4	−1.9	−1.3	−0.7	−0.2	0.1	0.4	1.0
Structural primary balance[b]	−2.6	−2.2	−1.5	−1.2	−0.7	−0.1	0.4	0.5	0.6	1.0
Primary fiscal impulse[b]	−1.1	−0.5	−0.8	−0.2	−0.5	−0.6	−0.5	−0.1	−0.1	0.0
of which revenue[b]	−0.8	−0.2	−0.4	−0.1	−0.2	−0.3	−0.2	−0.1	−0.1	0.0
of which expenditure[b]	−0.1	−0.2	−0.4	−0.1	−0.2	−0.3	−0.2	−0.1	−0.1	0.0
Cumulative primary impulse[b]	—	−0.5	−1.3	−1.5	−2.0	−2.6	−3.1	−3.2	−3.3	−3.7
Current sovereign rate[e]	3.4	4.3	4.2	3.7	3.4	3.4	3.3	3.3	3.3	3.3
Weighted sovereign rate[f]	2.0	2.3	2.5	2.6	2.7	2.8	2.8	2.9	2.9	3.2
Public debt[b]	115.6	119.1	122.0	122.6	123.5	124.2	124.5	124.2	123.8	115.5
Interest payments[b]	2.3	2.6	2.9	3.1	3.2	3.3	3.4	3.5	3.5	3.7
Interest payments net of inflation[b]	1.0	0.5	0.4	0.8	1.2	1.4	1.4	1.5	1.5	1.6
Snowball effect[b]	0.0	0.1	0.0	−1.2	−0.5	0.1	0.1	−0.1	0.0	0.5

[a] annual % change, volume [b] % of GDP [c] GDP deflator, annual % change [d] % of labour force [e] 10-year, annual % [f] annual %

Note: First simulation year: 2026. Deterministic simulation.

Sources: AMECO spring 2026 data, debtwatch v2.0 (github.com/OFCE/dwr).

4.5 Impact of lower interest rates

The variant presented in this section is based on lower interest rates from 2028, accentuating the gap observed today. Instead of an interest–growth differential ($r - g$) of 0.5 percentage point as in the reference scenario, the differential is zero, which roughly corresponds to the situation in 2012 (and frankly negative the folowing years up to now, Tip 1).

At the 2032 horizon, the fiscal effort would be 0.3 point of GDP lower (approximately €10 billion), which provides a useful rule of thumb for approximating the effect of interest rates on adjustment paths. The average output loss is 1.4 points of GDP, i.e. 0.1 point less than in the reference scenario (Table 3).

Table 9: Optimal adjustment, debt at 120% in 2032, lower interest rates (−0.5)

	2025	2026	2027	2028	2029	2030	2031	2032	2033	LT (2050)
GDP growth[a]	0.8	0.4	0.5	1.0	1.6	1.7	1.6	1.6	1.8	1.0
Output gap[b]	−0.4	−1.3	−2.1	−2.3	−1.9	−1.3	−0.7	−0.2	0.5	0.0
Average cumulative output gap[b]	—	−1.3	−1.7	−1.9	−1.9	−1.8	−1.6	−1.4	−1.2	−0.4
Potential GDP growth[a]	—	1.3	1.3	1.3	1.2	1.1	1.0	1.0	1.0	1.0
Inflation[c]	1.2	1.8	2.0	1.8	1.6	1.5	1.5	1.6	1.7	1.8
Unemployment rate[d]	7.7	8.3	8.7	9.3	9.2	8.8	8.2	7.6	6.9	7.0
Government balance[b]	−5.1	−5.5	−5.3	−4.4	−3.7	−3.2	−2.9	−2.8	−3.2	−3.3
Primary government balance[b]	−2.8	−2.9	−2.4	−1.4	−0.6	0.0	0.3	0.3	0.0	0.0
Structural primary balance[b]	−2.6	−2.2	−1.5	−0.3	0.3	0.6	0.6	0.4	−0.3	0.0
Primary fiscal impulse[b]	−1.1	−0.5	−0.8	−1.2	−0.6	−0.3	0.0	0.2	0.7	0.0
of which revenue[b]	−0.8	−0.2	−0.4	−0.6	−0.3	−0.1	0.0	0.1	0.3	0.0
of which expenditure[b]	−0.1	−0.2	−0.4	−0.6	−0.3	−0.1	0.0	0.1	0.3	0.0
Cumulative primary impulse[b]	—	−0.5	−1.3	−2.5	−3.1	−3.3	−3.3	−3.1	−2.4	−2.7
Current sovereign rate[e]	3.4	4.3	4.1	3.4	2.9	2.9	2.8	2.8	2.8	2.8
Weighted sovereign rate[f]	2.0	2.3	2.5	2.6	2.6	2.6	2.6	2.7	2.7	2.8
Public debt[b]	115.6	119.1	121.9	123.0	122.8	122.1	121.2	120.3	119.4	120.0
Interest payments[b]	2.3	2.6	2.9	3.0	3.1	3.1	3.1	3.1	3.1	3.3
Interest payments net of inflation[b]	1.0	0.5	0.4	0.8	1.1	1.3	1.3	1.2	1.1	1.1
Snowball effect[b]	0.0	0.1	−0.1	−0.3	−0.7	−0.8	−0.6	−0.6	−0.9	0.0

[a] annual % change, volume [b] % of GDP [c] GDP deflator, annual % change [d] % of labour force [e] 10-year, annual % [f] annual %

Note: First simulation year: 2026. Deterministic simulation.

Sources: AMECO spring 2026 data, debtwatch v2.0 (github.com/OFCE/dwr).

4.6 Impact of higher interest rates

The variant presented in this section is based on higher interest rates from 2028, namely the rate observed in September 2026 (4.5%). In this case, the long-term interest–growth differential is 1.7 percentage points.

The impact is substantial: the cumulative effort is 4.2% of GDP, i.e. an additional €24 billion at 2026 GDP relative to the reference scenario (Table 3), in which debt stands at 115.6% in 2025. The average output loss is 0.2 point higher than the reference scenario.

Between this scenario (high rates) and the previous one (lower rates), the difference in cumulative adjustment is of the order of €33 billion (at 2026 GDP) and 0.3 point of average output loss.

Table 10: Optimal adjustment, debt at 120% in 2032, higher interest rates (stable from end-2026)

	2025	2026	2027	2028	2029	2030	2031	2032	2033	LT (2050)
GDP growth[a]	0.8	0.4	0.5	0.6	1.5	1.8	1.7	1.6	1.8	1.0
Output gap[b]	−0.4	−1.3	−2.1	−2.7	−2.4	−1.8	−1.1	−0.5	0.3	0.0
Average cumulative output gap[b]	—	−1.3	−1.7	−2.0	−2.1	−2.0	−1.9	−1.7	−1.5	−0.5
Potential GDP growth[a]	—	1.3	1.3	1.3	1.2	1.1	1.0	1.0	1.0	1.0
Inflation[c]	1.2	1.8	2.0	1.8	1.6	1.5	1.5	1.5	1.6	1.8
Unemployment rate[d]	7.7	8.3	8.7	9.6	9.6	9.2	8.6	8.0	7.2	7.0
Government balance[b]	−5.1	−5.5	−5.4	−4.4	−3.7	−3.1	−2.8	−2.8	−3.1	−3.3
Primary government balance[b]	−2.8	−2.9	−2.4	−1.1	−0.1	0.6	1.1	1.3	1.0	1.8
Structural primary balance[b]	−2.6	−2.2	−1.5	0.2	1.0	1.5	1.6	1.5	0.9	1.8
Primary fiscal impulse[b]	−1.1	−0.5	−0.8	−1.6	−0.8	−0.4	−0.1	0.1	0.6	0.0
of which revenue[b]	−0.8	−0.2	−0.4	−0.8	−0.4	−0.2	−0.1	0.0	0.3	0.0
of which expenditure[b]	−0.1	−0.2	−0.4	−0.8	−0.4	−0.2	−0.1	0.0	0.3	0.0
Cumulative primary impulse[b]	—	−0.5	−1.3	−2.9	−3.7	−4.2	−4.3	−4.2	−3.6	−4.6
Current sovereign rate[e]	3.4	4.3	4.5	4.6	4.6	4.5	4.5	4.5	4.5	4.5
Weighted sovereign rate[f]	2.0	2.3	2.5	2.7	3.0	3.1	3.3	3.4	3.5	4.4
Public debt[b]	115.6	119.1	122.0	123.5	123.4	122.6	121.6	120.6	119.7	120.0
Interest payments[b]	2.3	2.6	2.9	3.3	3.5	3.7	3.9	4.0	4.1	5.1
Interest payments net of inflation[b]	1.0	0.5	0.5	1.0	1.6	1.9	2.1	2.2	2.2	2.9
Snowball effect[b]	0.0	0.1	0.0	0.4	−0.2	−0.2	0.1	0.3	0.1	1.8

[a] annual % change, volume [b] % of GDP [c] GDP deflator, annual % change [d] % of labour force [e] 10-year, annual % [f] annual %

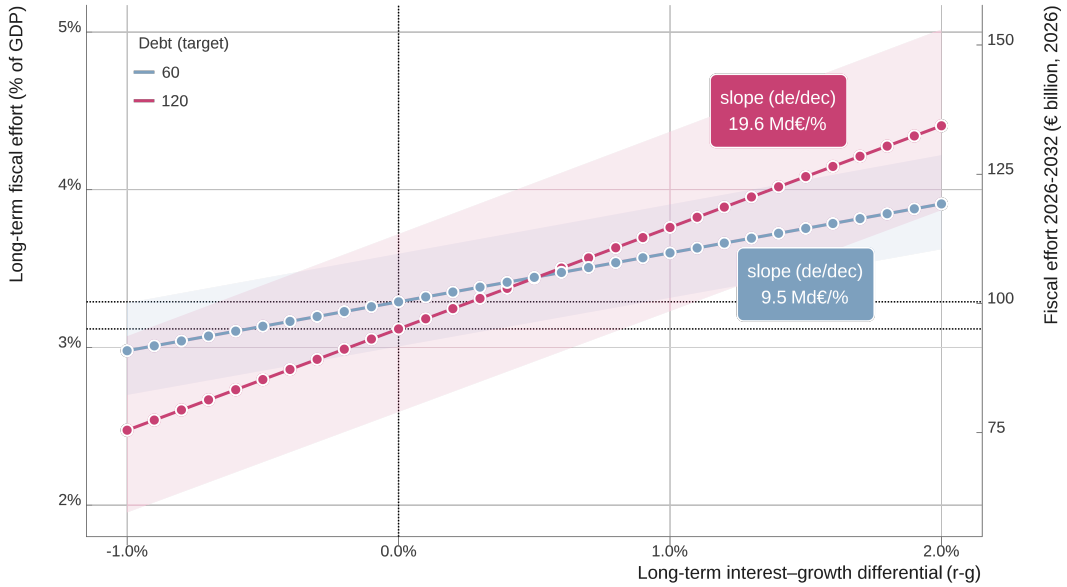
Note: First simulation year: 2026. Deterministic simulation.

Sources: AMECO spring 2026 data, debtwatch v2.0 (github.com/OFCE/dwr).

Figure 4 shows the sensitivity of the effort to the interest–growth differential. The sensitivity amounts to €20 billion (at 2026 GDP) per point of differential for public debt of around 120% of GDP (115.6% at the start of the period, 120% at the end). If debt were hypothetically lower (around 60% of GDP; see Section 5 for details of the assumptions), the cost would be halved, at €9.5 billion (at 2026 GDP). Because the current (or implicit) differential is negative at the start of the simulation period, higher public debt reduces the snowball effect. Further into the simulation, this effect fades and the differential rises under the weight of the current interest rate. For a differential of 0.5% and a 2032 horizon, the two effects offset exactly each other.

Were one to start from a higher implicit differential, or to run the same simulations over a longer horizon, the advantage of a low implicit differential would disappear.

Figure 4: Fiscal effort as a function of the interest–growth differential



Reading: An interest–growth differential of 1.0% requires an effort of €110 billion for debt at 60% of GDP, and of €115 billion for debt at 120% of GDP.

Note: Stochastic simulations, 256 draws. Shaded bands represent the 95% confidence interval.

Sources: Debtwatch v2.0, AMECO, OFCE autumn 2026 forecast.

4.7 Zero or stronger multipliers

Assuming zero multipliers helps to understand the influence of this parameter. The fiscal effort is lower than with non-zero multipliers, at 2.9% of GDP (€87 billion at 2026 GDP).

Table 11: Optimal adjustment, debt at 120% in 2032, zero multipliers

	2025	2026	2027	2028	2029	2030	2031	2032	2033	LT (2050)
GDP growth[a]	0.8	0.8	1.1	1.7	1.5	1.3	1.1	1.1	1.0	1.0
Output gap[b]	−0.4	−0.9	−1.1	−0.7	−0.4	−0.2	−0.1	0.0	0.0	0.0
Average cumulative output gap[b]	—	−0.9	−1.0	−0.9	−0.8	−0.6	−0.6	−0.5	−0.4	−0.1
Potential GDP growth[a]	—	1.3	1.3	1.3	1.2	1.1	1.0	1.0	1.0	1.0
Inflation[c]	1.2	1.8	2.0	1.9	1.7	1.7	1.7	1.8	1.8	1.8
Unemployment rate[d]	7.7	8.1	8.0	8.0	7.7	7.5	7.3	7.2	7.1	7.0
Government balance[b]	−5.1	−5.3	−4.8	−4.3	−3.8	−3.5	−3.4	−3.3	−3.3	−3.3
Primary government balance[b]	−2.8	−2.6	−2.0	−1.2	−0.7	−0.3	0.0	0.1	0.2	0.5

[a] annual % change, volume [b] % of GDP [c] GDP deflator, annual % change [d] % of labour force [e] 10-year, annual % [f] annual %

Note: First simulation year: 2026. Deterministic simulation.

Sources: AMECO spring 2026 data, debtwatch v2.0 (github.com/OFCE/dwr).

	2025	2026	2027	2028	2029	2030	2031	2032	2033	LT (2050)
Structural primary balance[b]	−2.6	−2.2	−1.4	−0.9	−0.5	−0.2	0.0	0.1	0.2	0.5
Primary fiscal impulse[b]	−1.1	−0.5	−0.8	−0.5	−0.4	−0.3	−0.2	−0.1	0.0	0.0
of which revenue[b]	−0.8	−0.2	−0.4	−0.2	−0.2	−0.2	−0.1	−0.1	0.0	0.0
of which expenditure[b]	−0.1	−0.2	−0.4	−0.2	−0.2	−0.2	−0.1	−0.1	0.0	0.0
Cumulative primary impulse[b]	—	−0.5	−1.3	−1.8	−2.2	−2.5	−2.7	−2.9	−2.9	−3.2
Current sovereign rate[e]	3.4	4.3	4.3	3.7	3.4	3.4	3.3	3.3	3.3	3.3
Weighted sovereign rate[f]	2.0	2.3	2.5	2.6	2.7	2.8	2.8	2.9	2.9	3.3
Public debt[b]	115.6	118.4	120.1	120.2	120.2	120.1	120.1	120.1	120.0	120.0
Interest payments[b]	2.3	2.6	2.8	3.0	3.2	3.3	3.3	3.4	3.4	3.8
Interest payments net of inflation[b]	1.0	0.5	0.4	0.8	1.1	1.2	1.2	1.3	1.3	1.6
Snowball effect[b]	0.0	−0.4	−0.7	−1.1	−0.6	−0.3	0.0	0.1	0.1	0.5

[a] annual % change, volume [b] % of GDP [c] GDP deflator, annual % change [d] % of labour force [e] 10-year, annual % [f] annual %

Note: First simulation year: 2026. Deterministic simulation.

Sources: AMECO spring 2026 data, debtwatch v2.0 (github.com/OFCE/dwr).

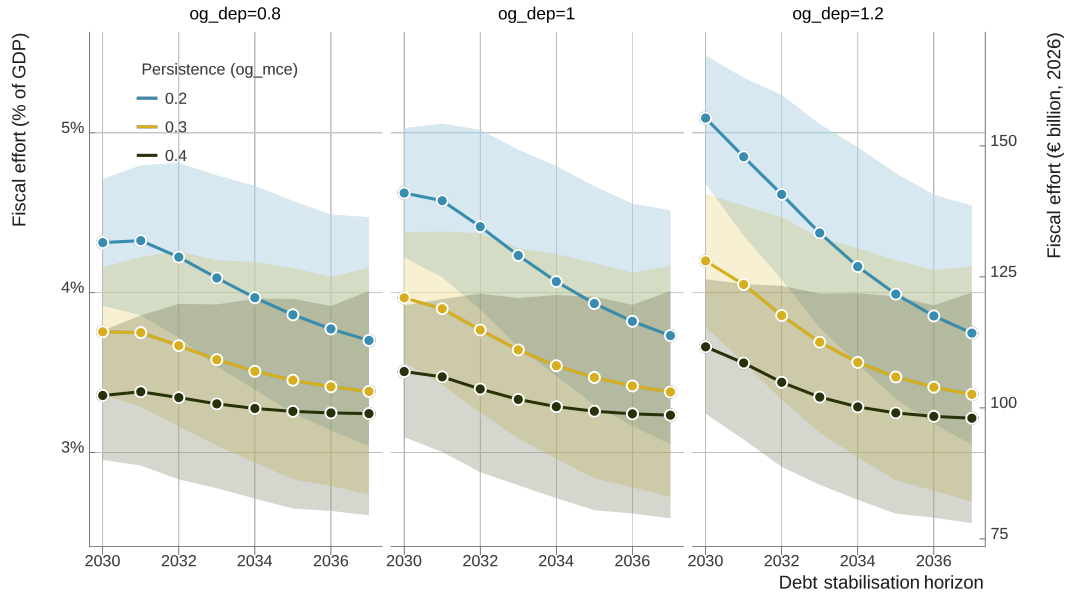
The fiscal multiplier therefore has a substantial effect on the fiscal effort required (defined as the opposite of the sum of fiscal impulses up to the debt stabilisation horizon).

In the model used, the multiplier depends on two main parameters (see Section 6.3): persistence, og_{mce}, and amplitude. Amplitude is a weighted average of the effect of expenditure, og_{dep}, and of revenue, og_{po}, with weight pc_{po}, both channels having the same persistence.

The closer the horizon, the larger the required effort — an intuitive result that is readily obtained in a one-period model with a multiplier, and which was at the heart of the 2011–2012 debate on fiscal multipliers during the fiscal consolidation in Greece (*self-defeating austerity*). Other insights emerge here, however. Not only the amplitude of the multiplier matters, but also its persistence. The simulation shows that, even for low multiplier values, the difference in effort is substantial, of the order of €39 billion at 2026 GDP, for an average adjustment lag of between 1 and 3.4 years (i.e. persistence $og_{mce} \in [0.2; 0.4]$ and amplitude $og_{dep} \in [0.8; 1.2]$).

Another result emerges as well: the more distant the horizon, the smaller and the more certain the effort. The difference in effort is only €16 billion for a 2037 horizon. Thus, when the multiplier is uncertain, committing to a short horizon is riskier than committing to a longer one.

Figure 5: Fiscal effort as a function of the horizon and the multiplier



Reading: The fiscal effort is the opposite of the sum of impulses from 2026 to the horizon at which public debt is stabilised at 120% of GDP.

Note: Stochastic simulations, 256 draws. Shaded bands represent the 95% confidence interval.

Sources: Debtwatch v2.0, AMECO, IFE|OFCE autumn 2026 forecast.

5 What if debt had been at 60%?

Here we rerun all the simulations of Table 2 under a strong assumption: public debt in 2025 is 55.6% of GDP instead of 115.6%, i.e. a downward shift of 60 points of GDP.

Instead of a target of 120% of GDP, we target debt of 60% of GDP. The simulation parameters are unchanged, and the conventions of Table 2 are retained. In particular, the government deficit in 2025 is the same (5.1% of GDP) and interest payments in 2026 are reduced in line with the new debt-to-GDP ratio — and therefore roughly halved. The sovereign rate is also lower, since the interest–growth differential ($r - g$) is assumed to be zero — a rather favourable assumption. Between 2012 and 2022, this differential was negative (see Tip 1) when measured using the market sovereign rate — and it remains negative today when measured using the implicit rate. The entire interest–growth differential is thus attributed to the gap between debt and the Stability and Growth Pact reference value, which is an overstatement but allows this effect to be isolated.

This thought experiment is admittedly artificial, but it is useful for gauging the constraint that the level of debt places on restoring public finances to balance (in terms of the primary deficit) and on a moderately ambitious medium-term debt objective.

Table 12 summarises the results of these simulations. The main finding is that halving public debt reduce slightly the cost of fiscal adjustment. With a zero interest–growth differential, the fiscal cost is 0.1 point of GDP lower than that computed for the observed level of debt (Table 2); for a differential of +0.8 percentage point, the gap is +0.0% of GDP.

Table 12: Simulations: “what if debt had been at 60% in 2025?”

				From 2026 to target year			Long term[a]
[b]		Target	Year	Fiscal effort[b,c]	Output loss[a,d]	Debt[b,e]	Fiscal effort[b]
1	IFE|OFCE forecast 2609	Debt	2032	3.3 (± 0.3)	1.5 (± 0.3)	59 (± 2.8)	2.7 (± 0.5)
2	Higher rates (r-g: +1.7%)	Debt	2032	3.8 (± 0.3)	1.6 (± 0.3)	59 (± 2.9)	3.6 (± 0.5)
3	Higher rates (r-g: +0.5%)	Debt	2032	3.4 (± 0.3)	1.6 (± 0.3)	59 (± 2.8)	3.0 (± 0.5)
4	No impulse in 2027	Debt	2032	3.5 (± 0.3)	1.6 (± 0.3)	59 (± 2.8)	2.7 (± 0.5)
5	Two years earlier	Debt	2030	4.0 (± 0.2)	2.1 (± 0.3)	60 (± 2.2)	2.7 (± 0.5)
6	Five years later	Debt	2037	2.8 (± 0.4)	0.8 (± 0.4)	60 (± 2.9)	2.7 (± 0.5)
7	Optimal impulses from 2026	Debt	2032	3.0 (± 0.3)	1.4 (± 0.3)	60 (± 2.7)	2.7 (± 0.5)
8	Debt stabilisation in 2032[f]	Balance	2032	2.8	1.3 (± 0.3)	65 (± 3.6)	3.0
9	Zero multipliers	Debt	2032	2.9 (± 0.3)	0.5 (± 0.3)	60 (± 2.5)	2.7 (± 0.4)
10	More persistent output gap	Debt	2032	3.7 (± 0.3)	2.0 (± 0.3)	59 (± 2.7)	2.7 (± 0.5)
11	Higher multipliers	Debt	2032	3.2 (± 0.3)	1.9 (± 0.4)	59 (± 2.8)	2.7 (± 0.5)
12	Cycle-dependent multipliers	Debt	2032	3.5 (± 0.3)	1.7 (± 0.4)	59 (± 2.8)	2.7 (± 0.5)

[a] 2050 [b] % of GDP [c] Cumulative impulses from 2026 to the target year (debt or balance target) [d] Average output loss from 2026 to the target year (debt or balance target) [e] Debt as % of GDP in the target year [f] The simulation runs without a fiscal rule; the impulse is therefore not stochastic

Note: 256 draws; the simulation starts in 2026. Headline figures are those of the deterministic simulation; figures in brackets give the 95% confidence interval derived from the stochastic simulations.

Sources: AMECO data May 2026, debtwatch 2.0.

Moreover, the ranking of the variants is close to that observed for debt at 115.6% of GDP in 2025.

The explanation for this counter-intuitive result is fairly simple. The key parameter for identifying the cost of debt, i.e. the constraint it imposes, is neither the level of debt nor interest payments. The essential parameter is the product of the interest–growth differential and debt ($\frac{r-g}{1+g} \times d$, see Tip 1).

In the case of France in 2025, this parameter works in favour of French public finances, since the implicit rate on French public debt is below the nominal growth rate. Over 2026–2032, the weighted sovereign rate is 2.7%, which is close to the nominal potential growth rate expected over the period (2.9% per year), and below the expected growth rate once the fiscal effort is taken into account (2.9% per year) (Table 3). The interest–growth differential remains negative and, all else being equal, more debt generates a negative snowball effect, which contributes (modestly) to reducing debt.

A higher market sovereign rate would erode this advantage more quickly, as Table 10 illustrates. The weighted average sovereign rate is 2.9% per year over 2026–2032, instead of 2.7% per year in the reference scenario. It slowly reaches a level above nominal potential growth and then rises gradually. It is not until 2028 that the interest–growth differential reaches zero and then turns positive. In the very long run it reaches a prohibitive level. The “snowball effect” row quantifies this adverse dynamic. Despite a high level of debt, this effect remains modest relative to the size of the deficit to be closed.

The no-policy-change scenario (Table 13) thus shows that, with a small differential (+0.5% per year), the snowball effect increases over time and would amount to 0.1 point per year in 2032 (i.e. public debt increases under its own weight by 0.1 point per year). Only from 2042 would it exceed half a percentage point per year. A larger differential directly increases this snowball effect. This illustrates why interest payments are not a relevant fiscal indicator: what matters is the interest burden net of the inflation tax or, better still, net of nominal growth (the snowball effect); as long as the interest–growth differential is small or negative, debt is not a burden — and may even facilitate the stabilisation of public finances[8].

Even higher market rates could accelerate this process. A rate of around 8% per year would be needed to push the weighted sovereign rate up to 2.8% in 2026. The conclusion is therefore simple: market rates must remain high for a long period for public debt to become a genuine constraint. This is a serious risk in the very long term, but one without immediate consequences. The same reasoning applies to countries such as Italy or Japan, which have not tipped into crisis because of excessive public debt. By contrast, fiscal policies aimed at reducing debt rapidly have a short-term impact that must on no account be overlooked, at the risk of severe setbacks.

6 Methodology

6.1 Main assumptions

AMECO puts the output gap at −0.6% of potential GDP in 2025, compared with −0.4% in the prev2609 reference scenario. 1. Potential growth is assumed to be 1% per year in the long run. Between 2026 and 2029, potential growth is slightly higher owing to a decline in structural unemployment towards 7% of the labour force.

2. Inflation is anchored at 1.75% in the long run. In 2026, the oil price remains high, returning to “normal” towards the end of 2027.
3. The government balance and public debt are calibrated on the latest notification of French public debt (March 2026) and on the IFE|OFCE autumn 2026 forecast. Other macroeconomic data for 2025 are taken from the May 2026 AMECO database. For 2025, they differ marginally from the May 2026 national accounts.
4. The output gap is calibrated on the IFE|OFCE autumn 2026 forecast. AMECO puts the output gap at −0.6% of potential GDP in 2025, compared with −0.4% in the prev2609 reference scenario.
5. The premium of the sovereign rate over nominal potential growth widens further in 2027 and then slowly declines towards 0.5 percentage point.
6. The fiscal multiplier is 0.85 (0.5 for revenue and 1.2 for expenditure, with impulses split equally between revenue and expenditure). There is an extensive empirical literature on multipliers Morteza Ghomi (2026).
7. The optimisation is subject to the constraint of reaching the debt target (*e.g.* 120%) at a given date (2032 or 2037) and remaining there thereafter. Impulses are computed by minimising an objective function that combines the quadratic loss from the output

[8] See, on this subject, the exchanges between François Geerolf and the Director General of INSEE (Geerolf, 2024).

gap and the variance of impulses. This optimisation incorporates the feedback effects of impulses on activity and hence on output gaps.

8. An alternative optimisation, which consists in stabilising debt regardless of its level in 2032, is described in Section 4.4. The government deficit is 4.9% of GDP in 2031 (5.1% in 2025), then rises to 5.7% in 2040 and 6.4% in 2050, a result that depends on the assumptions made about current and weighted sovereign rates. Note that modelling the weighted rate with an autoregressive process potentially understates its increase over the decade. In the longer term, this deviation widens, taking public debt to 161% of GDP in 2050. These dynamics are undeniably explosive, albeit relatively slow: over 25 years, debt increases by 45 points of GDP, i.e. 1.8 points per year. ### No-policy-change paths {#sec-annexe2}

The no-policy-change path is provided as a benchmark. It consists in running the model dynamics forward from the initial conditions without any fiscal impulse. The properties of the model are very simple: on the one hand, the output gap returns to equilibrium; on the other, public debt evolves through the accumulation of structural deficits and interest payments. Around this path, inflation depends on the output gap (whether through a Phillips-curve mechanism or through adjustment via the external account). The initial condition in 2025 is a small output gap (consistent with the assumption of the French Treasury, DG Trésor). The European Commission's assessment of the cyclical position is somewhat more negative, which would warrant slightly stronger growth in the short term.

The no-policy-change path is built on a zero fiscal impulse, i.e. the tax-to-GDP ratio is constant and public expenditure is constant as a share of potential GDP. This path already amounts to a fiscal adjustment once trend or legislated developments are taken into account, such as social spending, the multi-year military programming law, or exceptional taxes due to expire in 2026 or 2027. The chosen no-policy-change path is therefore by no means spontaneous; rather, it illustrates the dynamics at work.

From this perspective, a stable structural deficit combined with rising interest payments leads to an increase in the government deficit. By 2031, the resulting increase in the government deficit is of the order of one point of GDP, a result that depends on the assumptions made about current and weighted sovereign rates. Note that modelling the weighted rate with an autoregressive process potentially understates its increase over the decade. In the longer term, this deviation widens, taking public debt above 160% of GDP in 2050. These dynamics are undeniably explosive, albeit relatively slow: over 25 years, debt increases by 46 points of GDP, i.e. 1.8 points per year.

Table 13: No-policy-change scenario, no impulse after 2027

	2025	2026	2027	2028	2029	2030	2031	2032	2033	LT (2050)
GDP growth[a]	0.8	0.4	0.5	2.0	1.8	1.5	1.2	1.1	1.1	1.0
Output gap[b]	−0.4	−1.3	−2.1	−1.3	−0.7	−0.4	−0.2	−0.1	0.0	0.0

[a] annual % change, volume [b] % of GDP [c] GDP deflator, annual % change [d] % of labour force [e] 10-year, annual % [f] annual %

Note: First simulation year: 2026. Deterministic simulation.

Sources: AMECO spring 2026 data, debtwatch v2.0 (github.com/OFCE/dwr).

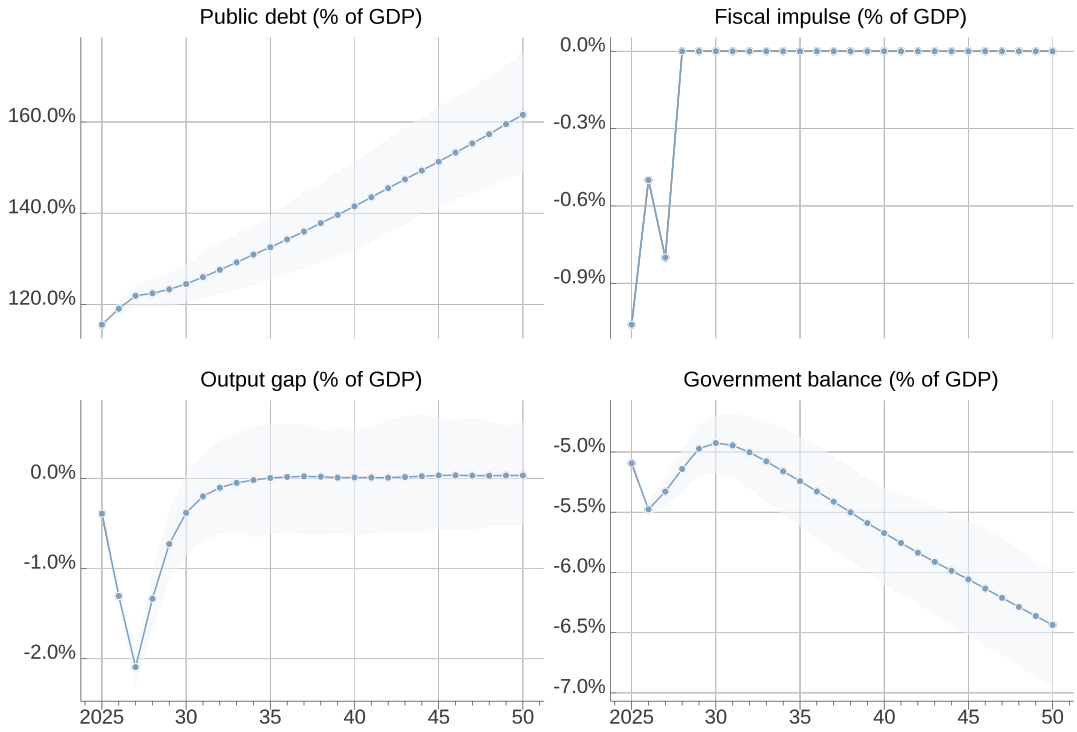
	2025	2026	2027	2028	2029	2030	2031	2032	2033	LT (2050)
Average cumulative output gap[b]	—	−1.3	−1.7	−1.6	−1.4	−1.2	−1.0	−0.9	−0.8	−0.2
Potential GDP growth[a]	—	1.3	1.3	1.3	1.2	1.1	1.0	1.0	1.0	1.0
Inflation[c]	1.2	1.8	2.0	1.8	1.7	1.6	1.7	1.7	1.8	1.8
Unemployment rate[d]	7.7	8.3	8.7	8.7	8.2	7.8	7.5	7.3	7.2	7.0
Government balance[b]	−5.1	−5.5	−5.3	−5.1	−5.0	−4.9	−4.9	−5.0	−5.1	−6.4
Primary government balance[b]	−2.8	−2.9	−2.4	−2.1	−1.8	−1.6	−1.5	−1.5	−1.4	−1.4
Structural primary balance[b]	−2.6	−2.2	−1.5	−1.4	−1.4	−1.4	−1.4	−1.4	−1.4	−1.4
Primary fiscal impulse[b]	−1.1	−0.5	−0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
of which revenue[b]	−0.8	−0.2	−0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
of which expenditure[b]	−0.1	−0.2	−0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cumulative primary impulse[b]	—	−0.5	−1.3	−1.3	−1.3	−1.3	−1.3	−1.3	−1.3	−1.3
Current sovereign rate[e]	3.4	4.3	4.2	3.7	3.4	3.4	3.3	3.3	3.3	3.3
Weighted sovereign rate[f]	2.0	2.3	2.5	2.6	2.7	2.8	2.8	2.9	2.9	3.3
Public debt[b]	115.6	119.1	122.0	122.5	123.4	124.5	125.9	127.4	129.0	161.0
Interest payments[b]	2.3	2.6	2.9	3.1	3.2	3.3	3.4	3.5	3.6	5.0
Interest payments net of inflation[b]	1.0	0.5	0.4	0.8	1.2	1.3	1.3	1.3	1.4	2.1
Snowball effect[b]	0.0	0.1	0.0	−1.5	−0.9	−0.4	−0.1	0.1	0.1	0.7

[a] annual % change, volume [b] % of GDP [c] GDP deflator, annual % change [d] % of labour force [e] 10-year, annual % [f] annual %

Note: First simulation year: 2026. Deterministic simulation.

Sources: AMECO spring 2026 data, debtwatch v2.0 (github.com/OFCE/dwr).

Figure 6: No-policy-change scenario, no impulse after 2027



6.2 Modelling principles

The equation governing the return of the output gap to equilibrium is specified as an error-correction model (ECM). Impulses affect the output gap. The impact multiplier is defined by the parameter og_{dep} or og_{po}. The full (or long-run) multiplier depends on the other ECM parameters, og_{lag} and og_{mce}. The values used in the simulations are: $og_{dep} = 1.2$, $og_{po} = 0.5$, $og_{mce} = 0.4$, $og_{lag} = 0.25$.

$$\Delta og = og_{lag} \times \Delta og_{-1} - og_{mce} \times og + og_{dep} \times ib_{dep} + og_{po} \times ib_{po} + \varepsilon \quad (1)$$

An autocorrelated noise term is added, with $ogn_{\sigma} = 0.015$ and $ogn_{ar} = 0.9$.

$$\Delta\varepsilon = ogn_{ar} \times \varepsilon_{-1} + \epsilon_{og} (\sim \mathcal{N}(0, ogn_{\sigma}^2))$$

The growth rate of the GDP deflator (referred to as inflation; no distinction is made between consumer and other prices) also follows an ECM. The long-run level is determined by the inflation target and a Phillips effect. The parameters are $inf_{lag} = 0$, $inf_{mce} = 0.68$, $inf_{tcho} = 0.15$.

$$\Delta\dot{p} = inf_{lag} \times d\dot{p}_{-1} - inf_{mce} \times (\dot{p} - inf_{star} - inf_{tcho} \times (u - nairu)) + \eta$$

As for the output gap, a random disturbance is added, with $inf_{\sigma} = 0.01$ and $infn_{ar} = 0.0$.

$$\Delta\eta = infn_{ar} \times \eta_{-1} + \epsilon_{inf} (\sim \mathcal{N}(0, inf_{sigma}^2))$$

Debt dynamics follow a standard equation. t_{aut} ensures accounting consistency and captures non-tax revenue.

$$\Delta dette = -s_p + int - t_{aut} \times vpib + one_{off}$$

The market rate is defined as the sum of inflation, potential growth, a risk premium ec and a term that depends on the gap between debt and a reference debt level d^{**}. In the simulations, r_{dette} is set to zero.

$$r_{inst} = g_{pot} + \dot{p} + ec + r_{dette} \times (d - d^{**})$$

The risk premium follows an ECM, with $ec_{mce} = 0.5$.

$$\Delta ec = -ec_{mce} \times (ec_{-1} - ec^{*})$$

The weighted average rate on public debt, or implicit rate, is a weighted average of its own lagged value and of the current rate, approximating a stock of debt tranches of equal maturity issued at different dates, with $r_{mat} = 9$.

$$r_{app} = 1/r_{mat} \times r_{inst,-1} + (1 - 1/r_{mat}) \times r_{app,-1}$$

The linear rule that determines impulses is ($tpo_{s^*} = 0.25$, $tpo_{og} = -0.25$, $tpo_{d^*} = -0.1$):

$$ib_{lr} = tpo_{s^*} \times (spp - s^{*}) + tpo_{d^*} \times (d - d^{*}) + tpo_{og} \times og$$

Unemployment follows an ECM whose target is the NAIRU and which is disturbed by the output gap; the short-run Okun coefficient is given by $tcho_{okun} = 0.5$, and the long-run coefficient is unity (i.e. in the case of a persistent shock to the output gap). $tcho_{mce} = 0.27$.

$$\Delta tcho = -tcho_{okun} \times dog - tcho_{mce} \times (tcho + og - nairu)$$

The NAIRU adjusts gradually to its target, so as to smooth changes, with $nairu_{mce} = 0.2$.

$$\Delta nairu = -nairu_{mce} \times (nairu_{-1} - nairu^{*})$$

An optimal fiscal policy is computed: successive fiscal impulses (say from 2025 to 2050) are determined such that public debt equals the debt target from a given date onwards (in the central case, 2032, i.e. 7 years after 2025). This problem has infinitely many solutions, since it suffices that the primary deficit be equal to the debt stabilizing deficit (0 if $r - g = 0$) from 2032 and that debt in 2032 equal the target. Among all these solutions, we select the one that minimises the quadratic deviation of activity or of impulses. Formally, the loss function is:

$$\mathcal{L} = \lambda_{og} \sum_{t=2025}^{\infty} \beta^t og_t^2 + \lambda_{ib} \sum_{t=2025}^{\infty} \beta^t ib_t^2 + \lambda_{max} \max_{t \geq 2025} (-og_t) \tag{2}$$

λ_{og}, λ_{ib} and λ_{max} assign relative weights to the three terms of this expression. β is a discount factor. This loss function allows the use of standard numerical minimisation algorithms (in this case COBYLA, as implemented in Johnson (2008)).

The first term can be interpreted as minimising the “variance” of the output gap, i.e. seeking paths that deviate as little as possible from 0 and along which the gap is as constant as possible. The impact of the restrictive policy is thus minimised. The ib_t^2 term is its counterpart for the instruments. It represents a world in which the budget is difficult to change. Such inertia, while not rational, is realistic. Combining the two loss functions brings both considerations together. The discount factor amounts to preferring distant rather than immediate consequences and provides a simple justification for *backloading* over *frontloading*.

Finally, the third term accounts for the trough in the output gap. As will be seen below, this loss function produces paths in which the negative part of og_t is as limited as possible. By

construction, this term of the loss function induces fairly strong *backloading*. To facilitate numerical computation, a continuous approximation of the max function is used[9].

$$\mathcal{L} = max(-og_t) \tag{3}$$

The problem solved is then given by Equation 4, where $\mathcal{S}$ is the solution of the dynamic system that computes the debt path from the impulses:

$$\min_{ib_t} \mathcal{L} \quad \text{subject to: for} \quad t \geq T \ , \quad d_t = d^* \quad \text{with} \quad d_t = \mathcal{S}(ib_t) \tag{4}$$

6.3 Fiscal multipliers

The modelling and parameters presented in Section 6.2 make it possible to compute (simulate) fiscal multipliers in simple cases. The first shock considered is a temporary increase in public spending or a temporary tax cut: an impulse of 1 point of GDP is applied in 2026, followed by an impulse of −1 point of GDP in 2027. Two cases are considered, depending on whether or not a linear fiscal rule is included.

The simulation results are shown in Figure 7. The multiplier as modelled is "super-neutral": not only does a temporary public spending shock have no impact on the output gap, it also has no impact on the cumulative output gap, irrespective of whether the fiscal rule is activated.

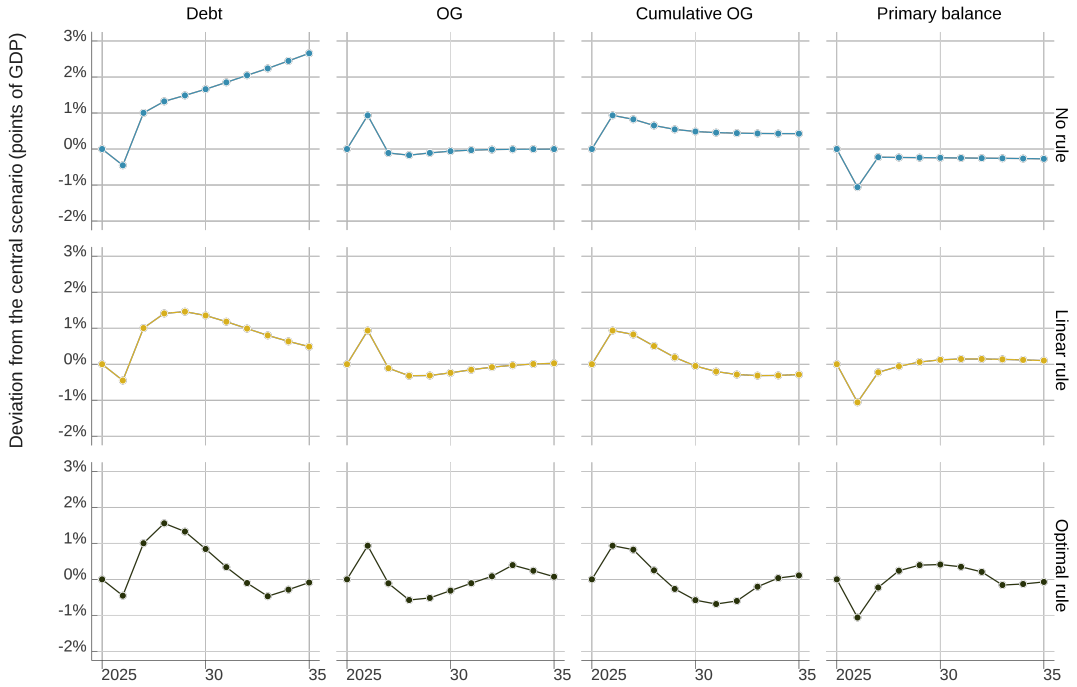
When the fiscal rule is activated, public debt returns (slowly) to its initial level, and the government balance remains positive until debt has returned to its initial value.

When the rule is not activated, the government balance returns to its initial value plus the change in interest payments, and the higher debt persists. One point of public spending raises debt by roughly one point. As the interest–growth differential is small in the central scenario, the accumulated snowball effects are not sufficient to increase debt and, above all, do not offset the slight temporary rise in inflation induced by the additional public spending.

The short-run multiplier is low, below 1, which is probably very conservative. The output gap does not persist because the shock is temporary, being the superposition of a positive public spending shock and its subsequent withdrawal.

[9] using $max(x_1, x_2) \approx (x_1^\sigma + x_2^\sigma)^{1/\sigma}$ with σ sufficiently large (8 in practice).

Figure 7: Fiscal multiplier, response of selected variables



Note: Variables are expressed as deviations from the reference scenario, in points of GDP. OG is the output gap, debt is public debt and the primary balance is the primary government balance. Under the optimal rule, debt must have returned to its initial level (120% of GDP) by 2032.

Source: debtwatch v2.0.

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